Set No. \_\_\_\_\_

Specifications, Proposal, and Contract Documents for:

# Virtual Service Center CIP NO. GGC0440000 Job No. 49-22-PW



City of Kirkland Department of Public Works 123 Fifth Avenue Kirkland, Washington 98033

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# CITY OF KIRKLAND DEPARTMENT OF PUBLIC WORKS

# KIRKLAND VITURAL SERVICE CENTER CIP NO. GGC0440000 JOB NO. 49-22-PW

Approved for Construction:

Rod Steitzer, P.E. Capital Projects Manager

# CITY OF KIRKLAND DEPARTMENT OF PUBLIC WORKS

## KIRKLAND VIRTUAL SERVICE CENTER CIP NO. GGC0440000 JOB NO. 49-22-PW

## Certificate of Engineer:

The technical portions of the Special Provisions and Plans contained herein have been prepared by or under the direction of the undersigned, whose seal as Professional Architect licensed to practice in the State of Washington, is affixed below.



Jeff Wandasiewicz, AIA Principal, ARC Architects

# **INVITATION TO BID**

Notice is hereby given that the City of Kirkland will receive sealed bids in the office of the Purchasing Agent, City Hall, 123 Fifth Avenue, Kirkland, Washington, at 10:00 A.M., local time on October 11<sup>th</sup>, 2022, for the project hereinafter referred to as:

#### Virtual Service Center CIP NO. GGC0440000 PROJECT JOB NO. 49-22-PW

At said time all bids will be opened and publicly read aloud. Each bid shall be accompanied by a bid proposal deposit in the form of a cashier's check or a bond issued on a form acceptable to your surety made payable to the City of Kirkland for a sum of not less than five percent (5%) of the total bid amount. No bid shall be considered unless accompanied by such bid proposal deposit. Incomplete proposals and proposals received after the time stated above will not be considered. Faxed or emailed responses are not acceptable.

The work to be performed under these specifications consists of furnishing all labor, tools, materials, and equipment necessary for construction of the **Virtual Service Center** and all related work, all in accordance with the Contract Plans, these Contract Special Provisions, and the Standard Specifications. Specific work includes, but is not limited to, construction of an approximately 1,700 SF addition to the north side of City Hall. The proposed station will be a pre-engineered steel framed structure with multiple bi-fold hanger doors serving a multi-use space. Site work will include storm water systems, utilities, landscaping, amenities and paving. The project has bid alternates as outlined in section 012300 Alternates.and all related work. The estimated cost for this project is in the range of \$2,250,000 to \$2,400,000 excluding sales tax. Deductive Alternate #1 approximately (\$415,000) excluding sales tax; Additive Alternate #2 approximately \$16,000 excluding sales tax.

<u>The City will not sell bid packages</u>. Plans, specifications, and addenda may be viewed and obtained online at *www.bxwa.com*. Click on: "Posted Projects"; "Public Works", "City of Kirkland". The Bidders List is maintained by the Builder's Exchange of Washington, Inc. Registration for the bidder's list may be made online, by phoning (425) 258-1303, or at Builder's Exchange of Washington located at 2607 Wetmore Ave, Everett, WA.

The City of Kirkland in accordance with Title VI of the Civil Rights Act of 1964, 78 Stat. 252, 42 USC 2000d to 2000d-4 and Title 49, Code of Federal Regulations, Department of Transportation, Subtitle A, Office of the Secretary, Part 21 Nondiscrimination in Federally-Assisted Programs of the Department of Transportation issued pursuant to such Act, hereby notifies all bidders that it will affirmatively ensure that in any contract entered into pursuant to this invitation, disadvantaged business enterprises as defined in 49 CFR Part 26 will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, national origin, or sex in consideration for an award.

Questions regarding this project shall be submitted in writing to Hannah Evans via email at <u>hevans@kirklandwa.gov</u>. Bidders shall submit questions no later than 5:00 P.M. on September 28<sup>th</sup>, 2022. Answers to questions received by this deadline shall be posted in an addendum on September 30<sup>th</sup>, 2022.

The City reserves the right to reject any and all bids, and to waive any informalities in the bidding, and to make the award to the lowest, responsive, responsible bidder as best serves the interests of the City.

No bids may be withdrawn within forty-five (45) after the actual date of the bid opening.

#### Dated this 15<sup>th</sup> day of September, 2022

Jay Gewin

Purchasing Agent 425-587-3123 City of Kirkland

Published: Seattle Times – September 15, 2022 and September 30, 2022

END OF SECTION

#### **BIDDER'S CHECKLIST FORM**

The omission or deletion of any bid item may be considered non-responsive and may be cause for the rejection of the bid.

- 1. Has a bid bond or certified check been enclosed with your bid? Is the amount of the bid guaranty at least 5 percent of the total amount of the bid?
- 2. Has the proposal been properly completed and signed? Do written amounts on the proposal agree with the amounts shown in the figures?
- 3. Have you bid on all items including, if applicable, all alternates?
- 4. Have you acknowledged all addenda, if any, in the Bid Form (Section 00 41 00)
- 5. Do not submit any of the forms still attached to the Project Manual. Remove or copy the forms and submit in the sealed envelope as directed.
- 6. Are you and all your subcontractors familiar with the schedule of value requirements including but not limited to the required placement of 5% of the bid for work between substantial completion and final completion?
- 7. Have you reviewed the Bidder's Qualifications and Bidder Responsibility Criteria forms and understand these obligations if you are selected as the apparent low bidder?
- 8. The following items must be completed and included with the Bid Form within the sealed envelope:
  - A. Bid Form (00 41 00) The bid price must be shown in the space provided. Show price in both words and figures. The bid form must be completed in full, signed, and dated.
  - **B. Bidder's Qualifications Form (00 10 20):** This form must be filled in and signed. The owner reserves the right to check all statements and to judge the adequacy of the bidder's qualifications.
  - C. Bid Bond Security Form (00 43 30): A surety issued bid bond must be executed by the bidder and its surety company. The amount of the bid bond shall be not less than five (5%) of the total bid and may be shown in dollars or on a percentage basis. A cashier's check payable to the City of Kirkland and issued for an amount not less than 5% of the total bid may be submitted in lieu of a bid bond.
  - D. Non-Collusion, Bidder Responsibility, and Minimum Wage Certification Form (00 15 40): This form must be filled in, signed, and notarized.
  - E. Subcontractor Listing (00 44 00): This form must be filled in and signed if the estimated bid amount exceeds \$1,000,000 as required by RCW 39.30.060. (One hour after published bid submittal time for HVAC and electrical subcontractors; 48 hours after published bid submittal time for structural steel installation and rebar installation subcontractors.)
- 9. The following forms are to be executed after the contract is awarded:
  - A. AGREEMENT FORM (00 52 20): This agreement to be executed by the successful bidder.
  - **B. PERFORMANCE BOND (00 61 40):** One hundred percent of the Contract Price to be executed by the successful bidder and his surety company. The surety on such bonds shall be a duly authorized surety company satisfactory of the Owner.
  - C. **LABOR MATERIALS AND TAXES BOND (PAYMENT BOND) (00 61 41):** One hundred percent of the Contract Price to be executed by the successful bidder and his surety company. The surety on such bonds shall be a duly authorized surety company satisfactory of the

Owner.

- D. RETAINAGE INVESTMENT OPTION (00 45 70): This agreement to be executed by the successful bidder.
- J. CERTIFICATES OF INSURANCE (00 60 00): To be executed by the successful bidder and by an acceptable insurance company. The City of Kirkland must be named as an additional insured.
- K. CONTRACTOR'S CERTIFICATION (00 83 00): Concerning Labor Standards and Prevailing Wage Requirements. Submit Statement of Intent to Pay Prevailing Wages. (Form F 700-029-000, available at Offices of Washington State Department of Labor and Industries).
- 10. Special Note: Prior to commencing work, the Contractor and all subcontractors must have applied and paid for a City of Kirkland Business License.

#### **END OF SECTION**

### BIDDER'S QUALIFICATIONS

Each bidder submitting a proposal for this Project shall submit, as part of its bid, the following information:

1.	Name of Bidder:			
2.	Business Address:			
3.	Telephone Number and Area Code:			
4.	IRS Federal Employer's Identification Number:	-		
5.	Current State Unified Business Identification Number			
6.	Number of years engaged in the contraction business under the present firm Name:			
7.	Total value of contracts in force:			
8.	To qualify for bidding for this project the General Contractor as the legal entity bidding the project shall have constructed one (1) municipal project with a total value of \$2 million dollars or greater, and within the past (5) five years <or> demonstrated body of work of similar complexity and similar construction cost.</or>			
<b>9.</b> proj	List below project(s) which meet Items A and/or B as outlined above. (Attach iect pages if required)	additional		
	Project Name: Project Value: Reference Name, phone number and email:			
	Project Name:			
	Project Value: Reference Name, phone number and email:			
	Project Name: Project Value: Reference Name, phone number and email:			
	Project Name: Project Value:			
	Project Name: Project Value: Reference Name, phone number and email:			
	Project Name: Project Value: Reference Name, phone number and email:			
	Project Name:			

	Project Value: Reference Name, phone number and email:
	Project Name: Project Value: Reference Name, phone number and email:
10.	Recent significant projects completed by Bidder including owner's name, Approximate cost, and completion date:
	1
	2
	3
	4
11.	Washington State Contractor Registration Number:
12.	Bonding Reference:
13.	Bonding Capacity:
Bidde	er:
Ву: _	Title: Date:
	This Form Must Be Submitted with the Bid.
	END OF SECTION

#### BIDDER'S RESPONSIBILITY CRITERIA

#### Low Responsible Bidder

It is the intent of the Owner to award a contract to the low responsible bidder. The Bidder must meet the minimum project bidding requirements outlined in Section 00 10 20 Bidder's Qualifications Section, Item 8.

In addition, the Owner shall consider an overall accounting of the items listed below which the bidder must meet. The bidder must submit the Non-Collusion, Bidder Responsibility, and Minimum Wage Certification Form (00 15 40) demonstrating that they meet the following criteria:

#### **Bid Procedures and Conditions**

#### Qualifications of Bidder

A. Bidders must meet the minimum qualifications of RCW 39.04.350, as amended:

"Before award of a public works contract, a bidder must meet the following responsibility criteria to be considered a responsible bidder and qualified to be awarded a public works project. The bidder must:

- (a) At the time of bid submittal, have a certificate of registration in compliance with chapter 18.27 RCW;
- (b) Have a current State unified business identifier number;
- (c) If applicable, have industrial insurance coverage for the bidder's employees working in Washington as required in Title 51 RCW; an employment security department number as required in Title 50 RCW; and a State excise tax registration number as required in Title 82 RCW; and
- (d) Not be disqualified from bidding on any public works contract under RCW 39.06.010 or 39.12.065(3).
- (e) If bidding on a public works project subject to the apprenticeship utilization requirements in RCW 39.04.320, not have been found out of compliance by the Washington state apprenticeship and training council for working apprentices out of ratio, without appropriate supervision, or outside their approved work processes as outlined in their standards of apprenticeship under chapter 49.04 RCW for the one-year period immediately preceding the date of the bid solicitation; and
- (f) Have received training on the requirements related to public works and prevailing wage under this chapter and chapter 39.12 RCW. The bidder must designate a person or persons to be trained on these requirements. The training must be provided by the department of labor and industries or by a training provider whose curriculum is approved by the department. The department, in consultation with the prevailing wage advisory committee, must determine the length of the training. Bidders that have completed three or more public works projects and have had a valid business license in Washington for three or more years are exempt from this subsection. The department of labor and industries must keep records of entities that have satisfied the training requirement or are exempt and make the records available on its web site. Responsible parties may rely on the records made available by the department regarding satisfaction of the training requirement or exemption; and
- (f) Until December 31, 2013, not have violated RCW 39.04.370 more than one time as determined by the Department Of Labor And Industries.
- B. In addition to the bidder responsibility criteria above, the bidder must also meet the following relevant supplemental bidder responsibility criteria applicable to the project:
  - a. The Bidder shall not currently be debarred or suspended by the Federal government. The Bidder shall not be listed as a current debarred or suspended bidder on the U.S.

General Services Administration's "Excluded Parties List System" website. Bidder debarment or suspension status may be verified through this website: http://www.sam.gov/. The Owner may also use other sources of information that may be available to otherwise determine whether the Bidder is in compliance with these supplemental criteria.

- b. The Bidder shall not owe delinquent taxes to the Washington State Department of Revenue, without a payment plan approved by the Washington State Department of Revenue. The Bidder shall not be listed on the Washington State Department of Revenue's "Delinquent Taxpayer List", which may be verified at the following website: http://dor.wa.gov/content/fileandpataxes/latefiling/dtlwest.aspx. The Owner may also use other sources of information that may be available to otherwise determine whether the Bidder is in compliance with these supplemental criteria.
- c. The Bidder shall not have been convicted of a crime involving bidding on a public works contract within five (5) years prior to the bid submittal deadline. The Bidder shall provide a duly executed sworn statement (on the included form, or on a form otherwise determined to be acceptable by the Owner), that the Bidder has not been convicted of a crime involving bidding on a public works contract. The Owner may also use independent sources of information that may be available to otherwise determine whether the Bidder is in compliance with these supplemental.
- d. The Bidder's standard subcontract form shall include the subcontractor responsibility language required by RCW 39.06.020, and the Bidder shall have an established written procedure which the Bidder uses to validate the responsibility of each of its subcontractors. The Bidder's subcontract form shall also include a requirement that each of its subcontractors shall have and document a similar procedure to determine whether the sub-tier subcontractors with whom it contracts are also "responsible" contractors as defined per RCW 39.06.020. The Owner may also use independent sources of information that may be available to otherwise determine whether the Bidder is in compliance with these supplemental criteria.
- e. The Bidder shall not have a record of prevailing wage complaints filed against the Bidder within five (5) years prior to the bid submittal date that demonstrates a pattern of failing to pay workers prevailing wages, unless there are extenuating circumstances that are acceptable to the Owner. The Owner may also use independent sources of information that may be available to otherwise determine whether the Bidder is in compliance with these supplemental criteria.
- f. The Bidder shall not have had any public works contract terminated for cause by a government agency during the five (5) year period immediately preceding the bid submittal deadline for the project, unless there are extenuating circumstances acceptable to the Owner. The Bidder shall provide a duly executed sworn statement (on the included form, or in a form otherwise determined to be acceptable by the Owner), that the Bidder has not had any public works contract terminated for cause by a government agency during the five (5) year period immediately preceding the bid submittal deadline for the project. The Owner may also use independent sources of information that may be available to otherwise determine whether the Bidder is in compliance with these supplemental criteria.
- g. The Bidder shall not have a record of excessive claims filed against the retainage or payment bonds for public works projects within three (3) years of the bid submittal date, that demonstrate a lack of effective management by the Bidder of making timely and appropriate payments to its subcontractors, suppliers, and workers, unless there are extenuating circumstances which are acceptable to the Owner. The Owner may also use

independent sources of information that may be available to otherwise determine whether the Bidder is in compliance with these supplemental criteria.

- h. Within two (2) years prior to the bid submittal date the Bidder shall not have had a project construction site shut down due to a safety violation (i.e., WISHA / OSHA written citations) from the Washington State Department Labor & Industries or analogous agency with jurisdiction in the location the work was performed, regardless of whether such willful and/or serious safety violations have been abated or not. The Bidder shall maintain compliance with all safety and health requirements (i.e., WISHA / OSHA) from the Washington State Department Labor & Industries (or analogous agency with jurisdiction in the location the work is performed). The Owner may verify such information provided with the Washington State Department Labor & Industries or analogous agency with jurisdiction in the location the work was performed. The Owner may also use other sources of information that may be available to otherwise determine whether the Bidder is in compliance with these supplemental criteria.
- C. If a Bidder fails to supply the required bidder responsibility documentation, information, or materials, then Bidder may be determined by the Owner to be non-responsive, and the bid may be rejected on this basis. If the Owner determines the apparent successful bidder does not meet the bidder responsibility criteria above and is therefore not a responsible bidder, the Owner shall notify the bidder in writing with the reasons for its determination. If the bidder disagrees with this determination, it may appeal the determination within twenty-four (24) hours of receipt of the Owner's determination by presenting additional written information to the Owner. The Owner will consider the additional information before issuing its final determination. If the Owner's final determination affirms that the bidder is not responsible, the Owner will not execute a contract with any other bidder until two (2) business days after the bidder determined to be not responsible has received the final determination. Please note that the above-described information, materials, and documentation requested by the Owner for purposes of determining Bidder responsibility is not necessarily exclusive, and the Owner expressly reserves the right to request additional information, materials, and documentation as may be determined to be necessary or desirable by the Owner in order to evaluate and determine Bidder's compliance with the above-described bidder responsibility criteria. At all times, the Owner may also use other sources of information that may be available to otherwise determine whether the Bidder is in compliance with the forgoing bidder responsibility criteria.

#### END OF SECTION

#### NON-COLLUSION, BIDDER RESPONSIBILITY, AND MINIMUM WAGE CERTIFICATION FORM

In accordance with the Contract Documents and Instructions to Bidder, the Bidder must provide the following sworn statement and certification:

Name of Bidder:

Address: \_\_\_\_\_

Telephone No.\_\_\_\_\_

E-Mail: \_\_\_\_\_

I, \_\_\_\_\_\_, the undersigned declarant, as the duly authorized representative on behalf of \_\_\_\_\_\_\_ (herein the "Bidder") hereby make this declaration on the basis of facts within the scope of my first hand knowledge and authority to which I am competent to testify:

- 1. I hereby certify, swear and affirm under penalty of perjury, that the Bidder, as of the date of this declaration (below) meets all of the minimum bidder responsibility qualifications of RCW 39.04.250, as amended.
- 2. I hereby certify, swear and affirm under penalty of perjury, that the Bidder, as of the date of this declaration (below) meets all of the minimum project bidding requirements outlined in the Bidder's Qualifications Form (Section 00 10 20) Item 8, if any.
- 3. I hereby certify, swear and affirm under penalty of perjury, that the Bidder, as of the date of this declaration (below) meets all of the supplemental bidder responsibility criteria as set forth in the Bidder's Responsibility Criteria (Section 00 15 30), Section B.
- 4. I hereby certify, swear and affirm under penalty of perjury, that the undersigned is the person that submitted the bid herewith, that such bid is genuine and not a sham or collusive, or made in the interest of any person not therein named; and he/she further says that said Bidder has not directly or indirectly induced or solicited any Bidder on the above work or supplies to put in a sham bid, or any other person or corporation to refrain from bidding; and that said Bidder has not in any manner sought by collusion to secure to himself or to any other person an advantage over any other Bidder or Bidders.
- 5. I hereby certify, swear and affirm under penalty of perjury, that in connection with the performance of the work of this Project, if awarded, I will pay each classification of laborer, workman, or mechanic employed in the performance of such work; not less than the prevailing rate of wage or not less than the minimum rate of wages as specified in the Contract Documents.

KIRKLAND CITY HALL - VIRTUAL SERVICE CENTER CONTRACT DOCUMENTS

Signed under penalty of perjury under the 20, at	e laws of the State of Washington this day of, Washington.
Name of Bidder/Contractor:	
Signature:	
Print Name:	
Title:	
STATE OF WASHINGTON	
COUNTY OF Ss.	
I certify that I know or have satisfactory evider appeared before me, and said person acknow that he/she was duly authorized execute the in of	nce that is the person who /ledged that he/she signed this instrument, on oath stated nstrument and acknowledged it as the to be the free and voluntary act of such
party for the uses and purposes herein mentio	oned.
DATED this day of	, 20
(SEAL)	
	Notary Public
	Print name:
	Residing at
	My commission expires

#### NOTICE TO ALL BIDDERS

To report bid rigging activities call: 1-800-424-9071

The U.S. Department of Transportation (USDOT) operates the above toll-free "hotline" Monday through Friday, 8:00 a.m. to 5:00 p.m., ET. Anyone with knowledge of possible bid rigging, bidder collusion, or other fraudulent activities should use the "hotline" to report such activities.

The "hotline" is part of USDOT's continuing effort to identify and investigate highway construction contract fraud and abuse and is operated under the direction of the USDOT Inspector General. All information will be treated confidentially and caller anonymity will be respected.

#### END OF SECTION

#### INSTRUCTION TO BIDDERS

#### A. EXAMINATION OF SITE AND CONSTRUCTION DOCUMENTS

- 1. Before submitting a proposal, the bidder shall:
  - a. Carefully examine the drawings and specifications,
  - b. Visit the site of the work,
  - c. Fully inform itself of existing conditions and limitation, relating to the construction of the project and the employment of labor thereon. Failure to do so will not relieve a successful bidder of its obligation to furnish all material and labor necessary to carry out the provisions of this contract.
  - d. Rely entirely upon its own judgment in making its proposal,
  - e. Include in its bid a sum sufficient to cover all items required by the contract including all labor, materials, services, and incidentals necessary to complete this project.

#### B. ADDENDA AND INTERPRETATIONS

Bidders shall promptly notify the City of Kirkland of any ambiguity, inconsistency or error which they may discover upon examination of the Project Manual, Drawings, and any Addenda or of the site and local conditions.

Bidders requiring clarification or interpretation of the Project Manual, Drawings, and/or any Addenda shall provide a written request to the City of Kirkland no later than 5:00 P.M. on September 28, 2022.

Any and all such interpretations and any supplemental instructions will be in the form of written addenda to the Project Manual and Drawings. Any interpretation, correction or change of the Project Manual, Drawings, and any Addenda made in any other manner will not be binding, and Bidders shall not rely upon such interpretations, corrections, and changes.

Failure of any bidder to receive Addenda shall not relieve any such bidder from any obligation under its bid as submitted. All Addenda so issued shall become part of the Contract Documents. Bidders shall acknowledge receipt of all Addenda, if any, on the Bid Form. Failure to do so may result in the bid being declared non-responsive.

No oral statements by Owner, Engineer, Architect, or other representative of the Owner shall, in any way, modify the Project Manual, Drawings, and any Addenda whether made before or after letting the Contract.

Questions regarding this project shall be submitted in writing to Hannah Evans (HEvans@kirklandwa.gov) via e-mail with the subject line of "KVSC: Bid Question". Questions received via phone or any other method other than e-mail with the appropriate subject line will not be accepted. Bidders shall submit questions no later than 5:00 P.M. on September 28, 2022.

#### C. PRODUCT SUBSTITUTIONS:

- 1. Substitutions: Bids must be based upon the specific articles and materials named in the Project Manual, Drawings, and any Addenda. Substitution may be made only under the following conditions:
  - a. Prior to Bid Opening: No later than 5:00 P.M. on September 28, 2022, prime bidders may submit to the City of Kirkland written requests for approval of articles or materials, accompanied by complete descriptions, technical data and samples. Approval or rejection of the proposed substitutions will be made by addenda issued to all bidders. Submit material/product requests as specified in Division 01 to Hannah Evans (HEvans@kirklandwa.gov) via e-mail with the subject line of "KVSC: Substitution

Request". Requests received via phone or any other method other than e-mail with the appropriate subject line will not be accepted.

- b. After Award of Contract: Approval of substitution will be made only in exceptional cases where the Contractor submits satisfactory evidence to the City of Kirkland that through no fault of its own, specified or otherwise approved items cannot be obtained in time to avoid delay to the work. Approval in such cases shall conform to the other requirements above.
- D. BID FORM (Section 00 41 00)

Bids must be submitted on and according to the Bid Form. Fill in all spaces. Bids shall not contain any recapitulation of work done. State numbers in writing and in figures. Completed form must be without interlineation, alteration or erasure. Signatures shall be in longhand. The bid price for the work as specified in the Project Manual, Drawings, any Addenda and any Alternates must be the total price to cover all items required by the contract including all labor, materials, services, taxes, permits, and incidentals necessary to complete this project.

E. POWER OF ATTORNEY

Attorneys-in-fact who sign bid bonds or contract bonds must file with each bond a certified and effectively dated copy of the power of attorney.

F. ORAL AND TELEGRAPHIC BIDS

Oral and telephonic modifications of bids cannot be considered.

G. SUBMISSION OF BID

Enclose bid and bid bond in opaque sealed envelope, as indicated in the Invitation to Bid; Deliver in person or by post. Bidder is responsible for delivery of bid at or before the time set for bid opening. The Owner may consider informal any bid not prepared and submitted in accordance with the provisions hereof and may waive any informalities or reject any and all bids. The Owner reserves the right to reject any bid if the evidence submitted by, or investigation of, such bidder fails to satisfy the Owner that such bidder is properly qualified to carry out the obligation of the contract and to complete the work contemplated therein. Conditional bids will not be accepted. No proposal or bid may be changed after the time set for receiving bids.

H. BID BOND

Each bidder agrees to furnish a certified check, bank cashier's check, or bid bond in the amount equal to five percent (5%) of the total base bid plus addictive alternative bids (if applicable) within its bid proposal. Failure to provide this bid security when required shall render the bid non-responsive. The right is reserved to hold the bid security of the three lowest bidders until the award of the contract or for a period of (60) sixty days, whichever is the shorter time. Bids of all unsuccessful bidders will be returned as soon as feasible after the bid opening.

I. WITHDRAWAL OF BIDS

Any bidder may withdraw its bid either personally or by written request at any time prior to the hour set for the bid opening. No bid may be withdrawn or modified after the time set for opening unless and until the award of the contract is delayed for period exceeding (60) sixty days.

J. TIME OF COMPLETION AND LIQUIDATED DAMAGES

The Owner can issue Notice to Proceed at any time after contract execution. Bidder must agree to commence work within 20 calendar days of receipt of the Notice to Proceed; and Substantially Complete the Work within 195 consecutive calendar days of the date of the Notice to Proceed, and to Finally Complete the Work within 30 consecutive calendar days thereafter. Bidder must agree to pay as liquidated damages the sum of \$1975 for each consecutive calendar day that Substantial Completion is delayed and the sum of \$535 thereafter for each consecutive calendar day that Final Completion is delayed. Liquidated damages have been established based on the estimated cost that will be incurred by City of Kirkland in the event the Contractor fails to complete the Work in the time stipulated.

#### K. SECURITY FOR FAITHFUL PERFORMANCE

Simultaneously with its delivery of the executed contract, the Contractor shall furnish a surety bond or bonds as security for faithful performance of the Contract and for payment of all persons performing labor under the Contract and furnishing material or services in connection with the Contract as described in the Contract Documents. The surety on such bond or bonds shall be a duly authorized surety company satisfactory to the Owner, registered in the State of Washington, Insurance Commissioner's Office. List Bonding Agent and address of same.

#### L. INSURANCE

The Contractor shall obtain such construction insurance as is set forth in Section 00 60 00 "Bonds and Certificates."

#### M. QUALIFICATIONS OF BIDDERS

Bidder must meet all criteria set forth in the Bidder's Qualifications (Section 00 10 20), Item 8 and the Bidder's responsibility Criteria in Section 00 15 30). The Owner may make such investigations as necessary to determine the ability of a Bidder to perform the work, and the Bidder shall furnish all such information and data as may be requested prior to bidding. The Owner reserves the right to reject any bid if the evidence submitted by, or if investigation of, such Bidder fails to satisfy the Owner that such Bidder is properly qualified to perform the obligations of the Contract and to complete the work contemplated therein. Conditional Bids will not be accepted.

#### N. LAWS AND REGULATIONS

The bidder's attention is directed to the fact that all applicable State laws, municipal ordinances, and rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the Contract throughout, and they shall be deemed to be included in the Contract the same as though written out in full therein. Bidders are advised that if successful, they will be required to meet all applicable federal, state, and local laws pertaining to permits, licenses, fees and taxes, as well as laws pertaining to employment and wages. Bidders are responsible for determining the extent and applicability of such laws.

#### O. AWARD OF THE CONTRACT/REJECTION OF BIDS

- 1. The Contract will be awarded to the responsible bidder submitting the lowest proposal complying with the condition of the Invitation for Bid and these contract documents provided the bid is reasonable and in the best interest of The Owner. Items in this bid, approved for contract by City of Kirkland, shall be awarded by the City of Kirkland.
- 2. City of Kirkland reserves the right to select, or not select, all or individual alternate bid items whichever is determined to be in the best interest of the City of Kirkland. The City of Kirkland has the right to determine the low bidder on the basis of the sum of the Base Bid and Alternates accepted.

- 3. City of Kirkland reserves the right to reject any and all bids and to waive any informality in bids received whenever such rejection or waiver is in the interest of the Owner.
- 4. The bidder to whom the award is made will be notified at the earliest practicable date.

#### P. DISQUALIFICATION OF BIDDERS

Any one or more of the following causes may be considered sufficient for the disqualification of a Bidder and the rejection of its bid or bids:

a. Evidence of collusion among Bidders.

b. Lack of expertise as shown by past work, and judged from the standpoint of workmanship and performance history.

c. Uncompleted work under other contracts which, in the judgment of the City, might hinder or prevent the prompt completion of additional work if awarded.

d. Being in arrears on existing contracts, in litigation with an Owner, or having defaulted on a previous contract.

e. Contractor's naming oneself as a Subcontractor for which they have no expertise and working knowledge directly within the firm.

f. Contractor's inability to meet the Bidder's Qualifications (Section 00 10 20) outlined in item 8.

g. Contractor's inability to meet the Bidder's Responsibility Criteria outlined in Section 00 15 30.

h. Failure to comply with any requirements of the Invitation for Bid or Instructions to Bidders.

#### END OF SECTION

#### INFORMATION AVAILABLE TO BIDDERS

The following documents are provided for the Contractor's reference. These documents are part of the Contract Documents and are made available to the Contractor for information only.

A. Partial Topographic Survey City of Kirkland City Hall, prepared by KPFF Inc., dated February 14, 2020, included in Drawings.

B. Subsurface Exploration and Geotechnical Engineering Report W-8608, Kirkland City Hall Expansion, prepared by RZA AGRA, Inc., dated January 1993, included as an attachment to this section.

#### END OF SECTION

# SUBSURFACE EXPLORATION AND GEOTECHNICAL ENGINEERING REPORT

# KIRKLAND CITY HALL EXPANSION 123 FIFTH AVENUE

# Kirkland, Washington

**Prepared** for

**City of Kirkland** 

W-8608

January, 1993





**RZA AGRA, Inc.** (formerly Rittenhouse Zeman & Associates, Inc.) Engineering & Environmental Services 11335 NE 122nd Way Suite 100 Kirkland, WA 98034-6918 (206) 820-4669 FAX (206) 821-3914

8 January 1993

W-8608

City of Kirkland 123 5th Avenue Kirkland, Washington 98033

Attention: Mr. Tom Fieldstead

Subject: Subsurface Exploration and Geotechnical Engineering Report Proposed Kirkland City Hall Expansion 123 Fifth Avenue Kirkland, Washington

#### Gentlemen:

RZA AGRA, Inc. (RZA AGRA) is pleased to present herein a copy of the above referenced report. This report presents the results of our subsurface exploration and geotechnical engineering evaluation completed to provide foundation design and construction recommendations for the proposed project. The scope of work for this project consisted of field explorations, laboratory testing, geotechnical engineering analyses and preparation of this report. Our services have been performed within the scope of work of our proposal dated 10 September 1992. Written authorization to proceed with the geotechnical engineering evaluation for this project was granted by the City of Kirkland on 6 November 1992.

We appreciate this opportunity to be of service to you on this project and would be pleased to discuss the contents of this report or other aspects of the project with you at your convenience.

Respectfully submitted,

RZA AGRA, Inc.

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Thomas A. Jones, P.E. Project Geotechnical Engineer



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Figure 2 - Lateral Pressures and Design Criteria, Cantilevered or Single Tie-Back Walls

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Appendix A - Subsurface Exploration Procedures and Boring Logs

Appendix B - Laboratory Testing Procedures and Results

SUBSURFACE EXPLORATION AND GEOTECHNICAL ENGINEERING REPORT PROPOSED KIRKLAND CITY HALL EXPANSION 123 FIFTH AVENUE KIRKLAND, WASHINGTON

#### 1.0 SUMMARY

The proposed project appears feasible from a geotechnical engineering standpoint with respect to the subsurface conditions encountered at the subject site. A brief summary of the project geotechnical considerations is presented below:

- Three exploratory borings were conducted across the site. The soils encountered typically consisted of glacially derived silty sand soils. However, approximately 5-1/2 feet of manplaced fill consisting of loose, gravelly silty sand was encountered in boring B-1 along the west side of the existing City Hall building. These soils appear to have been derived from on-site sources as their consistency was very similar to the native soils. Very stiff clayey silt was encountered at approximately 18 feet beneath the existing ground surface in boring B-2. In our opinion, the clayey silt will not affect the geotechnical design parameters for this project.
- We understand that the proposed project will consist of expanding the existing Kirkland City Hall building in two phases. Phase 1 would consist of extending the building to the south while Phase 2 would extend the building to the south and west. The proposed phased construction scheme is presented graphically on Figure 1, Site and Exploration Plan. Additional parking will be provided to the south of the proposed expansion. The proposed parking area currently consists of landscaped areas.
- Site grading for the proposed expansion would consist primarily of excavation during the Phase 2 portion of this project. We anticipate that cuts on the order of 12 to 15 feet may be necessary due to the existing topography along the west side of the existing building. Additionally, site grades will require cuts in order to construct the proposed parking area as presented on Figure 1.
- For shallow spread and continuous footings constructed above the medium dense, gravelly silty sand encountered in boring B-3, we recommend a maximum allowable bearing capacity of 3,500 pounds per square foot. For footings founded on the very dense, unweathered glacial till soils, we recommend a maximum allowable bearing capacity of

Fills

6,000 pounds per square foot. Footings founded on structural fill compacted to a minimum of 90 percent of its modified Proctor maximum dry density should be designed for a maximum allowable bearing capacity of 2,500 pounds per square foot. Alternatively, a maximum allowable bearing capacity of 3000 psf could be used for footings founded on structural fill compacted to a minimum of 95 percent of the modified Proctor maximum dry density.

Groundwater was encountered in boring B-1 and B-2 at the time of drilling. It is our opinion that the groundwater was concentrated within the very dense, well graded sand layer which was encountered in both of these borings. It appears that this sand layer dips downward from north to south and may possibly be within a few feet of the bottom of existing footings along the north side of the City Hall building. If this water-bearing sand layer is encountered during construction of the Phase 2 foundations, it most likely will require dewatering in order to construct the foundation portion of the building.

This summary is presented for introductory purposes only and should be used in conjunction with the full text of this report. The project description, site conditions, and our design recommendations are presented in the text of this report. The exploration procedures and logs are presented in Appendix B while the laboratory test procedures and results are presented in Appendix B and on the exploration logs, where appropriate.

#### 2.0 SITE AND PROJECT DESCRIPTION

The project site is located on the grounds of Kirkland City Hall. The site is bordered to the north by Fifth Avenue, to the south by Fourth Avenue, to the west by First Street and to the east by Second Street. The existing building is a two-story reinforced concrete structure with shallow spread and continuous footings and slab-on-grade floor support.

The proposed expansion will be completed in two phases. The first phase would consist of constructing a two-story structure to the south of the existing building. Phase 2 construction would also consist of completing a two-story addition to the south and west of the existing building. The proposed Phase 1 and Phase 2 expansions, as we understand them, are presented on Figure 1, Site and Exploration Plan. In addition to the proposed building expansion, the existing parking lot will also be expanded to the south.

The purpose of this evaluation was to establish general subsurface conditions at the site from which conclusions and recommendations for earthwork, foundation design and construction considerations for the project could be formulated. The scope of work consisted of field explorations, geotechnical engineering analyses, laboratory testing, and preparation of this report. In the event that there are any changes in the nature, design, elevation or location of the structures, the conclusions and recommendations contained in this report should be reviewed and modified, if necessary, to reflect those changes. This report has been prepared in accordance with generally accepted geotechnical engineering practices for the exclusive use of the City of Kirkland and their agents for specific application to this project.

#### 3.0 SITE CONDITIONS

The site conditions were evaluated on 21 November 1992. The surface and subsurface conditions are described below, while the exploration procedures and interpretive logs are presented in Appendix A. Laboratory testing procedures and test results are discussed in Appendix B and are also presented on the boring logs, where appropriate. The proposed site development and approximate locations of the explorations are indicated on the Site and Exploration Plan, Figure 1.

#### 3.1 Surface Conditions

The entire Kirkland City Hall site is entirely developed at this time. The existing City Hall building is centrally located on the site with parking lots and landscaped areas surrounding the building. An east-west trending landscape berm traverses the site along the southernmost margin of the existing asphalt paved parking lot. Surface water runoff is currently directed and collected by the on-site stormwater drainage system. Therefore, standing water was not observed on the site at the time of our exploration.

#### 3.2 Subsurface Conditions

The subsurface exploration program for this project consisted of advancing 3 hollow-stem auger borings at locations within the proposed expansion area. The approximate locations of our borings are presented on Figure 1, Site and Exploration Plan. The exploration procedures and detailed boring logs are presented in Appendix A of this report.

In general, the site is underlain at varying depths by medium dense to very dense, moist to wet, gray silty sand with some gravel to gravelly silty sand which was interpreted to represent weathered and unweathered glacial till. Overconsolidated by thousands of feet of overriding prehistoric glacial ice, the unweathered glacial till, and other soil units stratigraphically below the till, typically exhibits high strength and low

compressibility and permeability characteristics. Very dense glacial till was encountered in borings B-1, B-2, and B-3 at depths of 13 feet, 2 feet, and 8 feet, respectively.

In boring B-1, approximately 5-½ feet of loose, gravelly silty sand fill was encountered overlying medium dense silty sand with some gravel which was interpreted to be native weathered glacial till. The medium dense weathered glacial till, extended to a depth of approximately 13 feet beneath the existing ground surface. Between 13 and 18-½ feet, our boring encountered dense to very dense glacial till. At approximately 18-½ feet, the boring encountered a very dense water-bearing sand which extended to the bottom of the boring at 21-½ feet.

In boring B-2, approximately 2 inches of asphalt concrete and 6 inches of sand and gravel base course were found to overlie dense to very dense, gravelly silty sand interpreted to be glacial till. The glacial till extended to a depth of approximately 13-½ feet. Beneath the glacial till, our boring encountered very dense, water-bearing sand to a depth of 18 feet. Between 18 and 21-½ feet, our boring encountered very stiff, clayey silt.

Boring B-3 also encountered about 2 inches of asphalt concrete over 6 inches of sand and gravel base course. Native, medium dense, gravelly silty sand interpreted to be weathered glacial till was encountered to a depth of approximately 8 feet. The weathered glacial till graded to an unweathered glacial till and extended to a depth 20 feet where the boring was terminated.

#### 3.3 Groundwater Conditions

Groundwater was encountered in borings B-1 and B-2 at a depth of approximately 16 and 13 ½, respectively. The very dense, water-bearing, well-graded sand encountered in borings B-1 and B-2 appears to represent a confined aquifer with slight artesian pressure. Additionally, we anticipate that a perched groundwater condition exists atop the relatively impermeable unweathered glacial till. Perched groundwater should be expected where the vertical infiltration of water is impeded by relatively impermeable soils. In our opinion, this condition should exist across the site during wetter periods of the year, if not throughout the entire year. Perched groundwater conditions should be expected to fluctuate depending upon season, precipitation, changes in site utilization, and other factors. The volume of groundwater from both perched groundwater systems as well as the confined aquifer which could be expected emanate into the excavations will likely be determined by the upslope recharge area and the aerial extent of the confined aquifer.

#### 4.0 CONCLUSIONS AND RECOMMENDATIONS

We understand that the proposed project will be completed in two phases. Each phase would consist of

constructing a two-story addition to the existing Kirkland City Hall. In addition to the building construction, associated paved parking areas, access drives and landscape areas would be constructed. Based on the subsurface conditions encountered in our test borings, the proposed project appears feasible from a geotechnical standpoint.

#### 4.1 Site Preparation

Based on our understanding of the proposed project, we understand that proposed grades around the additions will remain similar to those which currently exist, except where additional parking will be established. Prior to site grading, any site surface water runoff and groundwater seepage should be collected and routed away to a proper drainage in order to facilitate earthwork and foundation construction. Once surface water runoff and groundwater seepage are controlled, all building, pavement, sidewalk and other areas to be graded should be cleared of all sod, topsoil, pavements and uncontrolled fill materials. We estimate the organic-rich topsoil stripping effort to be on the order of 6 inches in depth, or less. It may be possible that the east-west trending berm along the south side of the southern-most parking area may consist of soils deemed unsuitable for use as structural fill.

We anticipate that several utilities will require abandonment or relocation. In either case, the utilities should be removed, relocated, or abandoned in place in accordance with applicable state and local laws. All trench backfilling should be performed in accordance with the recommendations presented in the structural fill section of this report.

Following site excavation, areas which are at subgrade level should be prerolled and compacted with a roller or other suitable heavy equipment to a firm and non-yielding condition in order to achieve a minimum compacted level of at least 95 percent of its modified Proctor maximum dry density (ASTM:D-1557 test procedure). The upper foot of subgrade soils in pavement areas should also be compacted to at least 95 percent of the ASTM:D-1557 maximum dry density value. Due to the silty nature of these site soils, prerolling and adequate compaction can only be achieved when the soils are at or near their optimum moisture content. Any soft, wet, or significantly organic areas disclosed during excavation should be excavated as necessary to reveal non-organic soils and backfilled with structural fill as discussed subsequently.

The need for or advisability of, prerolling the silty soils during or after wet weather should be evaluated at the time of construction. Due to the silt content and moisture sensitive nature of the near-surface soils, earthwork attempted in the presence of excessive moisture during wet weather conditions may be difficult

yielding condition when the moisture content is more than a few percent above optimum. The optimum moisture content is that which yields the greatest soil density under a given compactive effort.

The soils encountered along the west side of the existing City Hall building, which might be used for future structural fill purposes, have a fine-grained soil content on the order of 20 to 40 percent. The moisture contents within the upper 10 to 12 feet typically varied between 12 and 16 percent. Soils similar to those encountered along the west side of the building typically have optimum moisture contents varying between about 7 and 11 percent. Therefore, due to the high silt content and the existing moisture content, these soils

will be sensitive to compaction particularly if the a couple percent above optimum. During and optimum. Selective drying may be required if f construction is more than Is will likely be wetter than uctural fill.

In the event that inclement weather or wet site materials as structural fill, we recommend that on-site soils or non-select ar material be used. Clean

free-draining fill should also be used for all wall backfill within 3 feet of basement and retaining walls. If import fill is required in wet site or wet weather conditions, such materials should generally contain less than 5 percent passing the U.S. No. 200 Sieve based on that soil fraction passing the U.S. No. 4 Sieve, with at least 30 percent retained on the U.S. No. 4 Sieve. The maximum individual particle size of soils used for structural fill should be less than 6 inches in diameter. It should be noted that the placement of structural fill is in many cases weather dependent. Delays due to wet weather are common, even when using select granular fill. If at all possible, we recommend that site grading and subsurface utility work be scheduled for dryer summer months.

#### 4.3 Utility Trenching and Backfilling

We anticipate that utility trenching and backfilling will be performed concurrent with construction. We recommend that installation conform to all applicable Federal, State, and local regulations such as WISHA and OSHA regulations for open excavations.

In order to maintain the function of existing utilities, we recommend that temporary excavations do not encroach upon the bearing soils below existing utilities. This bearing area should be considered to begin 3 feet away from the widest point of the pipe, extending downward at a 1H:1V slope. If, due to space constraints, an open excavation cannot be completed without encroaching on an existing utility, we recommend shoring the new utility excavation with a trench box or other suitable shoring system.

We recommend that all utility subgrade soils be firm and unyielding and free of all soils which are loose, disturbed or pumping. Such soils should be removed and replaced, if necessary. All structural fill used to replace overexcavated soils should be compacted as recommended in the structural fill section of this report.

Perched groundwater may be encountered during deeper trench excavations. Therefore, dewatering may be required to remove accumulated groundwater within the trenches. We recommend that sumps be excavated below seepage zones within the trenches from which accumulated groundwater can be pumped to a suitable discharge location.

After firm utility subgrades have been achieved, we recommend that a minimum of 6 inches of bedding material be placed in the trench bottom. Bedding material for rigid and flexible pipe should conform with Sections 9-03.15 and 9-03.16, respectively, of the 1991 WSDOT/APWA Standard Specifications for Road, Bridge and Municipal Construction, or alternate materials depending on the pipe material. We further recommend that all bedding materials extend at least 4 inches above utilities which require protection during subsequent trench backfilling. All trenches should be wide enough to allow for compaction around the haunches of the pipe. Otherwise, materials such as controlled density fill or pea gravel could be used to eliminate the mechanical compaction required.

Backfilling the remainder of the trenches could be completed with on-site soils during extended dry weather periods if they can be compacted to the minimum levels specified. All utility trench backfill should be compacted to at least the minimum levels recommended in the Structural Fill section of this report. All stockpiled soils should be protected from wet weather conditions if they are intended for reuse as trench backfill. If imported soils are required for trench backfill, we recommend they conform to WSDOT Specifications, Section 9-03.19, Bank Run Gravel for Trench Backfill, or be approved by RZA AGRA. Finally, we recommend that RZA AGRA be retained to perform field inspections and density testing, as well as observe construction procedures.

#### 4.4 Shoring Considerations

Temporary shoring may be necessary along the north and west sides of the Phase 2 excavation in order to support the excavation sidewalls during foundation excavation and construction of footings and basement walls. Anticipated excavation depths will vary between approximately 12 and 15 feet in depth. Excavations can be shored the full height of the excavat

shoring Vrs and deel open but decision may impact Int: litics

If necessary, the contractor should include provisions for protection of existing structure which are satisfactory to the owner and designers. The contractor, however, should be allowed to implement additional protective measures, if appropriate, depending upon conditions disclosed in the excavation once construction is under way. It is generally not the purpose of this report to provide specific criteria for construction methods, materials or procedures. This should be the responsibility of the shoring contractor to verify actual ground conditions at the site and determine construction methods and procedures needed for the installation of the appropriate shoring system. It appears that shoring consisting of steel soldier piles set in pre-augered holes with lean or structural concrete, together with pressure treated timber lagging and lateral support as required, could provide adequate performance for the project.

The advantage of using soldier piles, and possibly tie backs, is control of the cut face. Soldier pile and tieback systems can be designed for "at-rest" conditions, thereby minimizing deflection and settlement. A disadvantage of this system is its additional cost and increased installation time. Soldier pile drilling on the site may be difficult due to the glacial till soils, and due to the confined aquifer at depth which will likely be penetrated by soldier pile holes.

#### 4.4.1 Lateral Earth Pressures

The design of shoring is conventionally accomplished using empirical relationships and apparent earth pressure distributions. These earth pressure distributions or envelopes do not represent the real distribution of earth pressures but rather constitute hypothetical pressures from which brace or tieback loads can be calculated, which would not likely be exceeded in an actual excavation. Additionally, pressures must be selected on critical projects which will tend to limit deflections, both vertical and horizontal.

Design of temporary shoring should be based on either active or at-rest lateral earth pressures, depending upon the degree of deformation of the shoring which can be tolerated. Shoring which is free to deform on the order of 0.001 to 0.002 times the height of the shoring is considered to be capable of mobilizing active earth pressures. This lateral deformation is likely to be accompanied by vertical settlement which may extend back from the top of the cut a distance equal to roughly the height of the cut. Lesser amounts of settlement may also occur within a setback extending twice as far. Any greater amount of lateral deformation could allow greater vertical settlements. If no structural elements are located within this zone, or if structural elements within the zone are considered to be insensitive to this degree of settlement, then it would be appropriate to design utilizing active earth pressures. Active earth pressures are typically used for shoring adjacent to streets, alleys and vacant lots unless settlement sensitive utilities are located in close

proximity to the cut face. Utilities oriented perpendicular to the shoring wall are often particularly sensitive to lateral shoring deformation.

Typically, where wall deflections are comparatively large, vertical settlements adjacent to the wall can be on the order of one-half the horizontal movement. Where horizontal movements are quite small, the available data is inconclusive but there is a suggestion that vertical movements can sometimes be twice the horizontal value. Even so, on this site it is recommended that horizontal deflections be kept to a minimum; under these conditions, vertical settlements will also be quite small. With the following active apparent earth pressures used for design of the shoring, we anticipate lateral movements of soldier pile shoring could be structurally limited to less than about one inch, with vertical settlements on the order of 1 inch possible within a horizontal distance equal to the height of the shoring. Lesser vertical settlement on the order of 1/2 inch may occur within a distance of about twice the excavation depth.

An "at-rest" earth pressure condition theoretically assumes no movement of the soil behind the shoring; however, some settlement should realistically be anticipated due to construction practices and/or the fact that it is not possible to construct a perfectly stiff shoring system. At-rest earth pressures are typically used for shoring adjacent to buildings or other settlement sensitive features. Additional lateral surcharge loading may also be appropriate in these cases. For at-rest conditions, we recommend using soldier pile and tieback designed retaining wall systems. At-rest shoring should be structurally designed so that lateral yielding is less than about one-half inch. This should result in vertical settlements of less than about one-half inch, assuming adequate construction procedures.

For the case of a cantilevered shoring system, or shoring with only one level of tiebacks or internal bracing with horizontal backfill, the applied lateral earth pressure would be represented by a triangular pressure distribution expressed as an equivalent fluid density. Cantilever shoring or shoring with one level of lateral bracing can be designed with an active earth pressure expressed as an equivalent fluid density of 30 pounds per cubic foot (pcf). For design of shoring using at-rest earth pressure conditions with cantilever piles or piles with one level of bracing, we recommend using an equivalent fluid density of 50 pounds per cubic foot (pcf). Figure 2 of this report illustrates the recommended lateral pressures and design criteria for cantilevered shoring or shoring with a single row of lateral supports such as tiebacks or rakers. Higher pressures would be required for slopes above the shoring, or surcharges. Figure 3 of this report shows the recommended method of determining lateral earth pressures on shoring at the base of open cut slopes.
4.4.2 Soldier Piles

Soldier piles for shoring are typically set in pre-augered holes and backfilled with lean or structural concrete. Vertical loads, including the vertical component from the tieback anchors, on such piles may be resisted by a combination of friction and end-bearing below the base of the excavation. We recommend an allowable side friction value of 1,000 pounds per square foot and an end-bearing value of 10 tons per square foot (tsf) for design. Side friction should be neglected within the upper 2-foot below the base of excavation. The 10 tsf end-bearing is predicated on embedment of at least 7 feet below the base of the excavation. These above values include a safety factor of at least 2, which is generally considered appropriate for temporary wall applications.

The embedment depth of soldier piles below the final excavation level must be designed for adequate lateral or kick out resistance to horizontal loads. For design, the lateral resistance may be computed by using an allowable net passive equivalent fluid pressure of 300 pcf, applied over twice the diameter of the concreted soldier pile section or the pile spacing, whichever is less. This value includes a factor of safety of 1.5 for passive pressures, and requires that dewatering be provided to a level of at least 3 feet below the excavation base. Passive resistance within the upper 2-feet of soil below the bottom of excavation or lowest adjacent footing excavation base should be neglected.

We recommend lagging or some other form of protection be installed in all areas. Due to the soil arching effects, temporary lagging spanning eight feet or less may be designed for 50 percent of the lateral earth pressure used for the soldier pile design. Prompt and careful installation of lagging would reduce the potential for loss of ground. Requirements for lagging should be made the responsibility of the shoring contractor to prevent soil failure, slumping, loss of ground and to provide a safe working condition. We recommend that any voids behind the lagging be immediately backfilled. Immediate backfill behind lagging could reduce the risk of settlements behind the shoring in excess of the previously described estimates. However, the backfill should not allow potential hydrostatic pressure to buildup behind the wall. Drainage behind the wall must be maintained. A permeable sand or pea gravel may be considered for lagging backfill, we recommend using a controlled backfill material.

During our subsurface exploration, minor artesian ground water conditions were encountered between elevations 77 and 84 feet (13.5 feet to 18.5 feet below the existing ground surface) when drilling into the confined aquifer. Shoring contractors should be required to use drilling methods which will prevent loss of ground due to caving. This will likely require casing and/or drilling fluid such as bentonite when drilling near

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or into the confined aquifer beneath the site. Shoring installation, including drilling of both soldier piles and tiebacks may require prior dewatering of the confined aquifer depending on the drilling, casing, and hole stabilization methods chosen by the contractor.

#### 4.4.3 Tieback Recommendations

Resistance to lateral earth pressures acting on shoring can be obtained by embedment of soldier piles, tieback soil anchors and/or external braces such as rakers. The following paragraphs apply primarily to tieback shoring. An internal bracing system of rakers could be designed utilizing the frictional and passive earth pressure criteria described for shallow footings previously in this report. Figure 2 in this report illustrates general design criteria for single-row tiebacks.

The anchor portion of all tiebacks must be located a sufficient distance behind the retained excavation face to develop resistance within a stable soil mass. We recommend the anchorage be obtained behind an assumed no-load zone formed by a 60 degree angle, extended upwards from the base of the excavation and set back from the retained excavation face a horizontal distance of 1/4 of the depth of the excavation. The soils in front of the above described plane are called the no load zone. The anchor portion of the tieback behind the no-load zone should be a minimum length of 10 feet. All tieback holes within the no load zone should be immediately backfilled. The sole purpose of the backfill is to prevent possible collapse of the holes, loss of ground, and surface subsidence. We recommend the backfill consist of sand, gravel or a non cohesive mixture. A sand cement grout should be utilized only if some acceptable form of bond breaker (such as plastic sheathing) is applied to the tieback rod or tendons within the length of the no load zone.

Anchor holes should be drilled in a manner which will minimize loss of ground and not disturb previously installed anchors. During the drilling, caving could occur if loose, wet or saturated zones are encountered. The row of tieback should be designed to stay a sufficient height above the confined sand aquifer, if possible, to reduce the potential for loss of ground or caving. Drilling with a continuous flight hollow stem auger or with casing would reduce the potential for loss of ground. Tieback anchor installations should be subject to performance testing and proof loading as described below.

Use of the design values presented herein is dependent upon well constructed anchors. We recommend that concrete be placed in the drilled tieback anchor holes by tremie methods such as pumping through a hose placed at the bottom of the hole or pumping through the center of a continuous flight auger. This way, the grout is forced up through the anchor zone under pressure and the grout comprising the anchor is more

likely to be continuous. The grout should not be placed in the anchor zone by gravity methods such as flowing down a chute. We recommend that RZA AGRA be on-site to continuously monitor all tieback installations.

We estimate an allowable concrete to soil adhesion of 1,000 pounds per square foot can be used for low-pressure anchors founded in the very dense glacially derived soils. Higher adhesion is possible with high pressure (two-stage) grouting methods. This value is presented for planning and should be confirmed or modified by performance testing prior to production tieback installation. The tieback capacity is considered appropriate with full piezometric levels present in the confined aquifer.

At least one ultimate capacity test to at least double the design capacity should be completed prior to production tieback drilling efforts in each soil type. This test should proceed in eight equal load increments to the 200 percent load, with each increment held five minutes. The 200 percent load should be held until 30 minutes elapse with less than 0.01 inches of anchor movement. Actual test location should be determined in the field based on soil conditions observed during excavation. In addition, production tiebacks should be proof tested to at least 130 percent of design capacity. These tests should proceed in five equal load increments to the 130 percent load, which should be held until at least five minutes elapse with less than 0.01 inches of anchor movement. The tieback testing program should be monitored by RZA AGRA. Following proofloading, the tiebacks should be locked off at 80 percent of the designed working load. In general, total anchor movement in excess of 4 inches, excessive deformation of the soldier pile or tieback bearing system, excessive creep during testing, or failure to maintain the test load would indicate tieback failure. Replacement tiebacks for failures would require coordination between the contractor, designer and RZA AGRA.

#### 4.4.4 Shoring Monitoring

Any time an excavation is made below the level of existing grade, utilities or other structures, there is a risk of damage even if well designed shoring systems have been planned. We recommend, therefore, that a systematic program of observations be conducted during the project construction to delineate the effects of the construction on adjacent facilities and structures. Excavation monitoring should meet requirements of the City of Kirkland.

The monitoring program should include measurement of the horizontal and vertical movements of the adjacent structures and ground surface and the shoring system itself. At least two reference lines should be established adjacent to the excavation at horizontal distances back from the excavation face of up to

e: 1

about 2 times the final excavation height. Monitoring of the shoring system should include measurement of the vertical and horizontal movement of the top of each soldier pile. If local wet areas are noted within the excavation, additional monitoring points should be established. Reference points for horizontal movement should also be selectively placed at tieback locations.

The measurement system used for shoring monitoring should have an accuracy of at least 0.01 foot. All reference points should be installed and readings taken prior to commencing the excavation. All reference points should be read prior to and during shoring construction. The frequency of readings will depend on the results of previous readings and the rate of construction. As a minimum, the readings should be taken about once a week throughout construction until the permanent retaining walls are completed. All readings should be reviewed by the geotechnical engineer.

In order to establish the condition of adjacent structures prior to construction, we recommend that the owner and/or owner's representative make a complete inspection and evaluation of pavement, structures and utilities or facilities near the project site. This inspection should be directed towards detecting any sign of pre-existing damage, particularly those caused by settlement or lateral movement. Observations should be documented by pictures, notes, survey drawings and other means of verification. Contractors should also establish the existing conditions prior to construction for their own records.

#### 4.5 Foundations Considerations

The proposed additions may be supported on conventional spread and continuous footings with slab-ongrade floor support. Footings may be constructed on either undisturbed medium dense to very dense native soils or on compacted structural fill placed above suitably prepared native soils. For footings founded on medium dense, undisturbed native soils or on structural fill compacted to a minimum of 95 percent of its modified Proctor maximum dry density, we recommend utilizing a maximum allowable bearing pressure of 3,000 psf. For footings founded on dense to very dense undisturbed native soils, we recommend utilizing a maximum allowable soil bearing pressure of 6,000 psf. Any footings founded on structural fill, compacted to 90 or 95 percent of the modified Proctor maximum dry density, should be designed for maximum allowable bearing capacities of 2,500 or 3,000 psf, respectively. These allowable bearing pressures may be increased by up to one third to accommodate transient, dynamic loads such as wind and seismic forces. Exterior footings should be located at least 18 inches below the lowest adjacent finished grades for frost protection. Interior footings need only extend 12 inches below adjacent ground or floor slab levels. We recommend that all continuous footings have a minimum width of 18 inches and isolated footings have a minimum dimension of 24 inches.

We estimate total settlement of foundations founded in the prescribed bearing strata will be on the order of <sup>3</sup>/<sub>4</sub> inch or less. Differential settlement is estimated to be on the order of <sup>1</sup>/<sub>2</sub> inch or less. Foundation settlement is often a function of how well the footing subgrade was prepared. Footing excavations should be free of loose or soft soils, sluff, debris or water prior to pouring footing concrete. If possible, we recommend that the foundations be placed within the same soil type to minimize the magnitude of possible differential settlement. If a footing is founded on two different soil types, the lower maximum allowable soil bearing capacity should be used for the entire footing. No foundation element should be set in or above loose or disturbed soils, organic soils or uncompacted fill. If disturbed or soft soils are left beneath the footing area prior to concrete placement, future settlements may be greatly increased. For that reason, we recommend that the footing subgrade soils be observed by a representative of RZA AGRA prior to pouring footing concrete to document that the condition of the bearing soils is consistent with the recommendations contained in this report.

We understand that proposed column footings may be constructed very close to or possibly beneath existing perimeter continuous footings. It appears that all footings for the building were designed using a maximum allowable capacity of 6,000 psf. Therefore, we do not recommend that the proposed spread footings be constructed beneath the existing perimeter continuous footings unless that portion of the affected wall footing, and its loads, are incorporated into the design of the new spread footing. In areas where spread footings are constructed within the existing footing lines, we recommend temporarily supporting that portion of the wall and removing its underlying foundation. Temporary support could be derived from steel channels or beams which span across the affected area, or underpinning. With temporary support in place, the existing footings could be removed. The proposed spread footing could then be constructed to accommodate the net increased load from the interior column as well as providing support for the existing perimeter wall.

#### 4.6 Slab-on-Grade Floors

The slab-on-grade floor subgrade should be prepared in accordance with the previous site preparation recommendations. The slab-on-grade floor should be founded on prerolled or compactive native ground or structural fill compacted to a minimum of 90 percent of its modified Proctor maximum dry density. We recommend that the floor be underlain by a minimum 6-inch thickness of washed rock or pea gravel containing less than 3 percent fines passing the U.S. No. 200 Sieve, based on the soil fraction passing the U.S. No. 4 Sieve, with at least 30 percent retained on the U.S. No. 4 Sieve. This granular fill is intended to serve as a capillary break and working surface. An impervious moisture barrier should also be placed between the capillary break and floor slab.

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#### 4.7 Basement/Retaining Walls

The lateral soil pressures acting on basement or retaining walls will primarily depend on the degree of compaction and the amount of lateral movement permitted at the top of the wall during and after backfilling operations. If the wall to free to yield at the top an amount equal to at least 0.1 percent of the height of the wall, the soil pressure will be less than if structurally restrained from lateral movement at the top. Retaining walls can be designed using an equivalent fluid pressure of 30 pounds per cubic foot (pcf) and 50 pcf for yielding and non-yielding backfilled walls, respectively. Allowable passive pressure values should be designed for an equivalent fluid weight of 350 pcf, neglecting the upper one foot of soil. These equivalent fluid pressures assume that the backfill is compacted to 90 percent of the modified Proctor maximum dry density. We recommend that RZA AGRA be allowed to review these design values, and modify them if necessary, if they are to be applied to walls greater than 12 feet in height. We recommend an allowable base friction value of 0.40, utilizing a factor of safety of 1.5.

The above equivalent fluid pressures are based on the assumption of a uniform, horizontal backfill and no buildup of hydrostatic pressure behind the wall. Surcharge pressures due to sloping ground, adjacent footings, vehicles, construction equipment, etc., must be added to these values. Sloping surcharges within a distance from the top of the wall equal to the height of the wall should be factored into the wall design. The equivalent surcharge of the slope within the distance previously described should be equal to one half the height of the slope. A minimum width of 2 feet of clean, free-draining, granular material should extend from the footing drains of the base of the wall to within 1 foot of the ground surface, to prevent the buildup of hydrostatic forces. Wall backfill should consist of aggregate with less than 3 percent passing the U.S. No. 200 Sieve, based on that fraction passing the U.S. No. 4 Sieve, with at least 30 percent retained on the No. 4 Sieve. The upper one foot of wall backfill should be silty soils to cap the free-draining fill and reduce infiltration immediately adjacent to the wall. Filter fabric should be realized the primary purpose of the free-draining material is reduction of hydrostatic pressure. Some potential for moisture to contact the back face of the wall may exist even with this treatment, which may require more extensive water-proofing be specified for walls which require interior moisture-sensitive finishes.

To prevent the buildup of lateral earth pressures in excess of the above design pressures, overcompaction of fill immediately behind the walls should be avoided. Only light, self-propelled or hand compaction equipment should be allowed within close proximity of the wall. Backfill placed behind walls or around foundations should be placed in accordance with our recommendations for structural fill, except that the

maximum compacted fill density should not exceed 90 percent of the modified Proctor maximum dry density.

Care should be taken where utilities penetrate through backfilled walls. Minor settlement of wall backfill soils can impart significant soil loading on utilities, and some form of flexible connection may be appropriate at backfilled wall penetrations. At the base of the walls, we recommend providing continuous footing drains. The footing drains, with cleanouts, should consist of perforated pipes, sloped to drain with perforations placed down and enveloped by at least 6 inches of pea gravel in all directions. Free-draining backfill adjacent to the backfilled walls should be continuous and freely communicate with the pea gravel surrounding the footing drains.

#### 4.8 Drainage Considerations

Since the site soils have a high silt content, portions of the site may be highly susceptible to disturbance when wet. Due to the relatively impermeable nature of the site soils, surface runoff could be significant. Any accumulated surface water runoff or groundwater seepage on the site should be routed away from the construction and building area as much as possible before actual construction begins. The surface runoff should be collected and routed to a suitable discharge point or detention basin.

We recommend that the buildings be provided with a perimeter footing drain system with cleanouts to collect available water. Footing drains should consist of a minimum 4-inch diameter perforated PVC pipe fully enveloped in pea gravel or washed rock and be placed at the footing subgrade elevation around the outside of the perimeter foundation. Site grades should be planned to provide a positive surface drainage away from the buildings and to avoid ponding. Roof and surface runoff should not discharge into the footing drain system. Instead, a separate tightline drain network should be installed to direct runoff away from the completed building.

#### 4.9 Pavement Design Recommendations

It must be recognized that pavement design is a compromise between high initial cost and little maintenance on one side and low initial cost coupled with the need for periodic repairs. As a result, the owner will need to take part in the development of an appropriate pavement section. Critical features which govern the durability of the surface include the stability of the subgrade, the presence or absence of moisture, free water and organics, the fines content of the subgrade soils, the traffic volume, and the frequency of use by heavy vehicles.

The on-site native soils are highly silty and exhibit good subgrade support characteristics when undisturbed. Although a variety of pavement sections could be utilized, we recommend a minimum asphalt concrete thickness of 3 inches underlain by a minimum of 6 inches of crushed aggregate base over native subgrade and/or fill soils compacted as recommended in previous sections of this report. We recommend that the base course material generally conform to Section 9-03.9(3), Crushed Surfacing Top Course, of the 1991 WSDOT/APWA Standard Specifications for Road, Bridge and Municipal Construction. We are available to provide alternative pavement sections if desired.

### 4.10 Temporary and Permanent Cut and Fill Slopes

Temporary slope stability is a function of many factors and is exceedingly difficult under the circumstances to preestablish a safe and maintenance-free temporary cut slope angle. Therefore, it should be the responsibility of the contractor to maintain safe slope configurations since the contractor is continuously at the job site, able to observe the nature and condition of the cut slopes, and can monitor the subsurface materials and groundwater conditions encountered. We recommend that temporary slopes fully within the dense to very dense, glacially consolidated soils be excavated at an inclination no steeper than  $\frac{3}{4H:1V}$ . Temporary slopes in the medium dense fill soils and weathered glacial till soils should be no steeper than 1.5H:1V. If groundwater is encountered in the excavation, flatter slopes may be required. We do not recommend vertical slopes for cuts deeper than 4 feet if worker access is necessary. The cuts should be adequately sloped or shored to prevent injury to personnel from local sloughing and spalling. The excavation should conform to all applicable federal, state and local regulations. We recommend that all temporary slopes be covered with Visqueen and be anchored with sand bags if the slopes are to remain exposed to the elements for extended periods of time. This will minimize erosion due to wet weather and will protect the exposed soils from further introduction of moisture which could reduce the stability of the temporary slopes.

Permanent cut slopes excavated into the near-surface medium dense fill soils and native weathered glacial till soils should be made an inclination no steeper than 2H:1V. Flatter slopes may be required depending upon groundwater seepage and soil conditions. Permanent fill slopes above any perched groundwater zones should be constructed at an inclination no steeper than 2H:1V. Those slopes can be constructed either by compacting the slope face as fill placement progresses or by overbuilding the slope and cutting back to the compacted core. When the ground surface beneath the fill slopes more steeply than 5H:1V, the embankment should be keyed and benched into suitable native soils per the minimum requirements of BBC, Chapter 70. We recommend that a grading plan be submitted for our review prior to construction for evaluation of cut and fill slope stability.

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#### 4.11 Seismic Criteria

Seismic design of the structure requires the selection of a numerical coefficient of soil structure interaction, designated "S" of the 1991 Edition of the Uniform Building Code, Table No. 23-J. Based on the soil conditions encountered in the borings at the site and the published geologic mapping, we recommend the use of an "S-factor" equalling 1.2 as specified for Soil Profile Type S<sub>2</sub> in the 1991 UBC. Soil Profile Type S<sub>2</sub>, applies where the soil depth exceeds 200 feet and the soil types overlying bedrock are stable deposits of sand, gravel or stiff clays. The 1991 UBC, Figure 23-2 classifies the site as being within Seismic Zone 3. We assume that the Kirkland City Hall is within the occupancy category of essential facilities which have an importance factor (I) of 1.25 for earthquakes and 1.15 for wind, as presented in Table No. 23-L of the 1991 UBC.

#### 5.0 CLOSURE

The conclusions and recommendations presented in this report are based on our understanding of the proposed project and our subsurface exploration program and geotechnical engineering evaluation. The number, location and depth of the borings accomplished were within the scope of work and site constraints to formulate our recommendations. We recommend that RZA AGRA be provided the opportunity to review the geotechnical aspects of project plans and specifications in order to confirm that the recommendations and design considerations presented in this report have been properly interpreted and implemented for this project.

The integrity of the foundations depend on proper site preparation, fill placement and construction procedures. RZA AGRA would be available to provide geotechnical engineering services during earthwork, foundation construction and utility construction phases of this project. If variations in subsurface conditions were observed at that time, RZA AGRA would be available to provide additional geotechnical engineering recommendations to minimize delays as the project proceeds.

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We appreciate the opportunity to be of service to you on this project. Please do not hesitate to contact our office if you have any questions or comments regarding the contents of this report.

Respectfully submitted,

RZA AGRA, Inc.

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Thomas A. Jones, P.E. Project Geotechnical Engineer EXPIRES 93 4/27/

John E. Zipper, P.E Associate TAJ/KWG/LAD EXPIRES 1/24/93

Enclosures:

Boring Logs B-1 through B-3

Figure 1, Site and Exploration Plan

cc: Jeff Floor/Arai-Jackson Architects and Planners Greg Schindler/KPFF Consulting Engineers





(THIS CAPACITY MUST BE VERIFIED IN THE FIELD. TIEBACK ANCHORS TO BE FOUNDED WITHIN DENSE TO VERY DENSE SOILS TO UTILIZE CAPACITIES.)

> $\tau$ u = UNTIMATE ADHESION = 2000 PSF  $\tau \alpha$  = ALLOWABLE ADHESION = 1000 PSF

#### NOTES:

- 1. ALL UNITS IN POUNDS AND FEET.
  - NET PASSIVE PRESSURE APPLIED OVER TWO CONCRETED PILE DIAMETERS OR
- 2. PILE SPACING, WHICHEVER IS LESS.
- 3. ACTIVE PRESSURE APPLIES OVER PILE SPACING ABOVE GRADE.
- 4. "AT REST" PRESSURES MAY APPLY AS DESCRIBED IN REPORT TEXT.

RZA AGRA, INC.	W.O. W-8608	KIRKLAND CITY HALL EXPANSION
Engineering & Environmental Services	DESIGN TAJ	KIRKLAND, WASHINGTON
11335 N.E. 122nd Way	DRAWN MJF	LATERAL PRESSURES AND DESIGN CRITERIA
Suite 100	DATE JAN 1993	CANTILEVERED OR SINGLE TIEBACK WALLS
Kirkland, Washington 98034—6918	SCALE N.T.S.	FIGURE 2

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APPENDIX A

# SUBSURFACE EXPLORATION PROCEDURES AND LOGS

## APPENDIX A W-8608

#### FIELD EXPLORATION

The field exploration program conducted for this study consisted of exploratory drilling at locations within the proposed building area. The approximate locations of the explorations are presented on the Site and Exploration Plan, Figure 1. The locations were obtained in the field by pacing from existing survey markers found in the field. Interpretive soil logs of the borings are presented in this Appendix.

#### EXPLORATORY DRILLING

The drilling subsurface exploration program was conducted on 21 November 1992. Three hollow-stem auger borings (B-1 through B-3) were drilled in the proposed building expansion areas. All borings were completed by Gregory Drilling under contract to RZA AGRA. A truck mounted drill rig which could perform auger drilling was utilized. During the drilling process, samples were generally obtained at 2½ foot depth intervals. The borings were continually observed and logged by a geologist from our firm. Standard Penetration Tests (SPT) were conducted through the auger or rock core casing.

Disturbed soil samples were obtained by using the Standard Penetration Test (SPT) procedure as described in ASTM:D 1586. This testing and sampling method consists of driving a standard 2-inch outside diameter split-barrel sampler a distance of 24 inches into the soil with a 140 pound hammer free-falling a distance of 30 inches. The number of blows for each 6-inch interval is recorded and the number of blows required to drive the sampler the last 12 inches is considered the Standard Penetration Resistance ("N") or blowcount which is represented in the boring logs in this Appendix. If a total of 50 blows is recorded within one 6 inch interval, the blowcount is recorded as 50 blows for the number of inches of penetration. The resistance, or "N" value, provides a measure of the relative density of granular soils or the relative consistency of cohesive soils. The high gravel, cobble and boulder content of some of the fluvial and colluvial soils or flood deposits, oftentimes prevent consistent or satisfactory standard penetration testing. The soil samples obtained from the split-barrel sampler were classified in the field and a representative portion placed in moisture-tight containers. The samples were then transported to our laboratory for further visual classification and laboratory testing.

The boring logs presented in this appendix are based on the drilling action, inspection of the samples secured, laboratory test results and field logs. The various types of soil and rock are indicated, as well as the depths where the materials or their characteristics changes. It should be noted that these changes may have been gradual, and if the changes occurred between sample intervals, they were interpreted.

# PROJECT: Kirkland City Hall Expansion w.o. W-8608 BORING NO. B-1

et)	SOIL DESCRIPTION	PE	IPLE ABER	UND	STAND	ARDP	ENETR	ATION RES	ISTANCE	Page 1 of 1
(fe	Approximate ground surface elevation: 102.5 feet	SAN	SAN	GRO		10	Blov 20	vs per foot 30	40	TESTING
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· · · ·	Loose, wet, tan-aray, aravelly silty SAND (Fill)									-
- 5 -			S-1  -	-						
	-		S-2	-						-
- 10 -	Modium donto, moletto wat tan araw elle SAND	   	· ·							
	with some gravel, scattered iron-oxide mottling (weathered glacial till)		S-3			•				-
- 15 -		-		-						-
	Very dense, wet, tan-gray, slity SAND with some gravel (unweathered glacial till) -		S-4	ATD					50/6" >	-
- 20 -	Very dense, wet to saturated, gray, well-graded	   	-							
	SAND with trace silt and gravel		S-5						80 >	
	Boring terminated at approximately 21.5 feet		-							-
- 25 -			-							
			-							-
- <sub>30</sub> _	LEGEND					0 M(	20 DISTUR	30 E CONTEN	40 I	50
]	2-inch OD split-spoon sample				Plastic li	mit RZA	Nat	ural L GRA, I	iquid limit	
AT					Engin 11 Kirk	eering 335 NE land, \	g & Envil E 122nd Washing	onmental Way, Suite gton 98034	Services 100 1-6918	

# PROJECT: Kirkland City Hall Expansion w.o. W-8608 BORING NO. B-2



Drilling started: 21 November 1992

Drilling completed: 21 November 1992

# PROJECT: Kirkland City Hall Expansion w.o. W-8608 BORING NO. B-3

		E	me	P~	CTANDADDDE		COLOTA NOT	Page 1
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				1		• • • • • • • • • • • • • • • • • • • •		
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1		8		1				
- 5 -	Medium dense, moist to wet, brown, gravelly silty		-	+				
	SAND		S-1.		····	•		
			.			$\mathbf{X}$		
			-					
			-			•••••••••••		
- 10 -	Very dense moist to wet tan-aray arayelly silty		-	-				
	SAND (unweathered glacial till)		S-2		•		75	
	- K _		-					
	· · · · · · · · · · · · · · · · · · ·		-			+		
			S-3			·	81	
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20	4 · · ·							-
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	Findineering & Environmental Services							
							a JEI VICES	
					11335 NE 1 Kirkland	22nd Way, Suit	te 100	
						John gron 7000	- 0710	

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Appendix B ş

APPENDIX B LABORATORY TESTING PROCEDURES AND RESULTS

# APPENDIX B W-8608

#### Laboratory Testing Procedures

A series of laboratory tests were performed during the course of this study to evaluate the index and geotechnical engineering properties of the subsurface soils.

#### Visual Classification

Samples recovered from the exploration locations were visually classified in the field during the exploration program. Representative portions of the samples were carefully packaged in watertight containers and transported to our laboratory where the field classifications were verified or modified as required. Visual classification was done in general accordance with the Unified Soil Classification system. Visual soil classification includes color, relative moisture content, soil type based on grain size, and accessory soil types included in the sample.

#### **Moisture Content Determinations**

Moisture content determinations were performed on representative samples obtained from the explorations in order to aid in identification and correlation of soil types. The determinations were made in general accordance with the test procedures described in ASTM:D 2216. The results of the tests are shown on the exploration logs in Appendix A.

KIRKLAND CITY HALL - VIRTUAL SERVICE CENTER CONTRACT DOCUMENTS

Bidder's Firm Name:	Date:
Address:	
Telephone No.:	
TO: City of Kirkland 123 5 <sup>th</sup> Avenue Kirkland, WA 98033	

Kirkland City Hall Virtual Service Center 123 5th Ave, Kirkland, WA 98033 CIP NO. GGC0440000 JOB NO. 49-22-PW

#### **GENERAL PROPOSAL**

The undersigned, hereinafter called the Bidder, declares that the only persons or parties interested in this proposal are those named herein; that this proposal is in all respects fair and without fraud; that it is made without collusion with any official or employee City of Kirkland; and that the proposal is made without any connection or collusion with any person making another proposal on this contract.

The Bidder further declares that they have carefully examined the contract documents for the construction of the project; that they have personally inspected the site; that they have satisfied themselves as to the quantities involved, including materials and equipment and conditions of work involved, including the fact that the description of the quantities of work materials, as included herein, is brief and is intended only to indicate the general nature of the work and to identify the said quantities with the detailed requirements of the contract documents; and that this proposal is made according to the provisions and under the terms of the contract documents, which documents are hereby made a part of this proposal.

The Bidder further agrees that they have exercised their own judgment regarding the interpretation of subsurface information and have utilized all data which they believe is pertinent from the Architect, Owner, and other sources in arriving at his/her conclusions.

The Bidder agrees to hold their bid proposal open for sixty (60) days after the actual date of bid opening and to accept the provisions of the Instructions to Bidders regarding disposition of bid bond.

The Bidder agrees that if this bid is accepted through Award of Contract by Council, it will, within ten (10) calendar days after notification of acceptance, execute the contract with the Owner in the form of contract included in the contract documents, and will, at the time of execution of the Contract, deliver to the Owner the Performance and Payment Bonds and all Certificates of Insurance required therein, and will, to the extent of its proposals, furnish all machinery, tools, apparatus, and other means of construction and do the work in the manner, in the time, and according to the requirements as specified in the contract documents and required by the engineer/architect or other project manager designated thereunder.

#### TIME OF COMPLETION:

The Owner can issue Notice to Proceed at any time after contract execution. The undersigned understands and agrees that Substantial Completion of the work shall be no later than <u>195</u> consecutive calendar days after the Notice to Proceed, and that Final Completion of the work shall be no later than <u>30</u> consecutive calendar days after Substantial Completion.

#### PERMITS, FEES AND INSPECTIONS:

The Owner will apply for and pay for the general building permit. The contractor is required to meet the requirements and conditions of any owner-procured permits, to post the permits, and for the scheduling and inspections related to these permits. The Contractor is responsible for all other required permits for the project in their entirety: including, but not limited to, the plumbing, electrical, mechanical, and utility permits. A City right-of-way permit is not required to be applied for or paid for as this is a City project, although the Contractor will need to comply with requirements of working in the right of way, such as, but not limited to, having an approved traffic control plan. Utility connection fees, if incurred by the contractor to facilitate the work, shall be paid back to the contractor by the Owner within the contact document change order process without markup of any kind. All other City of Kirkland and other State of Washington or local agency permits and requirements are the financial and administrative responsibility of the Contractor at no cost to the City of Kirkland.

#### BASE BID:

The Bidder further proposes to accept as full payment for the work proposed herein the amounts computed under the provisions of the contract documents and based upon the bid price for fully completed work as included in the proposal and the Bid Price represents a true measure of the labor, equipment, and materials required to perform and complete the work, including all allowances for overhead and profit for each type of work called for in these contract documents, as well as all use taxes, overhead, profit, bond premiums, insurance premiums and all other miscellaneous and incidental expenses. The amounts shall be shown in both words and figures. In case of discrepancy, the amount shown in words shall govern.

The undersigned bids for complete construction of the Virtual Service Center Project as follows:

For the **Total for Base Bid**, which does not include Washington State sales tax, the sum of:

\_\_\_\_\_ DOLLARS

(Please print dollar amount in words in space above.)

Performance of the second s

#### TRENCHING

Trenching is included in the Total for Base Bid above. The bidder shall enter in the blank space provided below; the dollar amount (in numbers) the bidder has included in its Total for Base Bid for any work requiring trenching that will exceed a depth of 4'-0" per Chapter 49.17 RCW. If trenching excavation safety provisions do not pertain to the project the Bidder should enter "N.A." or "Not Applicable" in the following blank \$\_\_\_\_\_. The bidder must fill in the blank.

#### ALTERNATE BIDS

Alternate #1 (Deductive) Sectional Roll Up Doors in lieu of Bi-Fold Hanger Doors per section 01 23 00. Bidder shall provide the differential amount to the Total Base Bid to accomplish Alternate #1. The bidder must bid on Alternate #1.

The undersigned bids for complete construction of Alternate #1 for a differential amount to the Total for Base Bid, which does not include Washington State sales tax, the sum of:

\_\_\_\_\_ DOLLARS

(Please print dollar amount in words in space above.)

\$\_\_\_\_\_(Please write dollar figure in numerals in space above.)

<u>Alternate #2 (Additive)</u> Add Telecommunications Cabling per section 01 23 00. Bidder shall provide the differential amount to the Total Base Bid to accomplish Alternate #2. The bidder must bid on Alternate #2.

The undersigned bids for complete construction of Alternate #2 for a differential amount to the Total for Base Bid, which does not include Washington State sales tax, the sum of:

\_\_\_\_\_ DOLLARS (Please print dollar amount in words in space above.)

\$

(Please write dollar figure in numerals in space above.)

#### ADDENDA

Receipt of the following Addenda is hereby acknowledged.

Addendum No.	dated	
Addendum No.	dated	
Addendum No.	dated	
Addendum No.	dated	

#### **BID REVIEW MEETING:**

The Undersigned agrees that if they are the successful bidder, they will be available for a bid review meeting with the Architect and the Owner at the Owner's office, at a time to be agreed upon.

Within the three-year period immediately preceding the date of the bid solicitation for this Project, bidder has not been determined by a final and binding citation and notice of assessment issued by the department of labor and industries or through a civil judgment entered by a court of limited or general jurisdiction to have willfully violated, as defined in RCW 49.48.082, any provision of chapter 49.46, 49.48, or 49.52 RCW.

I certify (or declare) under penalty of perjury under the laws of the State of Washington that the foregoing is true and correct:

CONTRACTOR (Firm Name)	
By (Signature)	Printed Name/Title of Signatory
(Indicate whether Contractor is Partnership)	
Washington State Contractor's Registration Number	Contractor's Industrial Insurance Account Number
Contractor's Address:	
	Telephone Number
	Fax Number

#### BID FORM TO BE SUBMITTED IN A SEALED ENVELOPE END OF SECTION

# **BID DEPOSIT**

Herewith find deposit in the form of a cashier's check or certified check in the amount of \$\_\_\_\_\_\_which amount is not less than five percent (5%) of the total bid.

SIGN HERE\_\_\_\_\_

# **BID BOND**

KNOW ALL MEN BY THESE PRESENTS:

That we, \_\_\_\_\_\_, as Principal, and \_\_\_\_\_\_, as Surety, are held and firmly bound unto the City of Kirkland, as Obligee, in the penal sum of \_\_\_\_\_\_\_ dollars, for the payment of which the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns,

jointly and severally, by these presents.

The condition of this obligation is such that if the Obligee shall make any award to the Principal for

Project Name

Job Number

according to the terms of the proposal or bid made by the Principal therefor, and the Principal shall duly make and enter into a contract with the Obligee in accordance with the terms of said proposal or bid and award and shall give bond for faithful performance thereof, with Surety or Sureties approved by the Obligee; or if the Principal shall, in case of failure to do so, pay and forfeit to the Obligee the penal amount of the deposit specified in the call for bids, then this obligation shall be null and void; otherwise it shall be and remain in full force and effect and the Surety shall forthwith pay and forfeit to the Obligee, as penalty and liquidated damages, the amount of this bond.

SIGNED, SEALED AND DATED THIS	DAY OF	, 20
PRINCIPAL:	SURETY:	

Note: If a Bid Bond is provided, it must be accompanied by a power of attorney which appoints the Surety's true and lawful attorney-in-fact to make, execute, seal and deliver this Bid Bond.

#### CITY OF KIRKLAND SUBCONTRACTOR IDENTIFICATION FOR CONTRACTS ESTIMATED TO BE IN EXCESS OF ONE MILLION DOLLARS (\$1,000,000.00)

RCW 39.30.060 requires the following:

"(1) Every invitation to bid on a prime contract that is expected to cost one million dollars or more for the construction, alteration, or repair of any public building or public work of the state or a state agency or municipality as defined under RCW 39.04.010 ... shall require each prime contract bidder to submit:

(a) **Within one hour after the published bid submittal time**, the names of the subcontractors with whom the bidder, if awarded the contract, will subcontract for performance of the work of: HVAC (heating, ventilation, and air conditioning); plumbing as described in chapter 18.106 RCW; and electrical as described in chapter 19.28 RCW, or to name itself for the work; or

(b) **Within forty-eight hours after the published bid submittal time**, the names of the subcontractors with whom the bidder, if awarded the contract, will subcontract for performance of the work of structural steel installation and rebar installation.

The prime contract bidder shall not list more than one subcontractor for each category of work identified, unless subcontractors vary with bid alternates, in which case the prime contract bidder must indicate which subcontractor will be used for which alternate. Failure of the prime contract bidder to submit as part of the bid the names of such subcontractors or to name itself to perform such work or the naming of two or more subcontractors to perform the same work shall render the prime contract bidder's bid non-responsive and, therefore, void."

To turn in this Subcontractor Identification form, please deliver to City Hall, 123 5th Avenue, Kirkland, WA 98033. A City employee will accept, and date/time stamp the form.

Each bidder shall submit a list of:

- 1. HVAC, plumbing, electrical, structural steel installation, and rebar installation subcontractors; and
- 2. The specific items of work those subcontractors will perform on the contract; and
- 3. The specific items of work that will be performed by the bidder on the contract relating to work described in RCW 39.30.060.

#### CITY OF KIRKLAND SUBCONTRACTOR IDENTIFICATION LIST

\*REQUIRED IF ESTIMATE AMOUNT EXCEEDS \$1,000,000 (Reference RCW 39.30.060 RCW)

Proposed Subcontractors and items of work to be performed:
Subcontractor Name:
HVAC Work to be Performed:
Subcontractor Name:
Plumbing Work to be Performed:
Subcontractor Name:
Electrical Work to be Performed:
Subcontractor Name:
Structural Steel Installation Work to be Performed:
Subcontractor Name:
Rebar Installation Work to be Performed:
- make additional pages in necessary -
Work to be performed by Prime Contractor.

#### RETAINAGE INVESTMENT FORM

#### CONTRACTOR:

PROJECT NAME: Kirkland Virtual Service Center

DATE:

Pursuant to R.C.W. 60.28.010, as amended, you may choose how your retainage under this contract will be held and invested. Please complete and sign this form indicating your preference. If you fail to do so, the Owner will hold your retainage as described in "Current Expense" option 1 below.

- 1. <u>Current Expense:</u> The Owner will retain your money in its Current Expense Fund Account until thirty days following final acceptance of the improvement or work as completed. You will not receive interest earned on this money.
- 2. <u>Interest Bearing Account:</u> The Owner will deposit retainage checks in an interest-bearing account in a bank, mutual savings bank, or savings and loan association, not subject to withdrawal until after the final acceptance of the improvement or work as completed or until agreed to by both parties. Interest on the account will be paid to you. Any fees incurred shall be the responsibility of the contractor.
- 3. <u>Escrow/Investments:</u> The Owner will place the retainage checks in escrow with a bank or trust company until thirty days following the final acceptance of the improvement or work as completed. When the moneys reserved are to be placed in escrow, the Owner will issue a check representing the sum of the moneys reserve payable to the bank or trust company and you jointly. This check will be converted into bonds and securities chosen by you and approved by the Owner and these bonds and securities will be held in escrow. Interest on these bonds and securities will be paid to you as interest accrues.

The Contractor in choosing option (3) agrees to assume full responsibility to pay all costs which may accrue from escrow services, brokerage charges or both, and further agrees to assume all risks in connection with the investment of the retained percentages in securities.

4. <u>Bond-in-Lieu:</u> With the consent of the Owner, the contractor may submit a bond for all or any portion of the amount of funds retained by the Owner in a form and from an authorized surety insurer acceptable to the Owner. Such bond and any proceeds therefrom shall be made subject to all claims and liens and in the same manner and priority as set forth for retained percentages in this chapter. The Owner shall release the bonded portion of the retained funds to the contractor within thirty days of accepting the bond from the contractor. Whenever an Owner accepts a bond in lieu of retained funds from a contractor, the contractor shall accept like bonds from any subcontractors or suppliers from which the contractor or supplier to the subcontractor or supplier within thirty days of accepting the bond from the subcontractor or supplier to the subcontractor or supplier within thirty days of accepting the bond from the subcontractor or supplier.

Retainage is normally released 30 days after Final Acceptance of the work or following receipt of Labor and Industries/Department of Revenue clearance, whichever date is the later. Retainage on landscaping work may be retained longer, due to its seasonal nature. State law allows for limited early release in certain circumstances.

KIRKLAND CITY HALL - VIRTUAL SERVICE CENTER CONTRACT DOCUMENTS

#### CONTRACTOR:

Signature:	
Print or Type Name:	
Title:	
Date:	

## THIS FORM TO BE EXECUTED AFTER CONTRACT IS AWARDED

### END OF SECTION

#### AGREEMENT FORM

THIS AGREEMENT is made and entered into this \_\_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_ by and between the City of Kirkland, Washington, a municipal corporation of the State of Washington, hereinafter referred to as "City" and \_\_\_\_\_\_, hereinafter referred to as "Contractor" effective as of the date of the first signature on the agreement so long as all other parties' authorized signatories have also executed the Agreement.

In consideration of the mutual covenants and obligations contained herein, the City and Contractor agree as follows:

- 1. **Agreement.** The "Contract Documents" form the "Contract." The Contract Documents consist of this Agreement, any attached Exhibits, the Project Manual, including the General Conditions; Supplemental Conditions, if any, Special Provisions, if any, the Specifications, Contract Plans, and Amendments to the Specifications; and written modifications, amendments and Change Orders to the Contract issued after execution of this Agreement, the City's Contract Bid Documents for the Project, including but not limited to the Bid package, Instructions to Bidder, Addenda, Proposal Form, Contractor's Proposal and all documents referenced as comprising the Contract and Contract Documents, which are hereby fully incorporated as part of the Contract as if set forth herein.
- 2. **Project.** Contractor shall fully complete all Work and furnish all labor, tools, materials, and equipment for the project entitled Kirkland Virtual Service Center, Job #49-22-PW, including all changes to the Work, timely and in strict accordance with the Contract Documents.
- 3. Payments. In consideration of full and faithful compliance with the terms and conditions of this agreement and the Contract Documents, the City shall pay Contractor, at the times and in the provided Documents, total manner in the Contract the sum of Dollars (\$\_ ), which sum is subject, however, to increase or decrease in such proportion as the quantities for unit price items set forth in the Bid Proposal Form are so changed as set forth in the Contract Documents or as modified by an approved Change Order or addendum as permitted by the Contract Documents. The payments to Contractor include the costs for all labor, tools, materials, equipment, and subcontracts for the Work.
- 4. **Contract Sum.** The Contract Sum shall be the bid amount plus anticipated Washington State Sales Tax, subject to addition and deductions as provided in the Contract Documents.

The Contract Sum is based upon the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:

5. Completion Date. The Contract Time shall be measured from the Notice to Proceed date to the date of Substantial Completion, subject to adjustments of the Contract Time as provided in the Contract Documents. Time is of the essence in completion of the Work. Contractor shall achieve Substantial Completion of the Work by 195 consecutive calendar Days after receipt of the notice to proceed, which shall be sent via e-mail, subject to adjustments of this Contract Time as provided in the Contract Documents, and shall achieve Final Completion not later than 30 consecutive calendar Days thereafter. Contractor represents to the City that the Contract Time is adequate for full performance of the Work. Contractor shall also achieve any interim milestones and phasing requirements set forth in the Contract Documents. If the physical Work under this Agreement is not completed within the time specified, Contractor shall pay liquidated damages

and all engineering inspection and supervisions costs to the City as specified in the Contract Documents.

- 6. Liquidated damages. The City will assess, and Contractor will be responsible for, liquidated damages in the amount of \$1975.00 per Day for each Day beyond the Contract Time that Substantial Completion is not timely achieved and \$535.00 per Day beyond the Contract Time that Final Completion is not timely achieved. Contractor and the City agree that any liquidated damages established by this Agreement are not penalties and are a reasonable estimation of actual damages to the City, as of this date of Agreement, based on the inherent uncertainty and difficulty in calculating and quantifying damages caused by delays in the construction of the Project. This provision is intended to be in lieu of Contractor's liability for delay damages sustained by Owner by reason of Contractor's delay in reaching Substantial Completion by the date set for Substantial Completion. This provision shall not relieve or release Contractor from liability occasioned by other breaches or defaults under this Contract, nor shall it limit Owner's rights to terminate the Contract for cause pursuant to the General Conditions or to pursue any other remedy under the Contract or otherwise. In addition, Owner may recover its actual damages (including direct architectural, administrative, and other related costs attributable to the Project) as a result of any delay by Contractor in reaching Final Completion within the time required in Paragraph 4 above.
- 7. Independent Contractor. Contractor's employees, while engaged in the performance of any of Contractor's services under this Agreement, shall be considered employees of the Contractor and not employees, agents, representatives of the City and as a result, shall not be entitled to any coverage or benefits from the City. Contractor's relation to the City shall be at all times as an independent contractor. Any and all Workman's Compensation Act claims on behalf of Contractor employees, and any and all claims by third-party as a consequence of any negligent act or omission on the part of Contractor's employees, while engaged in services provided to be rendered under this Agreement, shall be solely Contractor's obligation and responsibility.
- 8. **Jurisdiction and Venue.** Any lawsuit or legal action brought by any party to enforce or interpret this Agreement or any of its terms or covenants shall be brought in King County Superior Court for the State of Washington.
- 9. Contract is complete and integrated agreement. The Contract represents the entire, complete, and integrated agreement between the parties and supersedes prior negotiations, representations or agreements, either written or oral. No oral representations or other agreements have been made by the parties except as specifically established in the Contract.
- 10. **Severability.** A court of competent jurisdiction's determination that any provision or part of this Agreement is illegal or unenforceable shall not cancel or invalidate the remainder of this Agreement, which shall remain in full force and effect. In such event a provision is determined void or unenforceable, the parties agree to negotiate a replacement provision to enable that party to receive the benefit as nearly as possible as to what it would have received but for the determination that a provision was illegal or unenforceable.
- 11. **Disclaimer.** No liability of Contractor shall attach to the City by reason of entering into this Agreement, except as expressly provided in this Agreement.

In witness whereof, the City, as approved by the City Council, and Contractor have executed this agreement by their proper officers or duly authorized agents

Dated:	Dated:
City of Kirkland	Contractor Name
Ву:	Ву:
Its:	Its:

Attention: If Contractor is a corporation, the name of the corporation should be listed in full and both the President and Secretary must sign the contract. OR, if one signature is permitted by corporation by-laws, a copy of the by-laws shall be furnished to the City and made part of the Contract Documents.

If the business is a partnership, the full name of each partner should be listed followed by d/b/a and the firm or trade name. Any one partner may sign the Contract.

If the business is a limited liability company, an authorized management member or manager must sign followed by his/her title.

(For corporations, LLC's and other legal entities)

STATE OF WASHINGTON	)
COUNTY OF KING	)

On this day before me	e, the undersigned, a Notary Publ	ic in and for the State of Washington, duly
commissioned and sv	vorn, personally appeared	, to me known to
be the	of	, the legal entity that executed the
foregoing instrument, and acknowledged the said instrument to be the free and voluntary act and deed of		
said legal entity, for the uses and purposes therein set forth, and on oath stated that he/she was		
authorized to sign sai	d instrument.	

Given under my hand and official seal this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_.

Print Name: \_\_\_\_\_\_ NOTARY PUBLIC in and for the State of Washington, residing \_\_\_\_\_\_ Commission expires: \_\_\_\_\_\_

(For individuals and d/b/a's)

STATE OF WASHINGTON

COUNTY OF KING

) SS ) On this day before me, the undersigned, a Notary Public in and for the State of Washington, duly commissioned and sworn, personally appeared \_\_\_\_\_\_ and

to me known to be the individual(s) described herein and who executed the foregoing instrument, and acknowledged that he/she/they signed the same as his/her/their free and voluntary act and deed, for the uses and purposes therein mentioned.

Given under my hand and official seal this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

Print Name: \_\_\_\_\_\_ NOTARY PUBLIC in and for the State of Washington, residing \_\_\_\_\_\_ Commission expires: \_\_\_\_\_

**END OF SECTION** 

#### BONDS AND CERTIFICATES

The bond and insurance requirements set forth on the following pages are required of the successful bidder.

- 1.01 <u>GENERAL:</u> In addition to the Bid Security, the City of Kirkland requires the Contractor to furnish the following bonds and insurance. The insurance coverage shall be maintained during the life of the Contract and for not less than one year thereafter.
- 1.02 EVIDENCE OF COMPLIANCE:
  - A. <u>Performance Bond:</u> Submitted at time of execution of the Contract and attached thereto.
  - B. <u>Labor, Materials, and Taxes Bond:</u> Submitted at time of execution of the Contract and attached thereto.
  - B. <u>Insurance</u>: A Certificate of Insurance shall be filed with "City of Kirkland." This Certificate shall be reflective of all Insurance Coverage required by the City's Contract Documents. Any Certificate filed with the City of Kirkland found to be incomplete or not according to Form, will be returned as not satisfactory. Rejected Certificates shall be corrected as necessary and resubmitted to the City of Kirkland.

Certificates of Insurance shall indicate the following to be Additional Named Insureds:

- City of Kirkland; It's officers, elected officials, employees, agents, and volunteers
- Consultants hired by the City of Kirkland to administer the construction
- The Architect/Engineer(s) of Record

In addition to the foregoing, the Certificate of Insurance must include a Cancellation Notification of not less than forty-five (45) days. The Certificate should also contain the Contract Number and a "concise verbal definition" of the Contract to which the Certificate applies.

1.03 INSURANCE GENERALLY: The Contractor shall not commence work under this contract until he has obtained the insurance required hereunder and such insurance has been approved by the City of Kirkland. In like manner, the General Contractor shall not allow any subcontractor to commence work on any subcontract until the subcontractor has submitted to the General Contractor a Certificate of Insurance reflective of the coverage required by the City of Kirkland. The City of Kirkland's approval of insurance shall not relieve or decrease the Contractor's liability hereunder. Each policy shall contain an endorsement stating that the insurance company will not, prior to the completion of the Work or any expiration date shown on the policy and certificate, whichever occurs first, terminate the policy or change any coverage therein without first mailing, by registered mail, written notice of such action at least thirty (30) days prior to the termination or change, to the City of Kirkland. Certificate shall be issued on an ACORD Form, or a form that meets with the City of Kirkland's approval. The Insuring Company shall have a Best Rating of A, or meet with the City of Kirkland's approval.

The "Cancellation" Block shall be altered to include the wording "Should any of the above described policies be canceled or materially reduced before expiration date thereof, the issuing company will mail 30 days written notice to the certificate holder named to the left."

1.04 <u>CONTRACTOR'S LIABILITY INSURANCE</u>: The insurance required by the City of Kirkland is as specified below and in the amounts indicated:
- Α. Worker's Compensation and Employer's Liability Insurance: All employees of the Contractor and subcontractors shall be insured under Washington State Industrial Insurance. Employees not subject to the State Act shall be insured under Employer's Liability with a \$2,000,000.00 limit of liability. A separate Certificate of Insurance shall be furnished to the City of Kirkland if any of the Contractor' payroll is not reported to the Washington State Industrial Insurance. The contractor shall be responsible for confirming compliance of all subcontractors with the above requirements.
- Β. Comprehensive General Liability and Comprehensive Automobile Liability Insurance: The Contractor shall obtain and retain Bodily Injury and Property Damage Liability Insurance providing the following:
  - Additional Insured: City of Kirkland, and the Architect/Engineer of Record shall be 1. named as additional insured for liability arising out of the work of this Contract as a result of the negligence, real or alleged, on the part of the contractor and his subcontractors.
  - 2. Limits of Liability: The minimum acceptable General Liability Limit shall be \$5,000,000 Aggregate/\$2,000.000 Occurrence. Coverage shall include owners & Contractors Protective Liability and Employers Liability (Stop-Gap) Coverage. The minimum acceptable Automobile Liability Limit shall be \$2,000,000. The Owner does not represent that the minimum required insurance coverage or limits are adequate to protect Contractor from all liabilities.
  - Coverage: Coverage shall be written on an "Occurrence" Basis, or meet the City of 3. Kirkland's approval. Coverage shall be as is usual to the practice of the Insurance Industry; included but not limited to the following coverages:
    - Premises and Operations including Explosion, Collapse and Underground a. Liability:
    - b. Products and completed Operations;
    - Owners and Contractors Protective Liability; C.
    - Broad form Property Damage Liability: d.
    - Blanket Contractual Liability: e.
    - Personal Injury Liability, including coverage's A, B, and C; f.
    - Employers "Stop-Gap" Liability; g.
    - Automobile Liability for All Owned, Non-Owned, Hired Leased or Borrowed h. Vehicles. Automobile Coverage shall include "Any Auto" or "Scheduled Autos" and shall include Hired and Non-Owned Auto Liability; i.
      - Un-insured and Under-insured Motorist Coverage should also be in effect.
  - Products and Completed Operations Insurance: The minimum acceptable Annual 4. Aggregate for Products and Completed Operations Liability shall be \$5,000,000. This coverage must be maintained for a period of not less than three years after the final acceptance of the work performed.
  - Professional Liability: The minimum acceptable coverage for Professional Liability shall 5. be \$1,000,000, if applicable.
- 1.05 PROPERTY INSURANCE: The Contractor shall purchase and maintain property insurance upon the entire Work at the site to 115 percent of the full value thereof. This insurance shall include the interests the City of Kirkland, the Contractor, and all subcontractors in the Work being performed. The coverage shall be written on a "Builder's Risk" basis. All materials which are to be made part of the construction project are to be so insured while being stored at or off the job site(s) and/or while being transported to and from the job site(s). Builders Risk insurance shall be on a special perils policy form and shall insure against the perils of fire and extended coverage and physical loss or damage including flood, earthquake, theft, vandalism, malicious mischief, and collapse. The Builders Risk insurance shall include coverage for temporary buildings, debris removal, and damage to materials in transit or stored off-site. This Builders Risk insurance covering the work will have a deductible of \$5,000 for each occurrence, which will be the

responsibility of the Contractor. Higher deductibles for flood and earthquake perils may be accepted by the Owner upon written request by the Contractor and written acceptance by the Owner. Any increased deductibles accepted by the Owner will remain the responsibility of the Contractor. The Builders Risk insurance shall be maintained until the Owner has granted substantial completion of the project. Insurance against loss of tools, equipment, construction, or otherwise not to be incorporated into the Work is the responsibility of the Contractor and the cost of such insurance shall not be included in the cost of insurance required herein before.

- A. <u>Waiver</u>: City of Kirkland and the Contractor waive all rights against (1) each other and the subcontractors, sub-subcontractors, agents and employees each of the other, and (2) the Owner for damages caused by fire or other perils to the extent covered by insurance obtained pursuant to this Article or any other property insurance applicable to the Work, except such rights as they may have to the proceeds of such insurance held by the City of Kirkland, as trustee.
- 1.06 <u>BONDS</u>
  - A. <u>Performance and Payment Bond:</u> Furnish surety bond (Section 00 61 40) in an amount equal to 100 percent of the Contract Sum covering faithful performance of the work and payment of labor and materials. Furnish bonds issued by a bonding company licensed to transact business in the locality of the Work and approved by the Owner. The bond must state that it is provided pursuant to Ch. 39.08 RCW.

END OF SECTION

### PERFORMANCE BOND

### SURETY TO HAVE AN A.M. BEST RATING OF A:VII OR BETTER.

Bond No.

KNOW ALL PERSONS BY THESE PRESENTS, that \_\_\_\_\_\_\_\_(Contractor), as Principal, and \_\_\_\_\_\_\_, (insert name of surety), as Surety, a corporation duly organized under the laws of the State of \_\_\_\_\_\_\_, (insert Surety's state of incorporation), and authorized to do business as a surety in the State of Washington, are held and firmly bound unto the City of Kirkland (City) in the sum of \_\_\_\_\_\_\_ dollars (\$\_\_\_\_\_\_), lawful money of the United States of America, plus the total amount of extra orders issued by the City to the Principal pursuant to the terms of the Contract referred to in the next succeeding paragraph hereof, for the payment whereof Principal and Surety bind ourselves, and our heirs, executors, administrators, representatives, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has been awarded, and is about to enter into, a written Contract with the City for **PROJECT NAME:** Kirkland Virtual Service Center, which is hereby made a part of this bond as if fully set forth herein;

NOW, THEREFORE, the condition of this bond is such that:

- 1. If the Principal shall completely and faithfully perform all of its obligations under the Contract, including any warranties required thereunder, and all modifications, amendments, additions, and alterations thereto, including modifications which increase the contract price or time for completion, with or without notice to the surety;
- 2. If the Principal shall indemnify and hold the City harmless from any and all losses, liability, damages, claims, judgments, liens, costs, and fees of any type that the City may be subject to because of the failure or default of the Principal (a) in performance of any of the terms, conditions, or obligations of the Contract, including all modifications, amendments, additions, and alterations thereto, and any warranties required thereunder, and/or (b) in the payment for labor, equipment, and materials by satisfying all claims and demands incurred under the Contract, and reimbursing and paying Owner all expenses that Owner may incur in making good any default by the Principal; and
- 3. If the Principal shall indemnify and hold the City harmless from all claims, liabilities, causes of action, damages and costs, including property damages and personal injuries, resulting from any defect appearing or developing in the material provided or workmanship performed under the Contract;

THEN THIS obligation shall be null and void; otherwise to remain in full force and effect. If the City shall declare Principal to be in default of the Contract, and shall so notify Surety, Surety shall, within a reasonable time which shall not exceed 14 days, except for good cause shown, notify the City in writing of the manner in which surety will satisfy its obligations under this Bond.

Nonpayment of the Bond premium will not invalidate this Bond nor shall the City be obligated for the payment thereof. The Surety hereby waives notice of any modification of the Contract or extension of time made by the City.

Signed this	day of	, 20	
Principal:		Surety:	
Ву:		Ву:	
Title:		Title:	
Address:		Address:	
City/Zip:		City/Zip:	
Telephone: (	)	Telephone:	( )

Note: A power of attorney must be provided which appoints the Surety's true and lawful attorney-in-fact to make, execute, seal and deliver this performance bond.

KIRKLAND CITY HALL - VIRTUAL SERVICE CENTER CONTRACT DOCUMENTS



### LABOR, MATERIAL, AND TAXES BOND (PAYMENT BOND)

### Surety to have an A.M. Best rating of A:VII or better.

Bond No. \_\_\_

KNOW ALL PERSONS BY THESE PRESENTS, that, \_\_\_\_\_\_ (Contractor), as Principal, and \_\_\_\_\_\_, (insert name of surety), as Surety, a corporation duly organized under the laws of the State of \_\_\_\_\_\_ (insert Surety's state of incorporation), and authorized to do business as a surety in the State of Washington, are held and firmly bound unto the City of Kirkland (City) for the use and benefit of claimants as hereinafter defined, in the sum of \_\_\_\_\_\_ Dollars (\$\_\_\_\_\_\_), lawful money of the United States of America, plus the total amount of any extra orders issued by the City, for the payment whereof Principal and Surety bind themselves, their heirs, executors, administrators, representatives, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, Principal has been awarded, and is about to enter into, a Contract with City of Kirkland for **PROJECT NAME: Kirkland Virtual Service Center**, which contract is by this reference made a part hereof;

WHEREAS, the contract is a public works contract, subject to the provisions of RCW Titles 39 and 60;

NOW, THEREFORE, the conditions of this obligation are such that, if the Principal shall promptly make payment to all claimants as hereinafter defined, for (a) all labor and material used or reasonably required for use in the performance of the contract and (b) all taxes, increases, and penalties incurred on the above-referenced contract under Titles 50, 51, and 82 RCW which may be due, then this obligation shall be void; otherwise, it shall remain in full force and effect, subject, however, to the following conditions: A claimant is defined as and includes (a) a person claiming to have supplied labor or materials for the prosecution of the work provided for in the contract, including any person having direct contractual relationship with the contractor furnishing the bond or direct contractual relationship with any subcontractor, or an assignee of such person, (b) the state with respect to taxes incurred on the above-referenced contract under Titles 50, 51, and 82 RCW which may be due and (c) any other person or entity as allowed or required by law.

1. The Principal and Surety hereby jointly and severally agree with the City that every claimant as herein defined, who has not been paid in full prior to Final Acceptance of the project, or materials were furnished by such claimant, has an action on this bond for such sum or sums as may be justly due claimant, and may have execution thereon. The City shall not be liable for the payment of any costs or expenses of any such suit or action.

(Form continues on next page)

2. No suit or action shall be commenced hereunder by any claimant (except the state with respect to taxes, increases, and penalties incurred on the above-referenced contract under Titles 50, 51, and 82 RCW which may be due) unless the claimant has sent the written notice required under RCW Title 39 to the Principal and to the City's Purchasing Agent by registered or certified mail, or by hand delivery, no later than 30 days after Final Acceptance of the Project.

The amount of this bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder, inclusive of the payment by Surety of mechanics' liens which may be filed of record against the improvement, whether or not claim for the amount of such lien be presented under and against this bond.

The Surety hereby waives notice of any modification of the contract or extension of time made by the City.

Signed this	day of	, 20
	Surety.	
By:	By:	
Title:	Title:	
Address:	Address:	
City/Zip:	City/Zip:	
Telephone: ( )	Telephone: (	)

Note: A power of attorney must be provided which appoints the Surety's true and lawful attorney-in-fact to make, execute, seal and deliver this performance bond.

### END OF LABOR, MATERIAL AND TAXES (PAYMENT) BOND FORM

### DOCUMENT 00 63 00 – CLARFICATION, MODIFICATION, AND CLOSEOUT FORMS

### 1.1 ADMINISTRATIVE FORMS

- A. Sample copies of administrative forms are provided in this section. Originals may be obtained from the American Institute of Architects; https://www.aiacontractdocs.org; (800) 942-7732, or requested from Architect.
- B. Information and Modification Forms:
  - 1. Change Order Form: AIA Document G701-2001 "Change Order."
  - 2. Form of Request for Proposal: AIA Document G709-2001 "Work Changes Proposal Request."
  - 3. Form of Architect's Memorandum for Minor Changes in the Work: AIA Document G710-1992 "Architect's Supplemental Instructions."
  - 4. Form of Change Directive: AIA Document G714-2007 "Construction Change Directive."
  - 5. Form of Requests for Information (RFIs): AIA Document G716-2004 "Request for Information (RFI)."
  - 6. Substitution Request Form: CSI Form 1.5C
- C. Payment Formatting and Closeout Forms:
  - 1. Payment Application: AIA Document G702S-2017 "Application and Certificate for Payment and Continuation Sheet."
  - 2. Schedule of Values Form: AIA Document G703S-2017 "Continuation Sheet."
  - 3. Certificate of Substantial Completion: AIA Document G704-2017 "Substantial Completion Certificate."

END OF DOCUMENT 00 63 00

# MAIA® Document G701<sup>™</sup> – 2017

# **Change Order**

**PROJECT**: (name and address)

CONTRACT INFORMATION: Contract For: Date:

CHANGE ORDER INFORMATION: Change Order Number: Date:

**OWNER:** (name and address)

**ARCHITECT**: (name and address)

**CONTRACTOR:** (name and address)

### THE CONTRACT IS CHANGED AS FOLLOWS:

(Insert a detailed description of the change and, if applicable, attach or reference specific exhibits. Also include agreed upon adjustments attributable to executed Construction Change Directives.)

The original (Contract Sum) (Guaranteed Maximum Price) was	\$ 	
The net change by previously authorized Change Orders	\$	
The (Contract Sum) (Guaranteed Maximum Price) prior to this Change Order was	\$	
The (Contract Sum) (Guaranteed Maximum Price) will be (increased) (decreased) (unchanged) by this Change Order in the amount of	\$	
The new (Contract Sum) (Guaranteed Maximum Price), including this Change Order, will be	\$	=
The Contract Time will be (increased) (decreased) (unchanged) by	(	) days.
The new date of Substantial Completion will be		

NOTE: This Change Order does not include adjustments to the Contract Sum or Guaranteed Maximum Price, or the Contract Time, that have been authorized by Construction Change Directive until the cost and time have been agreed upon by both the Owner and Contractor, in which case a Change Order is executed to supersede the Construction Change

Directive.

### NOT VALID UNTIL SIGNED BY THE ARCHITECT, CONTRACTOR AND OWNER.

ARCHITECT (Firm name)	CONTRACTOR (Firm name)	OWNER (Firm name)
SIGNATURE	SIGNATURE	SIGNATURE
PRINTED NAME AND TITLE	PRINTED NAME AND TITLE	PRINTED NAME AND TITLE
DATE	DATE	DATE

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Application and Certificate for Payment, Contra TO CONTRACTOR: PROJECT: PROJECT:	tor-Subcontractor Version APPLICATION NO: PERIOD TO: SUBCONTRACT FOR: SUBCONTRACT DATE:	Distribution to: OWNER ARCHITECT CONTRACTOR
FROM SUBCONTRACTOR:	SUBCONTRACT DATE: PROJECT NOS:	CONTRACTOR D
<b>SUBCONTRACTOR'S APPLICATION FOR PAYMENT</b> Application is made for payment, as shown below, in connection with the Subcom AIA Document G703 <sup>TM</sup> , Continuation Sheet, is attached.	The undersigned Subcontractor certifies that to the information and belief the Work covered by this Appacet. accordance with the Subcontract Documents, that all and Work for which previous Certificates for Payment work for which the current provide the base is in a construct the subcontract because the subcontract and that current provide the subcontract because the subcontract set of the set of	e best of the Subcontractor's knowledge, blication for Payment has been completed in ounts have been paid by the Subcontractor for 'ere issued and payments received from the
2. NET CHANGE BY CHANGE ORDERS	SUBCONTRACTOR:	17 CUL-
4. TOTAL COMPLETED & STORED TO DATE ( <i>Column G on G703</i> )	State of:	Date:
5. RETAINAGE: a% of Completed Work (Columns $D + E$ on G703) §	County of: Subscribed and sworn to before me this day of	
(Column F on G703)	Notary Public:	
Total Retainage (Lines 5a + 5b, or Total in Column I of G703) \$	My commission expires:	
6. TOTAL EARNED LESS RETAINAGE		a B
8. CURRENT PAYMENT DUE		
9. BALANCE TO FINISH, INCLUDING RETAINAGE (Line 3 minus Line 6)		
CHANGE ORDER SUMMARY ADDITIONS DE	UCTIONS	30
I otal changes approved in previous months by Owner \$     \$       Total approved this month     \$		
TOTAL S \$		
NET CHANGES by Change Order S		

stitute ects' legal counsel, copyright@aia.org.

ALA Document G703STM – 2017

# **Continuation Sheet, Contractor-Subcontractor Version**

		ITEM DE		A	Use Column I on	In tabulations bel	AIA Document ( Payment; or G73) Subcontractor's s
GRAND TOTAL		SCRIPTION OF WORK		В	Contracts where variable reta	ow, amounts are stated to the	702 <sup>TM</sup> , Application and Certi 2 <sup>TM</sup> –2009, Application and Ce
		SCHEDULED VALUE		С	inage for line items	nearest dollar.	fication for Paymen ertificate for Paymer
		FROM PREVIOUS APPLICATION (D + E)	WORK CO	ם	may apply.		t; G702 <sup>TM</sup> CMa–199) it, Construction Mar
-		THIS PERIOD	MPLETED	п			2, Application and C 1ager as Adviser Edi
		MATERIALS PRESENTLY STORED (Not in D or E)		L			ertificate for tion, containing
		TOTAL COMPLETED AND STORED TO DATE (D + E + F)		G	ARCHITECT'S PRO	PERIOD TO:	APPLICATION NO APPLICATION DA
1		% (G ÷ C)			DJECT NO		9
ũ.		BALANCE TO FINISH (C - G)	;	Н			
	20 N	RETAINAGE (lf variable rate)	,	1			

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# MATA<sup>®</sup> Document G704<sup>™</sup> – 2017

# Certificate of Substantial Completion

<b>PROJECT:</b> (name and address)	CONTRACT INFORM Contract For: Date:	ATION:	CERTIFICATE INFORMATION: Certificate Number: Date:
OWNER: (name and address)	ARCHITECT: (name	and address)	CONTRACTOR: (name and address)
The Work identified below has to be substantially complete. Su designated portion is sufficientl or utilize the Work for its inten- below is the date established by <i>(Identify the Work, or portion the</i> )	been reviewed and found, to abstantial Completion is the y complete in accordance w ded use. The date of Substant this Certificate. <i>hereof, that is substantially c</i>	the Architect's best ki stage in the progress of ith the Contract Docum tial Completion of the complete.)	nowledge, information, and belief, f the Work when the Work or aents so that the Owner can occupy Project or portion designated
ARCHITECT (Firm Name) SIGN	ATURE P	RINTED NAME AND TITLE	DATE OF SUBSTANTIAL COMPLETION
WARRANTIES	tion of the Project or portion	designated above is al	les the date of commencement of

The date of Substantial Completion of the Project or portion designated above is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below:

(Identify warranties that do not commence on the date of Substantial Completion, if any, and indicate their date of commencement.)

### WORK TO BE COMPLETED OR CORRECTED

A list of items to be completed or corrected is attached hereto, or transmitted as agreed upon by the parties, and identified as follows:

(Identify the list of Work to be completed or corrected.)

The failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. Unless otherwise agreed to in writing, the date of commencement of warranties for items on the attached list will be the date of issuance of the final Certificate of Payment or the date of final payment, whichever occurs first. The Contractor will complete or correct the Work on the list of items attached hereto within ( ) days from the above date of Substantial Completion.

Cost estimate of Work to be completed or corrected: \$

The responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work, insurance, and other items identified below shall be as follows:

(Note: Owner's and Contractor's legal and insurance counsel should review insurance requirements and coverage.)

The Owner and Contractor hereby accept the responsibilities assigned to them in this Certificate of Substantial Completion:

CONTRACTOR (Firm Name)	SIGNATURE	PRINTED NAME AND TITLE	DATE
OWNER (Firm Name)	SIGNATURE	PRINTED NAME AND TITLE	DATE
Ala Desument C704TM 2017	Converse 1062 1079 1002 2000 on	d 2017 by The American Institute of /	Architecto All viente versional MADNINC:

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# Matheward Mathematics All and a second seco

# **Proposal Request**

**PROJECT:** (name and address):

CONTRACT INFORMATION: Contract For: Date: Architect's Project number: Proposal Request Number: Proposal Request Date:

**OWNER**: (name and address):

**ARCHITECT:** (name and address):

**CONTRACTOR:** (name and address):

The Owner requests an itemized proposal for changes to the Contract Sum and Contract Time for proposed modifications to the Contract Documents described herein. The Contractor shall submit this proposal within ( ) days or notify the Architect in writing of the anticipated date of submission.

(Insert a detailed description of the proposed modifications to the Contract Documents and, if applicable, attach or reference specific exhibits.)

THIS IS NOT A CHANGE ORDER, A CONSTRUCTION CHANGE DIRECTIVE, OR A DIRECTION TO PROCEED WITH THE WORK DESCRIBED IN THE PROPOSED MODIFICATIONS.

**REQUESTED BY THE ARCHITECT:** 

PRINTED NAME AND TITLE

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# MATA<sup>®</sup> Document G710<sup>™</sup> – 2017

# Architect's Supplemental Instructions

<b>PROJECT:</b> (name and address)	<b>CONTRACT INFORMATION:</b> Contract For: Date:	ASI INFORMATION: ASI Number: Date:
OWNER: (name and address)	ARCHITECT: (name and address)	CONTRACTOR: (name and address)

The Contractor shall carry out the Work in accordance with the following supplemental instructions without change in Contract Sum or Contract Time. Proceeding with the Work in accordance with these instructions indicates your acknowledgment that there will be no change in the Contract Sum or Contract Time. (Insert a detailed description of the Architect's supplemental instructions and, if applicable, attach or reference specific exhibits.)

**ISSUED BY THE ARCHITECT:** 

ARCHITECT (Firm name)

SIGNATURE

PRINTED NAME AND TITLE

DATE

# MAIA<sup>®</sup> Document G714<sup>™</sup> – 2017

# **Construction Change Directive**

**PROJECT:** (name and address)

CONTRACT INFORMATION: Contract For: Date: **CCD INFORMATION:** Directive Number: Date:

**OWNER**: (name and address)

**ARCHITECT**: (name and address)

**CONTRACTOR**: (name and address)

The Contractor is hereby directed to make the following change(s) in this Contract: (Insert a detailed description of the change and, if applicable, attach or reference specific exhibits.)

### PROPOSED ADJUSTMENTS

1. The proposed basis of adjustment to the Contract Sum or Guaranteed Maximum Price:

- □ Lump Sum (increase) (decrease) of \$
- □ Unit Price of \$ per
- □ Cost, as defined below, plus the following fee: (Insert a definition of, or method for determining, cost)
- $\Box$  As follows:
- 2. The Contract Time is proposed to (be adjusted) (remain unchanged). The proposed adjustment, if any, is (an increase of days) (a decrease of days).

NOTE: The Owner, Architect and Contractor should execute a Change Order to supersede this Construction Change Directive to the extent they agree upon adjustments to the Contract Sum, Contract Time, or Guaranteed Maximum price for the change(s) described herein.

When signed by the Owner and Architect and received by the Contractor, this document becomes effective IMMEDIATELY as a Construction Change Directive (CCD), and the Contractor shall proceed with the change(s) described above.

Contractor signature indicates agreement with the proposed adjustments in Contract Sum and Contract Time set forth in this CCD.

ARCHITECT (Firm name)	OWNER (Firm name)	CONTRACTOR (Firm name)
SIGNATURE	SIGNATURE	SIGNATURE
PRINTED NAME AND TITLE	PRINTED NAME AND TITLE	PRINTED NAME AND TITLE
DATE	DATE	DATE

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# MAIA® Document G716™ – 2004

# Request for Information (RFI)

TO:	FROM:
2	$(\Omega / \alpha)$
PROJECT:	ISSUE DATE: RFI No.:
	REQUESTED REPLY DATE:
PROJECT NUMBERS:	COPIES TO:
	$\langle \langle ( \cdot ) \rangle$

REFERENCES/ATTACHMENTS: (List specific documents researched when seeking the information requested.)SPECIFICATIONSDRAWINGSOTHER

**SENDER'S RECOMMENDATION:** (If RFI concerns a site or construction condition, the sender may provide a recommended solution, including cost and/or schedule considerations.)

RECEIVER'S REPLY: (Provide answer to RFI, including cost and/or schedule considerations.)

By:

Date:

Copies to:

**NOTE:** This reply is not an authorization to proceed with work involving additional cost, time or both. If any reply requires a change to the Contract Documents, a Change Order, Construction Change Directive or a Minor Change in the work must be executed in accordance with the Contract Documents.

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# CSI Form 1.5C

## SUBSTITUTION REQUEST (During the Bid Period)

Project:	Substitution Request Number:
	From:
То:	Date:
· · · · · · · · · · · · · · · · · · ·	A/E Project Number:
Re:	Contract For:
Specification Title:	Description:
Section: Page:	Article/Paragraph:
Proposed Substitution:	
Manufacturer: Address: Trade Name:	Phone: Model No.:
Attached data includes product description, specification of the request; applicable portions of the data are clearly	ons, drawings, photographs, and performance and test data adequate for evaluation
Attached data also includes a description of changes to installation.	o the Contract Documents that the proposed substitution will require for its proper
Proposed substitution will have no adverse effect o     Proposed substitution does not affect dimensions a     Payment will be made for changes to building     substitution.  Submitted by: Signed by: Firm: Address:	n other trades and will not affect or delay progress schedule. nd functional clearances. design, including A/E design, detailing, and construction costs caused by the
Telephone:	
A/E's REVIEW AND ACTION	
<ul> <li>Substitution approved - Make submittals in accordan</li> <li>Substitution approved as noted - Make submittals in</li> <li>Substitution rejected - Use specified materials.</li> <li>Substitution Request received too late - Use specified</li> </ul>	ce with Specification Section 01 25 00 Substitution Procedures. accordance with Specification Section 01 25 00 Substitution Procedures. I materials.
Signed by:	Date:
Supporting Data Attached: 🗌 Drawings 🗌 Pro	oduct Data 🔲 Samples 🗌 Tests 🗌 Reports 🗌
© Copyright 2007, Construction Specifications Institute, 110 South Union Street, Suite 100, Alexandria, VA 22314 This is not an official CSI Construction Contract Administration	Page 1 Form Version: June 2004 CSI Form 1.5C a (CCA) Form. Please use CSI's official CCA Forms if required by your project needs.

\* . \* #

### **GENERAL CONDITIONS**

### PART 1 – GENERAL TERMS

### 1.1 DEFINITIONS

- A. "Application for Payment" means a written request submitted by Contractor to Owner for payment of Work completed in accordance with the Contract Documents and approved Schedule of Values, supported by such substantiating data as Owner may require.
- B. "Architect," "Engineer," or "A/E" means a person or entity lawfully entitled to practice architecture or engineering, representing Owner within the limits of its delegated authority.
- C. "Award of Contract" refers to City of Kirkland Council's acceptance of the Contractor's Bid. Council Award, or Bid Rejection, will occur within 60 calendar days after Bid opening. If the lowest responsible Bidder and the City of Kirkland agree, this deadline may be extended. If they cannot agree on an extension by the sixty (60) calendar day deadline, the City of Kirkland reserves the right to Award the Contract to the next lowest responsible Bidder or reject all Bids. The City of Kirkland will notify the successful Bidder of the Contract Award in writing.
- D. "Change Order" means a written instrument signed by Owner and Contractor stating their agreement upon all of the following: (1) a change in the Work; (2) the amount of the adjustment in the Contract Sum, if any, and (3) the extent of the adjustment in the Contract Time, if any.
- E. "Claim" means Contractor's exclusive remedy for resolving disputes with Owner arising out of or relating to the Contract Documents or the breach thereof or requesting an adjustment in the Contract Sum or Contract Time. As used in the Contract Documents, the exclusive meaning of "equitable adjustment" is the ability of Contractor to follow the contractual dispute resolution process as set forth herein, including the requirement for submitting a timely Notice, substantiation, and Claim.
- F. "Construction Change Directive" ("CCD") is a written order prepared by Owner that directs Work prior to total agreement on adjustment, if any, in the Contract Sum or Contract Time, or both.
- G. The "Contract" is the agreement between Owner and Contractor and is formed by the Contract Documents. The Contract represents the entire and integrated agreement between Owner and Contractor and supersedes prior negotiations, representations or agreements, either written or oral.
- H. "Contract Award Amount" is the sum of the Base Bid and any City accepted Alternates, including applicable sales tax at the current rate where the project resides.
- I. "Contract Documents" includes the Executed Agreement, General Conditions, modifications to the General Conditions, Supplementary and Special Conditions, Drawings and Specifications, the Project Manual, the Bonds and Insurance Certificate Requirements provided in the Bid Documents, and all addenda and modifications thereof.
- J. "Contract Sum" is the total amount payable by Owner to Contractor for performance of the Work in accordance with the Contract Documents, including all taxes imposed by law and properly chargeable to the Work, including applicable sales tax at the current rate where the project resides.

- K. "Contract Time" is the number of calendar days allotted in the Contract Documents from the Notice to Proceed for achieving Substantial Completion of the Work.
- L. "Contractor" means the person or entity who has agreed with Owner to perform the Work in accordance with the Contract Documents.
- M. "Day(s)" means calendar day(s) unless otherwise specified.
- N. "Drawings" are the graphic and pictorial portions of the Contract Documents showing the design, location, and dimensions of the Work, and may include plans, elevations, sections, details, schedules, and diagrams.
- O. "Final Acceptance" means the written acceptance of the Work by Owner, as more fully set forth in Section 6.
- P. "Final Completion" means that the Work is fully and finally complete in accordance with the Contract Documents and Contractor has submitted its final Application for Payment, as more fully set forth in Section 6.
- Q. "Force Majeure" means those acts entitling Contractor to request an equitable adjustment in the Contract Time, as more fully set forth in Section 3.
- R. "Notice" means a written notice which has been delivered in person to the individual or a member of the firm or entity or to an officer of the corporation for which it was intended or, if delivered or sent by registered or certified mail, to the last business address known to the party giving notice.
- S. "Notice to Proceed" means a written Notice from Owner to Contractor that permits preconstruction and construction activities to commence upon specified terms and defines the date on which the Contract Time begins to run.
- T. "Owner" means the City of Kirkland, a municipal corporation, which has the authority to enter into, administer, and/or terminate the Work in accordance with the Contract Documents. Owner shall designate in writing a Representative who shall have authority to bind Owner with respect to all matters requiring Owner's approval or authorization. A/E does not have such authority.
- U. "Person" means a corporation, partnership, business association of any kind, trust, company, or individual.
- V. "Prior Occupancy" means Owner's use of all or parts of the Project before Substantial Completion, as more fully set forth in Section 6.
- W. "Project Manual" means all Bid Documents, Contract Documents, General Conditions, Supplementary Conditions, if any, Specifications, Special Provisions, if any, and Addenda, if any.
- X. "Schedule" means a schedule of the Work, in a form satisfactory to Owner, as further set forth in Section 3.
- Y. "Project" means the total construction of which the Work performed in accordance with the Contract Documents may be the whole or a part and which may include construction by Owner or by separate contractors.

- Z. "Schedule of Values" means a written breakdown allocating the total Contract Sum to each principal category of Work, in such detail and format as requested by Owner.
- AA. "Specifications" are that portion of the Contract Documents consisting of the written requirements for materials, equipment, construction systems, standards and workmanship for the Work, and performance of related services. Specifications are prepared in sections which conform generally with trade practices. These sections are for Owner and Contractor convenience and shall not control Contractor in dividing the Work among the Subcontractors or in establishing the extent of the Work to be performed by any trade.
- BB. "Subcontract" means a contract between Contractor and a Subcontractor for the purpose of obtaining supplies, materials, equipment, work or services of any kind for or in connection with the Work.
- CC. "Subcontractor" means any Person of any tier, other than Contractor, who agrees to furnish or furnishes by contract with, or through Contractor, any supplies, materials, equipment, or services of any kind in connection with the Work.
- DD. "Substantial Completion" means that stage in the progress of the Work (or portion of the Work designated and approved by Owner) when the construction is sufficiently complete, in accordance with the Contract Documents, so that Owner can fully occupy or utilize the Work (or portion designated by Owner) for its intended use, as more fully set forth in Section 6. There may be separate dates of Substantial Completion specified in the Contract Documents for various phases or portions of the Work.
- EE. "Work" means the construction and services required by the Contract Documents, and includes, but is not limited to, labor, materials, supplies, equipment, services, permits, and the manufacture and fabrication of components, performed, furnished, or provided in accordance with the Contract Documents.
- FF. "Work Site" means the space identified and circumscribed on construction documents. The work site is controlled by the Contractor and the Contractor is responsible for compliance to regulatory requirements within the circumscribed area. Changes to the work site shall be submitted by Contractor and approved by Owner.

### **1.2 ORDER OF PRECEDENCE**

Any conflict or inconsistency in the Contract Documents shall be resolved by giving the documents precedence in the following order, with a revision to a Contract Document having precedence over the original document and a later document having precedence over an earlier document:

- 1. Executed Agreement, including any Change Orders.
- 2. Supplementary Conditions.
- 3. Special Conditions or Modifications to the General Conditions.
- 4. General Conditions
- 5. Specifications and Drawings. The Specifications and Drawings are complementary and shall have equal precedence. Thus, anything mentioned in the Specifications but not shown on the Drawings, or shown on the Drawings but not mentioned in the Specifications, shall be of like effect as if shown or mentioned in both. If there is any inconsistency between the Specifications and Drawings, Contractor will make an inquiry to Owner to determine how to proceed. Unless otherwise directed, Contractor will provide the better quality or greater

quantity of any Work or materials, as reasonably interpreted by Owner, at no change in the Contract Sum or Contract Time. In case of conflict within the Specifications, provisions in Division 1 shall take precedence over provisions of any other Division. In case of conflict within the Drawings, large scale Drawings shall take precedence over small scale Drawings.

- 6. Signed and Completed Bid Form
- 7. Instructions to Bidders
- 8. Advertisement for Bids

### **1.3 EXECUTION AND INTENT**

<u>Contractor Representations</u>: Contractor makes the following representations to Owner:

- 1. <u>Contract Sum and Contract Time reasonable</u>: The Contract Sum is reasonable compensation for the Work and the Contract Time is adequate for the performance of the Work, as represented by the Contract Documents;
- 2. <u>Contractor familiar with Project</u>: Execution of the Contract by Contractor is a representation that Contractor has carefully reviewed the Contract Documents, visited and examined the Project site, become familiar with the local conditions in which the Work is to be performed, and satisfied itself as to the nature, location, character, quality and quantity of the Work, the labor, weather, materials, equipment, goods, supplies, work, services and other items to be furnished and all other requirements of the Contract Documents, as well as the surface and subsurface conditions and other matters that may be encountered at the Project site or affect performance of the Work or the cost or difficulty thereof; No allowance shall subsequently be made on behalf of Contractor on account of error or negligence on its part or its failure to acquaint itself with the conditions of the site;
- 3. <u>Contractor financially capable</u>: Contractor is financially solvent, able to pay its debts as they mature, and possesses sufficient working capital to complete the Work and perform Contractor's obligations required by the Contract Documents; and
- 4. <u>Contractor can complete the Work</u>: Contractor is able to furnish the plant, tools, materials, supplies, equipment and labor required to complete the Work and perform the obligations required by the Contract Documents and has sufficient experience and competence to do so.

### PART 2 – INSURANCE AND BONDS

### 2.1 CONTRACTOR'S LIABILITY INSURANCE

<u>General insurance requirements</u>: Prior to commencement of the Work, Contractor shall obtain all the insurance required by the Contract Documents and provide evidence satisfactory to Owner that such insurance has been procured, including but not limited to (1) Certificates of Insurance, on ACORD Form 27 and/or ACORD Form 25-S, or other forms that are similarly binding on insurers, (2) the actual costs (expressed as a percentage) of Contractor's liability insurance under Section 2.1A.1 below, (3) endorsements, including endorsements for additional insureds as listed in Section 2.1D below, (4) evidence of State Workers' Compensation coverage, and (5) a copy of any builder's risk policy required by the Contract Documents. All policies, endorsements and certificates must be signed copies and shall contain a provision that coverages afforded under the policies cannot be materially altered (i.e. the coverages reduced, the limits decreased or the additional insured removed) allowed to expire, or cancelled without first giving forty-five (45) days prior written Notice by certified mail to Owner. Contractor

shall furnish to Owner copies of any subsequently issued endorsements amending, modifying, altering, or restricting coverage limits. Review of Contractor's insurance by Owner shall not relieve or decrease the liability of Contractor. Companies writing the insurance to be obtained shall be licensed to do business under Chapter 48 RCW or comply with the Surplus Lines Law of the State of Washington and shall be acceptable to Owner.

Contractor shall include in the Contract Sum the cost of all insurance and bond costs required for the Work. Insurance carriers providing insurance shall be acceptable to Owner, and its A. M. Best rating shall be indicated on the insurance certificates.

- A. <u>Term of insurance coverage</u>: Contractor shall maintain the following insurance coverage during the Work and for three years after Final Acceptance, with the exception of Professional Liability insurance, when required, which shall be maintained for a minimum of three years. Contractor shall also maintain the following insurance coverage during the performance of any corrective Work required by Section 5.
  - 1. <u>General Liability Insurance</u>: Commercial General Liability (CGL) on an Occurrence Form, including personal injury, bodily injury and property damage liability on Contractor's operations, including Subcontractors; on Work Contractor may subcontract or sublet to others; and on the indemnity provisions of this Contract. Coverage shall include, but not be limited to:
    - a. Personal injury
    - b. Blanket contractual liability;
    - c. Completed operations/products liability;
    - d. Explosion, collapse, and underground, which applicable to the work being performed; and
    - e. Employer's liability coverage.

Contractor's policy shall be designated primary coverage for both defense and indemnity, and any Owner's policies excess and non-contributory.

- 2. <u>Automobile Liability Insurance</u>: Automobile liability on an Occurrence Form for owned, nonowned, and hired vehicles.
- 3. <u>Professional Liability</u>: Required if professional services (e.g., architect, engineering, surveying, legal or medical) are being provided to the Owner and if those professional services are excluded from the General Liability Insurance provided. Coverage may be on a Claims Made basis, if coverage is maintained at least 3-years beyond Final Acceptance.
- B. <u>Industrial Insurance compliance</u>: Contractor shall comply with the Washington State Industrial Insurance Act and, if applicable, the Federal Longshoremen's and Harbor Workers' Act and the Jones Act.
- C. <u>Insurance to protect for the following</u>: All insurance coverages shall protect against claims for damages for personal and bodily injury or death, as well as claims for property damage, which may arise from operations in connection with the Work whether such operations are by Contractor or any Subcontractor.
- D. <u>Owner as Additional Insured</u>: All insurance coverages shall be endorsed to include Owner, its officers, and employees, and any required governmental agencies as additional named insureds for Work performed in accordance with the Contract Documents, and all insurance certificates and endorsements shall evidence such additional insureds.

E. <u>Subcontractor Coverage</u>: Contractor shall ensure and require that Subcontractors have insurance coverage to cover bodily injury and property damage on all operations and all vehicles owned or operated by Subcontractors. Subcontractors shall name Contractor and Owner, any required governmental agencies, and others designated in the Contract Documents as well as their officers and employees, as additional insureds and give at least 30 Days' Notice of cancellation.

### 2.2 COVERAGE LIMITS

<u>Insurance amounts:</u> The minimum coverage limits shall be as follows for applicable required insurance are specified in the Bonds and Insurance Certificates Section (Section 00 60 00) included with the Bid Documents. To the extent not set forth in the Bonds and Certificates Section or otherwise in the Contract Documents, they are as set forth below:

- A. Limits of Liability shall not be less than \$2,000,000 Combined Single Limit for Bodily Injury and Property Damage (other than Automobile Liability) Each Occurrence; Personal Injury and Advertising Liability Each Occurrence.
- B. \$5,000,000 Combined Single Limit Annual General Aggregate.
- C. \$5,000,000 Annual Aggregate for Products and Completed Operations Liability.
- D. \$2,000,000 Combined Single Limit for Automobile Bodily Injury and Property Damage Liability, Each Accident or Loss.
- E. \$1,000,000 for Professional Liability, if applicable.
- F. Coverages and Minimums: The Owner does not represent that the minimum required insurance coverage or limits are adequate to protect Contractor from all liabilities.

### 2.3 INSURANCE COVERAGE CERTIFICATES

- A. <u>Certificate required</u>: Prior to commencement of the Work, Contractor shall furnish to Owner a completed certificate of insurance coverage and additional insured endorsements.
- B. <u>List Project info</u>: All insurance certificates shall name Owner's Project number and Project title.
- C. <u>Cancellation provisions</u>: All insurance certificates shall specifically require 45 Days prior notice to Owner of cancellation or any material change, except 30 Days for surplus line insurance.

### 2.4 PAYMENT AND PERFORMANCE BONDS

<u>Conditions for bonds</u>: Payment and performance bonds for 100% of the Contract Award Amount, including Washington state sales tax, shall be furnished for the Work, using the City of Kirkland Contract Bond Form provided. Prior to execution of a Change Order, that cumulatively with previous Change Orders, increases the Contract Award Amount by 15% or more, the Contractor shall provide either new payment and performance bonds for the revised Contract Sum, or riders to the existing payment and performance bonds increasing the amount of the bonds. The Contractor shall likewise provide additional bonds or riders when subsequent Change Orders increase the Contract Sum by 15% or more. No payment or performance bond is required if the Contract Sum is \$35,000 or less and Contractor agrees that Owner may, in lieu of the bond, retain 50% of the Contract Sum for the period allowed by RCW 39.08.010.

### 2.5 ALTERNATIVE SURETY

<u>When alternative surety required</u>: Contractor shall promptly furnish payment and performance bonds from an alternative surety to protect Owner and persons supplying labor or materials required by the Contract Documents if (A) Owner has a reasonable objection to the surety; or (B) Any surety fails to furnish reports on its financial condition if required by Owner.

### 2.6 BUILDER'S RISK

- A. <u>Contractor to Buy Builder's Risk Insurance</u>: When the project involves substantial new building construction, as determined by the Owner, Contractor shall purchase and maintain Builder's Risk insurance in the amount of the Contract Sum, including all Change Orders, for the Work on a replacement cost basis until Substantial Completion. For projects not involving new building construction, an "Installation Floater" is an acceptable substitute for the Builder's Risk insurance. The insurance shall cover the interests of Owner, Contractor, and any Subcontractors, as their interests may appear.
- B. <u>Losses Covered</u>: Builder's risk insurance shall be placed on an "all risk" basis or equivalent policy form and insure against the perils of fire and extended coverage and physical loss or damage including theft, vandalism, malicious mischief, collapse, false work, flood, wind, temporary buildings, debris removal including demolition, and shall cover reasonable compensation for A/E's services and expenses required as a result of an insured loss.
- C. <u>Waiver of Subrogation Rights</u>: Owner and Contractor waive all subrogation rights against each other, any Subcontractors, A/E, A/E's subconsultants, separate contractors, if any, and any of their subcontractors, for damages caused by fire or other perils to the extent covered by property insurance obtained pursuant to this Section or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by Owner as fiduciary. The policies shall provide such waivers of subrogation by endorsement or otherwise. Contractor shall require a similar waiver from its Subcontractors of Subcontractors' subrogation rights against Contractor, Owner, A/E, A/E's subconsultants as part of their Subcontract. A waiver of subrogation shall be effective to a Person or entity even though that Person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the Person or entity had an insurable interest in the property damaged.

### PART 3 – TIME AND SCHEDULE

### 3.1 PROGRESS AND COMPLETION

- A. <u>Contractor to meet schedule</u>: Contractor shall diligently prosecute the Work, with adequate forces, achieve Substantial Completion within the Contract Time, and achieve Final Completion within the time period specified in the Contract Documents. If Contractor fails to perform in a timely manner in accordance with the Contract Documents and, through the fault of Contractor or Subcontractor(s), fails to meet the Schedule, Contractor shall be in default and shall take such steps as may be necessary to immediately improve its progress without change in the Contract Sum or Contract Time.
- B. <u>Schedule</u>: Promptly, but in no event later than fourteen (14) days after issuance of the Notice to Proceed, Contractor shall prepare and submit a preliminary network diagram in the form of a critical path method analysis ("Schedule"). See Division 01 for specific requirements for the Contractor's Construction Schedule ("Schedule"). The Schedule shall be related to the entire Project and fully consistent with the Contract Documents. The Schedule shall not exceed time limits specified by the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work, and shall show the sequence in which Contractor and

the dates on which Contractor plans to start and finish major portions of the Work, including dates for submission of Submittals, which shall be coordinated with the Schedule and identify dates for Owner review, and for acquiring materials and equipment. The Owner shall not be obligated to accept any Early Completion Schedule suggested by the Contractor. If the Contractor feels that the Work can be completed in less than the specified Contract Time, then the Surplus Time shall be considered Project Float. This Float shall be shown on the Schedule. It shall be available to accommodate changes in the work and unforeseen conditions. Neither the Contractor not the Owner have exclusive right to this Float Time. It belongs to the Project.

- C. <u>Monthly Updates</u>: With each Application for payment submitted by Contractor other than the final Application for Payment, Contractor shall submit to the Owner a current Schedule revised to indicate the portion of the Work executed during the time period covered by the Application for Payment, all progress slippages occurring during the previously covered time period, and the corrective actions taken for the slippage carryover into the time period covered by the Application for Payment, the anticipated delays or difficulties, and all other information required to adequately present the actual status of the progress of the Work as of the date of the Application for Payment as may be further required by the Owner.
- D. <u>Compliance with Schedule</u>: In the event the Contractor falls behind the Schedule to such an extent that the Owner in good faith determines that the Contractor will be unable to achieve Substantial Completion by the date set forth in the Schedule, as such date may be extended as provided in the Contract Documents, the Contractor shall within two (2) working days following the Owner's demand therefor, provide to the Owner, in writing, a detailed explanation of the measures the Contractor will take in order to recover from the delays so that the progress of the Work complies with the Schedule. If, in the Owner's good faith business judgment, the Contractor's intended recovery measures will not cause the Contractor to recover from the delay (provided such delay arises from a cause which is the Contractor's or its Subcontractor's responsibility) so as to achieve Substantial Completion on schedule, the Owner may direct the Contractor to accelerate the progress of the Work, at the Contractor's sole cost, which acceleration costs shall not cause an adjustment to the Contract Sum.
- E. <u>Contractor to notify Owner of delays</u>: Contractor shall perform the Work in accordance with the most recent Schedule submitted to Owner. Contractor shall promptly notify Owner in writing of any actual or anticipated event, interference, or that is delaying or could delay achievement of any milestone, performance of any critical path activity of the Work, or delay in the Substantial Completion date. Contractor shall indicate the expected duration of the delay, the anticipated effect of the delay on the Schedule, and the action being or to be taken to correct the problem. Provision of such Notice does not relieve Contractor of its obligation to complete the Work within the Contract Time.

### 3.2 DELAY

- A. <u>Force Majeure Events</u>: Acts of Force Majeure include, but are not limited to: acts of God or the public enemy; acts or omissions of any government entity not the fault of Owner or Contractor; fire or other casualty for which Contractor is not responsible; quarantine or epidemic; industry-wide strike or defensive lockout; unusually severe weather conditions which could not have been reasonably anticipated; and unusual delay in receipt of supplies or products which were ordered and expedited and for which no substitute reasonably acceptable to Owner was available. "Unusually severe weather" shall mean weather conditions that are abnormal for the period of time for which Force Majeure is claimed, that could not reasonably have been anticipated or avoided, and that had an adverse effect on the Schedule.
- B. <u>Contract Time adjustment for Force Majeure</u>: Contractor shall be entitled to an equitable adjustment in the Contract Time for changes in the time of performance directly attributable to

an act of Force Majeure, provided it submits Notice and a Claim in strict compliance with the requirements of Section 8. Contractor shall not be entitled to an adjustment in the Contract Sum resulting from an act of Force Majeure.

- C. <u>Contract Time or Contract Sum adjustment if Owner at fault</u>: Contractor shall be entitled to an equitable adjustment in Contract Time, and may be entitled to an equitable adjustment in Contract Sum, if the cost or time of Contractor's performance is changed due to the fault or negligence of Owner, provided the Contractor submits Notice and a Claim in strict compliance with the requirements of Section 8.
- D. <u>No Contract Time or Contract Sum adjustment if Contractor at fault</u>: Contractor shall not be entitled to an adjustment in Contract Time or in the Contract Sum for any delay or failure of performance to the extent such delay or failure was caused by Contractor or anyone for whose acts Contractor is responsible.
- E. <u>Contract Time adjustment only for concurrent fault</u>: To the extent any delay or failure of performance was concurrently caused by the Owner and Contractor, Contractor may be entitled to an adjustment in the Contract Time only for that portion of the delay or failure of performance that was concurrently caused, provided it submits Notice and a Claim in strict compliance with the requirements of Section 8, but shall not be entitled to an adjustment in Contract Sum.
- F. <u>Contractor to mitigate delay impacts</u>: Contractor shall make all reasonable efforts to prevent and mitigate the effects of any delay, whether occasioned by an act of Force Majeure or otherwise. Contractor shall not recover damages, an equitable adjustment or an increase in the Contract Sum or Contract Time from Owner where Contractor could have reasonably avoided the delay by the exercise of due diligence.
- G. <u>Types of damages permitted:</u> If Contractor and its Subcontractors are entitled to a change in the Contract Sum, the amount of the change shall be the actual costs incurred by the Contractor and Subcontractors directly related to the change calculated in accordance with Section 7 and provided Contractor has complied with Section 8. Failure of Contractor to comply with Section 8 shall result in waiver of Contractor's Claim. Contractor and its Subcontractors shall not be entitled to damages arising out of actual or alleged loss of efficiency; morale, fatigue, attitude, or labor rhythm; constructive acceleration; home office overhead; expectant underrun; trade stacking; reassignment of workers; rescheduling of Work, concurrent operations; dilution of supervision; learning curve; beneficial or joint occupancy; logistics; ripple; season change; extended overhead; profit upon damages for delay; impact damages including cumulative impacts; or similar damages.
- H. <u>Contractor to notify Owner of labor disputes</u>: If Contractor has knowledge that any actual or potential labor dispute is delaying or threatens to delay timely performance in accordance with the Contract Documents, Contractor shall immediately give notice, including all relevant information, to Owner.
- I. <u>Pass through notification provisions to Subcontractors</u>: Contractor agrees to insert a provision in its Subcontracts and to require insertion in all sub-subcontracts, that in the event timely performance of any such contract is delayed or threatened by delay by any actual or potential labor dispute, the Subcontractor or Sub-subcontractor shall immediately notify the next higher tier Subcontractor or Contractor, as the case may be, of all relevant information concerning the dispute.

### 3.3 DAMAGES FOR FAILURE TO ACHIEVE TIMELY COMPLETION

A. <u>Liquidated Damages:</u>

- 1. <u>Reason for Liquidated Damages</u>: Timely performance and completion of the Work is essential to Owner and time limits stated in the Contract Documents are of the essence. Owner will incur serious and substantial damages if Substantial Completion of the Work does not occur within the Contract Time. However, it would be difficult if not impossible to determine the exact amount of such damages. Consequently, provisions for liquidated damages are included in the Contract Documents.
- 2. <u>Calculation of Liquidated Damages amount</u>: The liquidated damage amounts set forth in the Contract Documents will be assessed not as a penalty, but as liquidated damages for breach of the Contract Documents. This amount is fixed and agreed upon by and between the Contractor and Owner because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages the Owner would in such event sustain. This amount shall be construed as the actual amount of damages sustained by the Owner, and may be retained by the Owner and deducted from periodic payments to the Contractor.
- 3. <u>Contractor responsible even if Liquidated Damages assessed</u>: Assessment of liquidated damages shall not release Contractor from any obligations or liabilities pursuant to the Contract Documents. If Contractor substantially fails to perform in a timely manner in accordance with the Contract Documents and, through the fault of Contractor or Subcontractor(s), fails to achieve Substantial Completion within the Contract Time, Contractor shall be in default.
- B. <u>Actual Damages</u>: If no liquidated damages are set forth in the Contract Documents, actual damages may be assessed for failure to achieve both Substantial Completion and Final Completion within the time provided. Actual damages will be calculated on the basis of direct, architectural, administrative, and any other related costs attributable to the Project from the date when Substantial and/or Final Completion should have been achieved, as applicable. Owner may offset these costs against any payment due Contractor.

### PART 4 – SPECIFICATIONS AND CONTRACT DOCUMENT REVIEW

### 4.1 DISCREPANCIES AND CONTRACT DOCUMENT REVIEW

- A. <u>Specifications and Drawings are basis of the Work</u>: The intent of the Specifications and Drawings is to describe a complete Project to be constructed in accordance with the Contract Documents. Contractor shall furnish all labor, materials, equipment, tools, transportation, permits, and supplies, and perform the Work required in accordance with the Drawings, Specifications, and other provisions of the Contract Documents.
- B. <u>Parts of the Contract Documents are complementary</u>: The Contract Documents are complementary. What is required by one part of the Contract Documents shall be binding as if required by all. Anything mentioned in the Specifications and not shown on the Drawings, or shown on the Drawings and not mentioned in the Specifications, shall be of like effect as if shown or mentioned in both.
- C. <u>Contractor to report discrepancies in Contract Documents:</u> Contractor shall carefully study and compare the Contract Documents with each other and with information furnished by Owner. If, during the performance of the Work, Contractor finds a conflict, error, inconsistency, or omission in the Contract Documents, it shall promptly and before proceeding with the Work affected thereby, report such conflict, error, inconsistency, or omission to A/E in writing.
- D. <u>Contractor knowledge of discrepancy in documents responsibility</u>: Contractor shall do no Work without applicable Drawings, Specifications, and, where required, accepted shop

drawings and other Submittals, unless instructed to do so in writing by Owner. If Contractor performs any construction activity, and it knows or reasonably should have known that any of the Contract Documents contain a conflict, error, inconsistency, or omission, Contractor shall be responsible for the performance and shall bear the cost for its correction.

- E. <u>Contractor to perform Work implied by Contract Documents</u>: Contractor shall provide any work or materials the provision of which is clearly implied and is within the scope of the Contract Documents even if the Contract Documents do not mention them specifically.
- F. <u>Interpretation questions referred to A/E</u>: Questions regarding interpretation of the requirements of the Contract Documents shall be referred to the A/E.

### 4.2 SUBMITTALS

- Definition of Submittals: "Submittals" means documents and other information required to be Α. submitted to A/E by Contractor pursuant to the Contract Documents, showing in detail: the proposed fabrication and assembly of structural elements; and the installation (i.e. form, fit, and attachment details) of materials and equipment. Submittals can include, but are not limited to, shop drawings, product data, diagrams, layouts, schematics, descriptive literature, illustrations, schedules, performance and test data, samples, and similar materials furnished by Contractor to explain in detail specific portions of the Work required by the Contract Documents. For materials and equipment to be incorporated into the Work, Contractor submittal shall include the name of the manufacturer, the model number, and other information concerning the performance, capacity, nature, and rating of the item. When directed, Contractor shall submit all samples at its own expense. Owner may duplicate, use, and disclose Submittals provided in accordance with the Contract Documents. Submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require Submittals.
- Β. Approval of Submittals by Contractor and A/E: Contractor shall coordinate all Submittals with the Schedule, shall review them for accuracy, completeness, and compliance with the Contract Documents, and shall indicate its approval thereon as evidence of such coordination and review. Where required by law, Submittals shall be stamped by an appropriate professional licensed by the state of Washington. Submittals submitted to A/E without evidence of Contractor's approval shall be returned for resubmission. Contractor shall review, approve, and submit Submittals with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of Owner or separate contractors. Contractor's Submittal schedule shall allow a reasonable time for A/E review. A/E will review, approve, or take other appropriate action on the Submittals. Contractor shall perform no portion of the Work requiring submittal and review of Submittals until the respective submittal has been reviewed and the A/E has approved or taken other appropriate action. Owner and A/E shall respond to Submittal with reasonable promptness. Any Work by Contractor shall be in accordance with reviewed Submittals. Submittals made by Contractor which are not required by the Contract Documents may be returned without action.
- C. <u>Contractor not relieved of responsibility when Submittals approved</u>: Approval, or other appropriate action with regard to Submittals, by Owner or A/E shall not relieve Contractor of responsibility for any errors or omissions in such Submittals, nor from responsibility for compliance with the requirements of the Contract Documents. Unless specified in the Contract Documents, review by Owner or A/E shall not constitute an approval of the safety precautions employed by Contractor during construction, or constitute an approval of Contractor's means or methods of construction. If Contractor fails to obtain approval before installation and the

item or work is subsequently rejected, Contractor shall be responsible for all costs of correction.

D. <u>Variations between Submittals and Contract Documents</u>: If Submittals vary from the requirements of the Contract Documents, Contractor shall in detail describe such variations in writing, separate from the Submittals, at the time it submits the Submittals containing such variations. If Owner approves any such variation, an appropriate Change Order will be issued. If the variation is minor and does not involve an adjustment in the Contract Sum or Contract Time, a Change Order need not be issued; however, the modification shall be approved by Owner in writing. Approval for substitutions shall not be sought and shall not be approved through the submission of Submittals.

### 4.3 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS, AND OTHER DOCUMENTS

- A. <u>The City/Owner not Contractor, owns Copyright of Drawings and Specifications</u>: The Drawings, Specifications, and other documents prepared by A/E are instruments of A/E's contracted service to the City through which the Work to be executed by Contractor is described. Neither Contractor nor any Subcontractor shall own or claim a copyright in the Drawings, Specifications, and other documents prepared by A/E, and A/E shall be deemed the author of them and will, along with any rights of Owner, retain all common law, statutory, and other reserved rights, in addition to the copyright. All copies of these documents, except Contractor's set, shall be returned or suitably accounted for to A/E, on request, upon completion of the Work.
- B. <u>Drawings and Specifications to be used only for this Project</u>: The Drawings, Specifications, and other documents prepared by the A/E, and copies thereof furnished to Contractor, are for use solely with respect to this Project. They are not to be used by Contractor or any Subcontractor on other projects or for additions to this Project outside the scope of the Work without the specific written consent of Owner and A/E. Contractor and Subcontractors are granted a limited license to use and reproduce applicable portions of the Drawings, Specifications, and other documents prepared by A/E appropriate to and for use in the execution of their Work.
- C. <u>License granted to Owner</u>: Contractor and all Subcontractors grant a non-exclusive license to Owner, without additional cost or royalty, to use for its own purposes (including reproduction) all Submittals, together with the information and diagrams contained therein, prepared by Contractor or any Subcontractor. In providing Submittals, Contractor and all Subcontractors warrant that they have authority to grant to Owner a license to use the Submittals, and that such license is not in violation of any copyright or other intellectual property right. Contractor agrees to defend and indemnify Owner pursuant to the indemnity provisions in Section 5 from any violations of copyright or other intellectual property rights arising out of Owner's use of the Submittals hereunder, or to secure for Owner, at Contractor's own cost, licenses in conformity with this Section.

### PART 5 – PERFORMANCE

### 5.1 CONTRACTOR CONTROL AND SUPERVISION

A. <u>Contractor responsible for Means and Methods of construction</u>: Contractor shall supervise and direct the Work, using its best skill and attention, and shall perform the Work in a skillful manner. Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences, and procedures and for coordinating all portions of the Work, unless the Contract Documents give other specific instructions concerning these matters. Contractor shall disclose its means and methods of construction when requested by Owner. The Contractor shall be responsible to the Owner for acts and omissions of

Contractor, Contractor's employees, Subcontractors, and their agents and employees, and other person or entities performing portions of the Work for or on behalf of the Contractor or any of its Subcontractors.

- B. <u>Competent superintendent required</u>: Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor. Contractor, as soon as practicable after award of the Contract, shall furnish in writing to Owner the name and qualifications of its proposed superintendent. Within 14 days of receipt of the information, Owner may reply to Contractor in writing stating (1) whether Owner has reasonable objection to the proposed superintendent or (2) that Owner requires additional time to review. The superintendent must be satisfactory to Owner and shall not be changed without the prior written consent of Owner. Owner may require Contractor to remove the superintendent from the Work or Project site, if Owner reasonably deems the superintendent incompetent, careless, or otherwise objectionable, provided Owner has first notified Contractor in writing and allowed a reasonable period for transition.
- C. <u>Contractor to employ competent and disciplined workforce</u>: Contractor shall enforce strict discipline and good order among all of the Contractor's employees and other persons performing the Work. Contractor shall not permit employment of persons not skilled in tasks assigned to them. Contractor's employees shall at all times conduct business in a manner which assures fair, equal, and nondiscriminatory treatment of all persons. Owner may, by written notice, request Contractor to remove from the Work or Project site any employee Owner reasonably deems incompetent, careless, or otherwise objectionable.
- D. <u>Contractor to keep Project documents on site</u>: Contractor shall keep on the Project site a copy of the Drawings, Specifications, addenda, reviewed Submittals, and permits and permit drawings.
- E. <u>Contractor to comply with ethical standards:</u> Contractor shall ensure that its owner(s) and employees, and those of its Subcontractors, comply with the Ethics in Public Service Act RCW 42.52, which, among other things, prohibits state employees from having an economic interest in any public works contract that was made by, or supervised by, that employee. Contractor shall remove, at its sole cost and expense, any of its, or its Subcontractors' employees, if they are in violation of this act.
- F. <u>Daily Reports</u>: Contractor shall provide a Daily Report to the Owner for each work day during the Contract Time. The Daily Report shall be completed on a form subject to the approval of the Owner and Architect. The Daily Report shall include any disputed, delayed, or disrupted Work as well as any changed or additional Work requested or identified. The Daily Report shall not serve as a substitute for, or relieve Contractor of its obligations to provide formal written notice to Contractor as required by the Contract Documents, including but not limited to Section 7 and Section 8.

### 5.2 PERMITS, TAXES, PATENTS AND ROYALTIES

- A. <u>Permits</u>: Owner will obtain and pay for the General Building Permit. All other permits and fees required to execute the work shall be obtained and paid for by the Contractor. Prior to Final Acceptance, the approved, signed permits shall be delivered to the Owner.
- B. <u>Contractor to comply with all applicable laws</u>: Contractor shall comply with and give notices required by all federal, state, and local laws, ordinances, rules, regulations, and lawful orders of public authorities applicable to performance of the Work. No person shall, on the grounds, of age, race, creed, color, sec, sexual oriental, religion, national origin, marital status,

honorably discharged veteran or military status, or disability (physical, mental, or sensory) be denied the benefits of, or otherwise be subjected to discrimination under any project, program, or activity funded in whole or in part under this Agreement.

- C. <u>Taxes</u>: Contractor shall pay sales, consumer, use, business and occupation, income and similar taxes for the Work that are legally enacted when the initial Contract Sum is agreed.
- D. <u>Patents and Royalties</u>: Contractor is responsible for, and shall pay, all royalties and license fees. Contractor shall defend, indemnify, and hold Owner harmless from any costs, expenses, and liabilities arising out of the infringement by Contractor of any patent, copyright, or other intellectual property right used in the Work; however, provided that Contractor gives prompt notice, Contractor shall not be responsible for such defense or indemnity when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents. If Contractor has reason to believe that use of the required design, process, or product constitutes an infringement of a patent or copyright, it shall promptly notify Owner of such potential infringement.

### 5.3 PREVAILING WAGES

- A. <u>Contractor to pay Prevailing Wages</u>: Contractor shall pay the prevailing rate of wages to all workers, laborers, or mechanics employed in the performance of any part of the Work in accordance with RCW 39.12 and the rules and regulations of the Department of Labor and Industries. The schedule of prevailing wage rates for the locality or localities of the Work, is determined by the Industrial Statistician of the Department of Labor and Industries. It is the Contractor's responsibility to verify the applicable prevailing wage rate.
- B. <u>Statement of Intent to Pay Prevailing Wages:</u> Before payment is made by the Owner to the Contractor for any work performed by the Contractor and subcontractors whose work is included in the application for payment, the Contractor shall submit, or shall have previously submitted to the Owner for the Project, a Statement of Intent to Pay Prevailing Wages, approved by the Department of Labor and Industries, certifying the rate of hourly wage paid and to be paid each classification of laborers, workers, or mechanics employed upon the Work by Contractor and Subcontractors. Such rates of hourly wage shall not be less than the prevailing wage rate.
- C. <u>Affidavit of Wages Paid</u>: Prior to release of retainage, the Contractor shall submit to the Owner an Affidavit of Wages Paid, certified by the Department of Labor and Industries, for the Contractor and each and every Subcontractor that performed work on the Project. Contractor's compliance with this paragraph and RCW 60.28 is a condition precedent to the release of retainage to Contractor.
- D. <u>Disputes</u>: Disputes regarding prevailing wage rates shall be referred for arbitration to the Director of the Department of Labor and Industries. The arbitration decision shall be final and conclusive and binding on all parties involved in the dispute as provided for by RCW 39.12.060.
- E. <u>Statement with pay application; Post Statements of Intent at job site</u>: Each Application for Payment submitted by Contractor shall state that prevailing wages have been paid in accordance with the prefiled statement(s) of intent, as approved. Copies of the approved intent statement(s) shall be posted on the job site with the address and telephone number of the Industrial Statistician of the Department of Labor and Industries where a complaint or inquiry concerning prevailing wages may be made.
- F. <u>Contractor to pay for Statements of Intent and Affidavits</u>: In compliance with chapter 296-127 WAC, Contractor shall pay to the Department of Labor and Industries the currently established

fee(s) for each statement of intent and/or affidavit of wages paid submitted to the Department of Labor and Industries for certification.

G. <u>Certified Payrolls</u>: Consistent with WAC 296-127-320, the Contractor and any subcontractor shall submit a certified copy of payroll records if requested.

### 5.4 SAFETY AND CLEAN-UP

- A. <u>Contractor responsible for safety</u>: Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Work. Contractor shall be solely and completely responsible for conditions of the Project site, including safety of all persons and property, during performance of the Work. Contractor shall maintain the Project site and perform the Work in a manner that meets statutory and common-law requirements for the provision of a safe place to work. This requirement shall apply continuously and not be limited to working hours. Any review by Owner or A/E of Contractor's safety measures in, on or near the site of the Work.
- B. <u>Contractor safety responsibilities:</u> In carrying out its responsibilities according to the Contract Documents, Contractor shall protect the lives and health of employees performing the Work and other persons who may be affected by the Work; prevent damage to materials, supplies, and equipment whether on site or stored off-site; and prevent damage to other property at the site or adjacent thereto. Contractor shall comply with all applicable laws, ordinances, rules, regulations, and orders of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury, or loss; shall erect and maintain all necessary safeguards for such safety and protection; and shall notify owners of adjacent property and utilities when prosecution of the Work may affect them.
- C. <u>Contractor to maintain safety records</u>: Contractor shall maintain an accurate record of exposure data on all incidents relating to the Work resulting in death, traumatic injury, occupational disease, or damage to property, materials, supplies, or equipment. Contractor shall immediately report any such incident to Owner. Owner shall, at all times, have a right of access to all records of exposure.
- Contractor to provide HazMat training: Contractor shall provide all persons working on the D. Project site with information and training on hazardous chemicals in their work at the time of their initial assignment, and whenever a new hazard is introduced into their work area. At a minimum, Contractor shall inform persons working on the Project site of the requirements of chapter 296-62 WAC, General Occupational Health Standards, any operations in their work area where hazardous chemicals are present; and the location and availability of written hazard communication programs, including the required list(s) of hazardous chemicals and material safety data sheets required by chapter 296-62 WAC. Contractor shall also provide training for persons working on the Project site which includes Methods and observations that may be used to detect the presence or release of a hazardous chemical in the work area, the physical and health hazards of the chemicals in the work area; the measures such persons can take to protect themselves from these hazards, the details of the hazard communications program developed by Contractor, or its Subcontractors, including an explanation of the labeling system and the material safety data sheet, and how employees can obtain and use the appropriate hazard information.
- E. <u>Hazardous, toxic or harmful substances and Notice</u>: Contractor shall not keep, use, dispose, transport, generate, or sell on or about the Project site, any substances now or hereafter designated as, or which are subject to regulation as, hazardous, toxic, dangerous, or harmful by any federal, state or local law, regulation, statute or ordinance (hereinafter collectively referred to as "hazardous substances"), in violation of any such law, regulation, statute, or

ordinance, but in no case shall any such hazardous substance be stored more than 90 Days on the Project site. Contractor shall promptly notify Owner of all spills or releases of any hazardous substances which are otherwise required to be reported to any regulatory agency and pay the cost of cleanup. Contractor shall promptly notify Owner of all failures to comply with any federal, state, or local law, regulation, or ordinance; all inspections of the Project site by any regulatory entity concerning the same; all regulatory orders or fines; and all responses or interim cleanup actions taken by or proposed to be taken by any government entity or private party on the Project site.

- F. <u>Public safety and traffic</u>: All Work shall be performed with due regard for the safety of the public. Contractor shall perform the Work so as to cause a minimum of interruption of vehicular traffic or inconvenience to pedestrians. All arrangements to care for such traffic shall be Contractor's responsibilities. All expenses involved in the maintenance of traffic by way of detours shall be borne by Contractor.
- G. <u>Contractor to act in an emergency</u>: In an emergency affecting the safety of life or the Work or of adjoining property, Contractor is permitted to act, at its discretion, to prevent such threatened loss or injury, and Contractor shall so act if so authorized or instructed.
- H. <u>No duty of safety by Owner or A/E</u>: Nothing provided in this Section shall relieve Contractor of sole and complete responsibility for safety at the Project site, for sole and complete responsibility for any violation of safety or property protection requirements or the correction thereof, or impose any duty upon Owner or A/E with regard to, or as constituting any express or implied assumption of control or responsibility over, any other safety conditions relating to employees or agents of Contractor or any of its Subcontractors, or the public. Any Notice Owner or A/E gives to Contractor of a safety or property protection violation will not: (1) relieve Contractor of sole and complete responsibility for the violation and the correction thereof, or for sole liability for the consequences of said violation; (2) impose any obligation upon Owner or A/E to inspect or review Contractor's safety program or precautions or to enforce Contractor's compliance with the requirements of this Section; or (3) impose any continuing obligation upon Owner or A/E to provide such Notice to Contractor or any other persons or entity.
- I. <u>Contractor to keep site clean and leave it clean</u>: Contractor shall at all times keep the Project site, including hauling routes, infrastructures, utilities, and storage areas, free from accumulations of waste materials. Before completing the Work, Contractor shall remove from the premises its rubbish, tools, scaffolding, equipment, and materials. Upon completing the Work, Contractor shall leave the Project site in a clean, neat, and orderly condition satisfactory to Owner. If Contractor fails to clean up as provided herein, and after reasonable notice from Owner, Owner may do so and the cost thereof shall be charged to Contractor.

### 5.5 OPERATIONS, MATERIAL HANDLING, AND STORAGE AREAS

- A. <u>Limited storage areas</u>: Contractor shall confine all operations, including storage of materials, to Owner-approved areas.
- B. <u>Temporary buildings and utilities at Contractor expense</u>: Temporary buildings (e.g., storage sheds, shops, offices) and utilities may be provided by Contractor only with the consent of Owner and without expense to Owner. The temporary buildings and utilities shall be removed by Contractor at its expense upon completion of the Work.
- C. <u>Roads and vehicle loads</u>: Contractor shall use only established roadways or temporary roadways authorized by Owner. When materials are transported in prosecuting the Work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by federal, state, or local law or regulation.

- D. <u>Ownership and reporting by Contractor of demolished materials</u>: Ownership and control of all materials or facility components to be demolished or removed from the Project site by Contractor shall immediately vest in Contractor upon severance of the component from the facility or severance of the material from the Project site. Contractor shall be responsible for compliance with all laws governing the storage and ultimate disposal. Contractor shall provide Owner with a copy of all manifests and receipts evidencing proper disposal when required by Owner or applicable law.
- E. <u>Contractor responsible for care of materials and equipment on-site</u>: Contractor shall be responsible for the proper care and protection of its materials and equipment delivered to the Project site. Materials and equipment may be stored on the premises subject to approval of Owner. When Contractor uses any portion of the Project site as a shop, Contractor shall be responsible for any repairs, patching, or cleaning arising from such use.
- F. <u>Contractor responsible for loss of materials and equipment</u>: Contractor shall protect and be responsible for any damage or loss to the Work, or to the materials or equipment until the date of Substantial Completion, and shall repair or replace without cost to Owner any damage or loss that may occur, except damages or loss caused by the acts or omissions of Owner. Contractor shall also protect and be responsible for any damage or loss to the Work, or to the materials or equipment, after the date of Substantial Completion, and shall repair or replace without cost to Owner any such damage or loss that might occur, to the extent such damages or loss are caused by the acts or omissions of Contractor, or any Subcontractor.

### 5.6 UNFORESEEN PHYSICAL CONDITIONS

- A. <u>Notice requirement for concealed or unknown conditions</u>: If Contractor encounters conditions at the site which are subsurface or otherwise concealed physical conditions which differ materially from those indicated in the Contract Documents, or unknown physical conditions of an unusual nature which differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, then Contractor shall give written notice to Owner promptly and in no event later than 7 Days after the first observance of the conditions. Conditions shall not be disturbed prior to such notice.
- B. <u>Adjustment in Contract Time and Contract Sum</u>: If such conditions differ materially and cause a change in Contractor's cost of, or time required for, performance of any part of the Work, the Contractor may be entitled to an equitable adjustment in the Contract Time or Contract Sum, or both, provided it makes a request therefore as provided in Section 7 and Section 8. Failure to provide notice as required by this Section, Section 7 and Section 8 shall result in waiver of Contractor's right to any adjustment in the Contract Time and Contract Sum.

### 5.7 MATERIAL, EQUIPMENT, TESTS, AND INSPECTION

A. <u>Contractor to provide new and equivalent equipment and materials</u>: All equipment, material, and articles incorporated into the Work shall be new and of the most suitable grade for the purpose intended, unless otherwise specifically provided in the Contract Documents. References in the Specifications to equipment, material, articles, or patented processes by trade name, make, or catalog number, shall be regarded as establishing a standard quality and shall not be construed as limiting competition. Contractor may, at its option, use any equipment, material, article, or process that, in the judgment of A/E and after submittal and approval of a substitute request, is equal to that named in the Specifications, unless otherwise specifically provided in the Contract Documents.

- B. <u>Contractor responsible for fitting parts together</u>: Contractor shall do all cutting, fitting, or patching that may be required to complete the Work or to make its several parts fit together properly, or receive or be received by work of others set forth in, or reasonably implied by, the Contract Documents. Contractor shall not damage or endanger any work of Owner or separate contractors by cutting, excavating, or otherwise altering the Work and shall not cut or alter the work of any other contractor unless approved in advance by Owner. Contractor shall restore all areas requiring cutting, fitting and patching to the condition existing prior to the cutting, fitting and patching, unless otherwise required by the Contract Documents.
- C. <u>Owner may reject defective Work and non-conforming materials</u>: Should any of the Work and/or materials be found defective, or in any way not in accordance with the Contract Documents, this Work, in whatever stage of completion, may be rejected by Owner. However, neither this authority of Owner nor a decision made either to exercise or not to exercise such authority shall give rise to a duty or responsibility of Owner or its representatives to Contractor, Subcontractors, their agents or employees, or other persons or entities performing portions of the Work. Work or materials condemned by the Owner or Architect/Engineer as failing to conform to Contract Documents, including but not limited to the quality of such materials, shall, upon notice from Owner or Architect/Engineer, be immediately removed by Subcontractor. Failure of Owner to immediately condemn any Work or materials as installed shall not in any way waive Owner's right to object thereto at any subsequent time.
- D. <u>Contractor to provide for all testing and inspection of Work</u>: Contractor shall maintain an adequate testing and inspection program and perform such tests and inspections as are necessary or required to ensure that the Work conforms to the requirements of the Contract Documents. Contractor shall be responsible for inspection and quality surveillance of all its Work and all Work performed by any Subcontractor. Unless otherwise provided, Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. Contractor shall give Owner timely notice of when and where tests and inspections are to be made. Contractor shall maintain complete inspection records and make them available to Owner.
- E. <u>Owner may conduct tests and inspections</u>: Owner may, at any reasonable time, conduct such inspections and tests as it deems necessary to ensure that the Work is in accordance with the Contract Documents. Owner shall promptly notify Contractor if an inspection or test reveals that the Work is not in accordance with the Contract Documents. Unless the subject items are expressly accepted by Owner, such Owner inspection and tests are for the sole benefit of Owner and do not: constitute or imply acceptance; relieve Contractor of responsibility for providing adequate quality control measures; relieve Contractor of its responsibility to comply with the requirements of the Contract Documents; or impair Owner's right to reject defective or nonconforming items, or to avail itself of any other remedy to which it may be entitled.
- F. <u>Inspections or inspectors do not modify Contract Documents</u>: Neither observations by an inspector retained by Owner, the presence or absence of such inspector on the site, nor inspections, tests, or approvals by others, shall relieve Contractor from any requirement of the Contract Documents, nor is any such inspector authorized to change any term or condition of the Contract Documents.
- G. <u>Contractor responsibilities on inspections</u>: Contractor shall promptly furnish, without additional charge, all facilities, labor, material and equipment reasonably needed for performing such safe and convenient inspections and tests as may be required by Owner. Owner may charge Contractor any additional cost of inspection or testing when Work is not ready at the time specified by Contractor for inspection or testing, or when prior rejection makes reinspection or

retest necessary. Owner shall perform its inspections and tests in a manner that will cause no undue delay in the Work.

### 5.8 CORRECTION OF NONCONFORMING WORK

- A. <u>Work covered by Contractor without inspection</u>: If a portion of the Work is covered contrary to the request of Owner or the requirements in the Contract Documents or a governmental authority having jurisdiction, it must, if required in writing by Owner, be uncovered for Owner's observation and be replaced at Contractor's expense and without change in the Contract Sum or Contract Time.
- B. <u>Payment provisions for uncovering covered Work</u>: If, at any time prior to Final Completion, Owner desires to examine the Work, or any portion of it, which has been covered, Owner may request to see such Work and it shall be uncovered by Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an adjustment in the Contract Sum for the costs of uncovering and replacement, and, if completion of the Work is thereby delayed, an adjustment in the Contract Time, provided it makes such a request as provided in Section 7. If such Work is not in accordance with the Contract Documents, the Contractor shall pay the costs of examination and reconstruction.
- C. <u>Contractor to correct and pay for non-conforming Work</u>: Contractor shall promptly correct Work found by Owner not to conform to the requirements of the Contract Documents, whether observed before or after Substantial Completion and whether or not fabricated, installed, or completed. Contractor shall bear all costs of correcting such nonconforming Work, including additional testing and inspections.
- D. <u>Contractor's compliance with correction and warranty provisions</u>: If, within one year after the date of Substantial Completion of the Work or designated portion thereof, or within one year after the date for commencement of any system warranties established, or within the terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, Contractor shall correct it promptly after receipt of written Notice from Owner to do so. Owner shall give such Notice promptly after discovery of the condition. This period of one year shall be extended, with respect to portions of Work first performed after Substantial Completion, by the period of time between Substantial Completion and the actual performance of the Work. Contractor's duty to correct with respect to Work repaired or replaced shall run for one year from the date of repair or replacement. Obligations under this Section shall survive Final Acceptance and are in addition to other warranties provided by contract or law.
- E. <u>Contractor to remove non-conforming Work</u>: Contractor shall remove from the Project site portions of the Work which are not in accordance with the requirements of the Contract Documents and are neither corrected by Contractor nor accepted by Owner.
- F. <u>Owner may charge Contractor for non-conforming Work</u>: If Contractor fails to correct nonconforming Work within a reasonable time after written notice to do so, Owner may replace, correct, or remove the nonconforming Work and charge the cost thereof to the Contractor.
- G. <u>Contractor to pay for damaged Work during correction</u>: Contractor shall bear the cost of correcting destroyed or damaged Work, whether completed or partially completed, caused by Contractor's correction or removal of Work which is not in accordance with the requirements of the Contract Documents.
- H. <u>No Period of limitation on other requirements</u>: Nothing contained in this Section shall be construed to establish a period of limitation with respect to other obligations which Contractor

might have according to the Contract Documents. Establishment of the time period of one year as described in this Section relates only to the specific obligation of Contractor to correct the Work, and has no relationship to the time within which the Contractor's obligation to comply with the Contract Documents may be sought to be enforced, including the time within which such proceedings may be commenced and damages for failure to comply with the Contract Documents may be sought.

I. <u>Owner may accept non-conforming Work and charge Contractor:</u> If Owner prefers to accept Work which is not in accordance with the requirements of the Contract Documents, Owner may do so instead of requiring its removal and correction, in which case the Contract Sum may be reduced as appropriate and equitable.

### 5.9 SUBCONTRACTORS AND SUPPLIERS

- A. <u>Subcontractor Responsibility</u>: The Contractor shall include the language of this paragraph in each of its first tier subcontracts, and shall require each of its subcontractors to include the same language of this Section in each of their subcontracts, adjusting only as necessary the terms used for the contracting parties. Upon request of the Owner, the Contractor shall promptly provide documentation to the Owner demonstrating that the subcontractor meets the subcontractor responsibility criteria below. The requirements of this paragraph apply to all subcontractors regardless of tier. At the time of subcontract execution, the Contractor shall verify that each of its first tier subcontractors meets the following bidder responsibility criteria:
  - 1. Have a current certificate of registration as a contractor in compliance with chapter 18.27 RCW, which must have been in effect at the time of subcontract bid submittal;
  - 2. Have a current Washington Unified Business Identifier (UBI) number;
  - 3. If applicable, have: Industrial Insurance (workers' compensation) coverage for the subcontractor's employees working in Washington, as required in Title 51 RCW; a Washington Employment Security Department number, as required in Title 50 RCW; a Washington Department of Revenue state excise tax registration number, as required in Title 82 RCW; An electrical contractor license, if required by Chapter 19.28 RCW; an elevator contractor license, if required by Chapter 70.87 RCW, not be disqualified from bidding on any public works contract under RCW 39.06.010 or 39.12.065(3), on a project subject to the apprenticeship utilization requirements in RCW 39.04.320, not have been found out of compliance by the Washington state apprenticeship and training council for working apprentices out of ratio, without appropriate supervision, or outside their approved work processes as outlined in their standards of apprenticeship under chapter 49.04 RCW for the one-year period immediately preceding the date of the Owner's first advertisement of the project, and meet all supplemental responsibility criteria set forth in the Contract Documents.
- B. <u>Provide names of Subcontractors and use qualified firms</u>: Before submitting the first Application for Payment, Contractor shall furnish in writing to Owner the names, addresses, and telephone numbers of all Subcontractors, as well as suppliers providing materials in excess of \$2,500. Contractor shall utilize Subcontractors and suppliers which are experienced and qualified, and meet the requirements of the Contract Documents, if any. Contractor shall not utilize any Subcontractor or supplier to whom Owner has a reasonable objection, and shall obtain Owner's written consent before making any substitutions or additions.
- C. <u>Coordination of Subcontractors; Contractor responsible for Work</u>: Contractor shall schedule, supervise, and coordinate the operations of all Subcontractors. No Subcontracting of any of the Work shall relieve Contractor from its responsibility for the performance of the Work in accordance with the Contract Documents or any other obligations of the Contract Documents.

- D. <u>Automatic assignment of subcontracts</u>: Each subcontract agreement for a portion of the Work is hereby assigned by Contractor to Owner provided that (1) the assignment is effective only after termination by Owner for cause pursuant to Section 9 and only for those Subcontracts which Owner accepts by notifying the Subcontractor in writing; (2) after the assignment is effective, Owner will assume all future duties and obligations toward the Subcontractor which Contractor assumed in the Subcontract; and (3) the assignment is subject to the prior rights of the surety, if any, obligated under any bond provided in accordance with the Contract Documents.
- E. <u>Owner may award other contracts; Contractor to cooperate</u>: Owner may undertake or award other contracts for additional work at or near the Project site. Owner shall help coordinate the activities of Owner's own forces and of each separate contractor engaged by Owner with the Work of Contractor, who shall reasonably cooperate and coordinate with the other contractors and with Owner's employees and shall carefully adapt scheduling and perform the Work in accordance with these Contract Documents to reasonably accommodate the other work.

### 5.10 WARRANTY

- A. <u>Contractor warranty of Work</u>: In addition to any special warranties provided elsewhere in the Contract Documents, Contractor warrants that all Work conforms to the requirements of the Contract Documents and is free of any defect in equipment, material, or design furnished, or workmanship performed by Contractor.
- B. <u>Contractor responsibilities</u>: With respect to all warranties, express or implied, for Work performed or materials furnished according to the Contract Documents, Contractor shall:
  - 1. <u>Obtain warranties:</u> Obtain, assign if requested, and furnish directly to Owner, all warranties that would be given in normal commercial practice or that are required by the Contract Documents, first executed by the applicable Subcontractor and those suppliers and manufacturers furnishing materials for the Work, and subsequently countersigned by Contractor, which shall extend to Owner all rights, claims, benefits and interests that Contractor may have under express or implied warranties or guarantees against the Subcontractor, supplier or manufacturer for defective or non-conforming Work;
  - 2. <u>Warranties for benefit of Owner</u>: Require all warranties to be executed, in writing, for the benefit of Owner;
  - 3. <u>Enforcement of warranties</u>: Enforce all warranties for the benefit of Owner, if directed by Owner; and
  - 4. <u>Contractor responsibility for Subcontractor warranties</u>: Be responsible to enforce any Subcontractor's, manufacturer's, or supplier's warranties should they extend beyond the period specified in the Contract Documents.
- C. <u>Warranties beyond Final Acceptance</u>: The obligations under this Section shall survive Final Acceptance.

### 5.11 INDEMNIFICATION

A. <u>Contractor to indemnify Owner</u>: To the fullest extent permitted by law, Contractor shall defend, indemnify, and hold Owner and A/E, their consultants, and agents and employees, directors, elected officials, officers, lenders, successors and assigns of any of them (collectively, the "Indemnified Parties"), harmless from and against all claims, demands, losses, damages, or costs, including but not limited to damages arising out of bodily injury or death to persons and
damage to property, direct and indirect, or consequential (including but not limited to costs and attorneys' fees incurred on such claims or in proving the right to indemnification), arising out of, caused by or resulting from performance of the Work. Contractor's indemnity and defense obligations do not extend to liability resulting from: the sole negligence or willful misconduct of the Indemnified Parties. Contractor's duty to indemnify and defend Owner for liability for damages arising out of bodily injury to persons or damage to property caused by or resulting from the concurrent negligence of (a) the Indemnified Parties; and (b) Contractor or its agents, employees, and Subcontractors and suppliers of any tier, shall apply only to the extent of the negligence of Contractor, its agents, employees, and Subcontractors and suppliers of any tier. This indemnification obligation shall include, but is not limited to, all Claims against the Owner by an employee or former employee of the Contractor or any Subcontractor.

- B. <u>Obligations</u>: The obligations of Contractor under this Section shall survive completion, acceptance, final payment and termination of the Contract and shall not be construed to negate, abridge, or otherwise reduce any other right or obligations of indemnity that would otherwise exist as to any party or person described in this Section. To the extent the wording of this Section would reduce or eliminate the insurance coverage of Owner or Contractor, this Section shall be considered modified to the extent that such insurance coverage is not affected. To the extent that any portion of this Section is stricken by a court or arbitrator for any reason, all remaining provisions shall retain their vitality and effect.
- C. <u>RCW Title 51</u>: Employee action and RCW Title 51: In any action against Owner and any other entity indemnified in accordance with this section, by any employee of Contractor, its Subcontractors, Sub-subcontractors, agents, or anyone directly or indirectly employed by any of them, the indemnification obligation of this section shall not be limited by a limit on the amount or type of damages, compensation, or benefits payable by or for Contractor or any Subcontractor under RCW Title 51, the Industrial Insurance Act, or any other employee benefit acts. In addition, Contractor waives immunity as to Owner and A/E only, in accordance with RCW Title 51.
- D. <u>Defense Costs.</u> Defense cost recovery shall include all fees (of attorneys and experts), in costs and expenses incurred in good faith. In addition, Owner shall be entitled to recover compensation for all of its expenses (including materials and labor) consumed in its defense.

## PART 6 – PAYMENTS AND COMPLETION

#### 6.1 CONTRACT SUM AND APPLICATION FOR PAYMENTS

- A. <u>Owner shall pay Contract Sum</u>: Owner shall pay Contractor the Contract Sum for performance of the Work, in accordance with the Contract Documents.
- B. <u>Contractor to submit Schedule of Values</u>: At least 7 Days prior to submitting its first Application for Payment, Contractor shall submit to Owner for approval a breakdown allocating the total Contract Sum to each principal category of work, in such detail as requested by Owner ("Schedule of Values"), but including a minimum of 30 line items. The approved Schedule of Values shall allocate appropriate amounts, not less than 5% of the total bid, to that portion of the Work between Substantial Completion and Final Completion to recognize not-yet-earned costs for demobilization, O&M manuals, and any other requirements for Project closeout and in advancing the Work from Substantial Completion to Final Completion. The approved Schedule of Values shall be used by Owner as a basis for reviewing progress payments. Payment for Work shall be made only for and in accordance with those items included in the Schedule of Values.
- C. <u>Monthly Application for Payment with substantiation</u>: At monthly intervals, unless determined otherwise by Owner, Contractor shall submit to Owner an itemized Application for Payment for

Work completed in accordance with the Contract Documents and the approved Schedule of Values. Each application shall be supported by such substantiating data as Owner may require.

- D. <u>Contractor certifies Subcontractors paid</u>: By submitting an Application for Payment, Contractor is certifying that all Subcontractors have been paid, less earned retainage in accordance with RCW 60.28.011, as their interests appeared in the last preceding Application for Payment. By submitting an Application for Payment, Contractor is recertifying that the representations set forth in Section 1.3 are true and correct, to the best of Contractor's knowledge, as of the date of the Application for Payment. Owner has the right to request written evidence from Contractor that Contractor has properly paid Subcontractors and material and equipment suppliers amounts paid by Owner to Contractor for subcontracted Work. Owner shall have the right to contact Subcontractors to ascertain whether they have been properly paid. Owner shall not have an obligation to pay or to see to the payment of money to a Subcontractor, except as may otherwise be required by law.
- E. <u>Reconciliation of Work with Schedule</u>: At the time it submits an Application for Payment, Contractor shall analyze and reconcile, to the satisfaction of Owner, the actual progress of the Work with the Schedule. The submission of an Application for Payment constitutes a certification that the Work is current on the Schedule.
- F. <u>Payment for material delivered to site or stored off-site</u>: If authorized by Owner, the Application for Payment may include request for payment for material delivered to the Project site and suitably stored, or for completed preparatory work. Payment may similarly be requested for material stored off the Project site, provided Contractor complies with or furnishes satisfactory evidence of the following:
  - 1. <u>Suitable facility or location within 10 miles of the Project</u>: The material will be placed in a facility or location that is within a 10-mile radius of the Project, structurally sound, secure (continuously under lock and key), dry, lighted and suitable for the materials to be stored or otherwise approved by Owner;
  - 2. <u>Insurance provided on materials in facility or location</u>: Contractor furnishes Owner a certificate of insurance extending Contractor's insurance coverage for damage, fire, and theft to cover the full value of all materials stored, or in transit;
  - 3. <u>Owner right of access to facility or location</u>: Owner shall at all times have the right of access to the Project site;
  - 4. <u>Contractor assumes total responsibility for stored materials</u>: Contractor and its surety assume total responsibility for the stored materials; and
  - 5. <u>Contractor provides documentation and Notice when materials moved to site</u>: Contractor furnishes to Owner certified lists of materials stored, bills of lading, invoices, and other information as may be required, and shall also furnish Notice to Owner when materials are moved from storage to the Project site.

## 6.2 PROGRESS PAYMENTS

A. <u>Owner to pay within 30 Days</u>: Owner shall make progress payments, in such amounts as Owner determines are properly due, within 30 Days after receipt of a properly executed Application for Payment. Owner shall notify Contractor in accordance with chapter 39.76 RCW if the Application for Payment does not comply with the requirements of the Contract Documents.

- B. <u>Withholding retainage; Options for retainage</u>: Owner shall retain 5% of the amount of each progress payment until 45 Days after Final Acceptance and receipt of all documents required by law or the Contract Documents, including, at Owner's request, consent of surety to release of the retainage. In accordance with chapter 60.28 RCW, Contractor may request that monies reserved be retained in a fund by Owner, deposited by Owner in a bank or savings and loan, or placed in escrow with a bank or trust company to be converted into bonds and securities to be held in escrow with interest to be paid to Contractor. Owner may permit Contractor to provide an appropriate bond in lieu of the retained funds.
- C. <u>Title passes to Owner upon payment:</u> Title to all Work and materials covered by a progress payment shall pass to Owner at the time of such payment free and clear of all liens, claims, security interests, and encumbrances. Passage of title shall not, however, relieve Contractor from any of its duties and responsibilities for the Work or materials, or waive any rights of Owner to insist on full compliance by Contractor with the Contract Documents. A progress payment, or partial or entire use or occupancy of the Project by Owner, shall not constitute acceptance of Work.

#### 6.3 PAYMENTS WITHHELD

- Owner's right to withhold payment: Owner may withhold or, on account of subsequently Α. discovered evidence, nullify the whole or part of any payment to such extent as may be necessary to protect Owner from loss or damage for reasons including but not limited to: (1) Work not in accordance with the Contract Documents; (2) Reasonable evidence that the Work required by the Contract Documents cannot be completed for the unpaid balance of the Contract Sum; (3) Work by Owner to correct defective Work or complete the Work in accordance with Section 5; (4) Claims (except where an insurer has unconditionally accepted coverage) filed or reasonable evidence indicating probable filing of such claims unless Contractor provides security acceptable to Owner; (5) The failure of Contractor to make payments to Subcontractors for labor, materials or equipment; (6) Damage to Owner or a separate contractor (except where an insurer has unconditionally accepted coverage); (7) Failure to submit affidavits pertaining to wages paid or certified payrolls as requested or otherwise required by statute; (8) Contractor's failure otherwise to perform in accordance with the Contract Documents; or (9) Contractor's negligent acts or omissions: Cost or liability that may occur to Owner as the result of Contractor's fault or negligent acts or omissions.
- B. <u>Owner to notify Contractor of withholding for unsatisfactory performance</u>: In any case where part or all of a payment is going to be withheld for unsatisfactory performance, Owner shall notify Contractor in accordance with chapter 39.76 RCW.

### 6.4 RETAINAGE, BOND CLAIM RIGHTS, AND LIENS

- A. <u>Chapters 39.08 RCW and 60.28 RCW incorporated by reference</u>: Chapters 39.08 RCW and 60.28 RCW, concerning the rights and responsibilities of Contractor and Owner with regard to the performance and payment bonds and retainage, are made a part of the Contract Documents by reference as though fully set forth herein.
- B. <u>Liens</u>: Contractor shall promptly pay (and secure the discharge of any liens asserted by) all persons properly furnishing labor, equipment, materials or other items in connection with the performance of the Work (including, but not limited to, any Subcontractors ) to the extent that Owner has paid Contractor for this Work. Owner may, at its option, withhold payment, in whole or in part, to Contractor until lien and claim releases are furnished. Contractor may provide other security acceptable to Owner, such as a bond, in lieu of paying disputed liens or claims. Contractor shall defend, indemnify, and hold harmless Owner from any liens, including all expenses and attorneys' fees, except to the extent a lien has been recorded because of a failure of payment by Owner for the Work implicated in any such lien.

#### 6.5 SUBSTANTIAL COMPLETION

- A. <u>Substantial Completion defined</u>: Substantial Completion is the stage in the progress of the Work (or portion thereof designated and approved by Owner) when the construction is sufficiently complete, in accordance with the Contract Documents, so Owner has full and unrestricted use and benefit of the facilities (or portion thereof designated and approved by Owner) for the use for which it is intended. All Work other than incidental corrective or punch list work shall be completed. Substantial Completion shall not have been achieved if the Work cannot achieve Final Completion within the time specified in the Agreement, if all systems and parts are not functional, if utilities are not connected and operating normally, if all required occupancy permits have not been issued, or if the Work is not accessible by normal vehicular and pedestrian traffic routes. The date Substantial Completion is achieved shall be established in writing by Architect. Contractor may request an early date of Substantial Completion which must be approved by Change Order. Owner's occupancy of the Work or designated portion thereof does not necessarily indicate that Substantial Completion has been achieved.
- B. <u>Owner to determine if Work is complete:</u> Upon receipt of Contractor's list, Owner will make an inspection to determine whether the Work or designated portion thereof has achieved Substantial Completion. If Owner's inspection discloses any item, whether or not included on Contractor's list, that is not sufficiently complete in accordance with the Contract Documents so that Owner can occupy or utilize the Work or designated portion thereof for its intended use, Contractor shall, before the occurrence of Substantial Completion, complete or correct the item upon notification by Owner, and Contractor shall then submit a request for another inspection by Owner to determine Substantial Completion. If Owner determines that the Work or designated portion has not achieved Substantial Completion, Contractor shall expeditiously complete the Work or designated portion, again request an inspection, and pay the costs associated with the re- inspection.
- C. <u>Contractor to complete punch list in timely manner</u>: Contractor shall prepare, continue to monitor, and cause to be completed, all punch lists with respect to the activity of each Subcontractor and report weekly to Owner on outstanding punch list items.

#### 6.6 PRIOR OCCUPANCY

- A. <u>Prior Occupancy defined; Restrictions</u>: Owner may, when legally permissible to do so and upon written Notice to Contractor, take possession of or use any completed or partially completed portion of the Work ("Prior Occupancy") at any time prior to Substantial Completion, and Contractor shall cooperate with such occupancy and use and the establishment of a punch list. Unless otherwise agreed in writing, Prior Occupancy shall not: be deemed an acceptance of any portion of the Work; accelerate the time for any payment to Contractor; prejudice any rights of Owner provided by any insurance, bond, guaranty, or the Contract Documents; relieve Contractor of the risk of loss or any of the obligations established by the Contract Documents; establish a date of Substantial or Final Completion; establish a date for termination or partial termination of the assessment of liquidated damages; or constitute a waiver of claims.
- B. <u>Damage; Duty to repair and warranties</u>: Notwithstanding anything in the preceding paragraph, Owner shall be responsible for loss of or damage to the Work resulting from Prior Occupancy. Contractor's one year duty to repair any system warranties shall begin on building systems activated and used by Owner as agreed in writing by Owner and Contractor.

#### 6.7 FINAL COMPLETION, ACCEPTANCE, AND PAYMENT

- A. <u>Final Completion defined</u>: Final Completion shall be achieved when the Work is fully and finally complete in accordance with the Contract Documents. The date Final Completion is achieved shall be established by Owner in writing, but in no case shall it constitute Final Acceptance, which is a subsequent, separate, and distinct action.
- B. <u>Final Acceptance defined</u>: Unless otherwise determined by Owner, Final Acceptance shall be achieved after Contractor has completed all the requirements of the Contract Documents. The date Final Acceptance is achieved shall be established by Owner in writing. Pursuant to RCW 60.28, "Lien for Labor, Materials, Taxes on Public Works," completion of the Contract Work shall occur upon Final Acceptance. Neither Final Acceptance nor final payment shall release Contractor or its sureties from any obligations of these Contract Documents or the payment and performance bonds, or constitute a waiver of any claims by Owner arising from Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. <u>Final payment waives Claim rights</u>: Acceptance of final payment by Contractor or any Subcontractor shall constitute a waiver and release to Owner of all claims by Contractor or any such Subcontractor for an increase in the Contract Sum or the Contract Time, and for every act or omission of Owner relating to or arising out of the Work, except for those Claims made in accordance with the procedures, including the time limits, set forth in Section 8.

#### PART 7 – CHANGES

#### 7.1 CHANGE IN THE WORK

- A. <u>Changes in the Work</u>: Changes in the Work may be accomplished after execution of the Contract without invalidating the Contract. Changes in the Work are recognized and incorporated into the Contract solely by Change Order and are subject to the limitations stated in this Part 7 and elsewhere in the Contract Documents. A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone. Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.
- B. <u>Change Order</u>: A Change Order is a written instrument signed by the Owner, Contractor, and Architect that modifies or amends the Contract Documents by setting forth: (1) a change in the Work, (2) the amount of any adjustment in the Contract Sum, and (3) the extent of any adjustment in the Contract Time. The Change Order shall constitute full payment and final settlement of all claims for time and direct, indirect, and consequential costs, including costs of delays, inconvenience, disruption of schedule, or loss of efficiency or productivity, related to any Work either covered or affected by the Change Order, or related to the events giving rise to the Change Order.
- C. <u>Change Order Proposal from Contractor</u>: If Contractor at any time believes that a change in the Work has occurred that involves a change in the Contract Sum and/or Contract Time, Contractor shall provide written Notice to Owner in accordance with Section 8. Contractor's failure strictly to follow the procedure set forth in the Contract Documents shall waive any right of Contractor to a change in the Contract Sum or Contract Time on account of any such change in the Work.
- D. <u>Owner-Initiated Changes</u>: For an Owner-initiated change or directive, Owner may

- <u>Request a written Change Order Proposal (COP) from Contractor</u>. Contractor shall submit a COP within 14 Days of the request from Owner, or within such other period as mutually agreed. Contractor's COP shall be full compensation for implementing the proposed change in the Work, including any adjustment in the Contract Sum or Contract Time, and including compensation for all delays in connection with such change in the Work and for any expense or inconvenience, disruption of schedule, or loss of efficiency or productivity occasioned by the change in the Work. Upon receipt of the COP, Owner may accept the proposal and incorporate it into Change Order, reject the proposal, request further documentation, or negotiate acceptable terms with Contractor.
- 2. Issue a Construction Change Directive (CCD). Pending execution of a Change Order, Owner may issue a CCD directing Contractor to proceed immediately with the Work. A CCD is a written order prepared by Owner that directs Contractor to perform Work prior to total agreement on an adjustment, if any, in the Contract Sum and/or Contract Time. Owner may direct Contractor through a CCD, at any time and without invalidating the Contract, to proceed with a change in the Work or to perform Work that Contractor contends to be a change in the Work, with or without the agreement of Contractor and prior to agreement of the basis for adjustment, if any, to the Contract. Owner's use of a CCD does not constitute agreement that the directive constitutes a change in the Work. the Contract Sum or the Contract Time. All Work done pursuant to an Owner-directed change in the Work shall be executed in accordance with the Contract Documents. Upon receipt of a CCD, Contractor shall promptly commence and proceed diligently with performance of the directed Work. Within 7 Days of its receipt of a CCD, Contractor shall notify Owner in writing either (a) of its acceptance of its terms, in which case the terms will become effective, and the CCD will be incorporated into a Change Order, or (b) of Contractor's rejection of the terms, in which case Contractor must submit a written Rejection within 14 Days after Contractor delivered written Notice to Owner as noted above. The written Rejection must fully explain the reasons for rejecting the CCD and include all necessary supporting documentation. Failure to submit written Notice within 7 Days of Contractor's receipt of a CCD or a written Rejection with 14 Days after delivery of written Notice shall constitute Contractor's acceptance of the terms of the CCD. Contractor's Rejection of a CCD shall not relieve Contractor of its obligation to comply promptly with the CCD.
- E. <u>Contractor fault or negligence alleged as basis for change in Contract Sum</u>: No change in the Contract Sum shall be allowed to the extent Contractor's changed cost of performance is due to the fault or negligence of Contractor or anyone for whose acts Contractor is responsible; or to the extent Contractor is responsible for change concurrently caused by Contractor and Owner; or to the extent the change is caused by an act of Force Majeure as defined in this Agreement.

## 7.2 CHANGE IN THE CONTRACT SUM

- A. <u>Contract Sum changes only by Change Order</u>: The Contract Sum shall only be changed by a Change Order. Contractor shall include any request for a change in the Contract Sum in its COP.
- B. <u>Allowances</u>: Any Allowances stated in the Contract Documents shall be included in the Contract Sum. Items covered by Allowances shall be supplied for such amounts and by such persons or entities as Owner may direct, but Contractor shall not be required to employ persons or entities to whom Contractor has made reasonable and timely objection. Owner shall select materials and equipment under an Allowance with reasonable promptness. Allowances shall cover the net cost to Contractor of materials and equipment delivered and/or installed at the site, as identified in the Allowance, and all required taxes, less applicable trade

discounts. Whenever actual costs are more than or less than Allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect the difference between actual, reasonable costs and the Allowances.

- C. <u>Methods for Calculating Change Order Pricing:</u> The value of any Work covered by a Change Order or any adjustment to the Contract Sum shall be determined by fixed price, unless otherwise agreed to by Owner. The following procedures shall apply with respect to pricing:
  - a. <u>Breakdown and itemization of details on COP</u>: Contractor's COP shall be accompanied by a complete itemization of the costs, including labor, material, subcontractor costs, and overhead and profit. The costs shall be itemized in the manner set forth below, and shall be submitted on breakdown sheets in a form approved by Owner. If the total cost of the change in the Work does not exceed \$2,000, Contractor shall not be required to submit a breakdown if the description of the change in the Work is sufficiently definitive for Owner to determine fair value.
  - b. <u>Use of industry standards in calculating costs</u>: All costs shall be calculated based upon appropriate industry standard methods of calculating labor, material quantities, and equipment costs such as R.S. Means or other standards acceptable to the Owner and Contractor.
  - c. <u>Markups on additive and deductive Work</u>: The cost of any additive or deductive changes in the Work shall be calculated as set forth below. Where a change in the Work involves additive and deductive work by the same Contractor or Subcontractor, small tools, overhead, profit, bond and insurance markups will apply to the net difference.
  - d. <u>Components of Increased Costs</u>: Any request for an adjustment of the Contract Sum shall include only the following
    - i. <u>Craft labor costs</u>: These are the labor costs determined by multiplying the estimated or actual additional number of craft hours needed to perform the change in the Work by the hourly labor costs. Craft hours should cover direct labor, as well as indirect labor due to trade inefficiencies. The hourly costs shall be based on the following:
      - Basic wages and benefits: Hourly rates and benefits as stated on the Department of Labor and Industries approved "statement of intent to pay prevailing wages" or a higher amount if approved by the Owner. Direct supervision shall be a reasonable percentage not to exceed 15% of the cost of direct labor. No supervision markup shall be allowed for a working supervisor's hours.
      - 2. Federal insurance: Direct contributions required by the Federal Insurance Compensation Act; Federal Unemployment Tax Act; and the State Unemployment Compensation.
      - 3. Travel allowance: Travel allowance and/or subsistence, if applicable, not exceeding those allowances established by regional labor union agreements, which are itemized and identified separately.
      - 4. Safety: Cost incurred due to the Washington Industrial Safety and Health Act, which shall be a reasonable percentage not to exceed 2% of the sum of the amounts calculated in (1), (2), and (3) above.
    - ii. <u>Material costs</u>: This is an itemization of the quantity and cost of materials needed to perform the change in the Work. Material costs shall be developed first from actual known costs, second from supplier quotations or if these are not available, from standard industry pricing guides. Material costs shall consider all

available discounts. Freight costs, express charges, or special delivery charges, shall be itemized.

- iii. <u>Equipment costs</u>: This is an itemization of the type of equipment and the estimated or actual length of time the construction equipment appropriate for the Work is or will be used on the change in the Work. Costs will be allowed for construction equipment only if used solely for the changed Work, or for additional rental costs actually incurred by the Contractor. Equipment charges shall be computed on the basis of actual invoice costs or if owned, from the current edition of one of the following sources:
  - 1. The Equipment Watch Fleet Manager Estimator Package (digital). The maximum rate for standby equipment shall not exceed that shown in the Associated General Contractors Washington State Department of Transportation (AGC WSDOT) Equipment Rental Agreement, current edition on the Contract execution date.
  - 2. The National Electrical Contractors Association for equipment used on electrical work.
  - 3. The Mechanical Contractors Association of America for equipment used on mechanical work.

The Equipment Watch Rental Rate Blue Book shall be used as a basis for establishing rental rates of equipment not listed in the above sources. The maximum rate for standby equipment shall not exceed that shown in the AGC WSDOT Equipment Rental Agreement, current edition on the Contract execution date.

- iv. <u>Allowance for small tools, expendables & consumable supplies</u>: Small tools consist of tools which cost \$250 or less and are normally furnished by the performing contractor. The maximum rate for small tools shall not exceed the following:
  - 1. 3% for Contractor: For Contractor, 3% of direct labor costs.
  - 2. 5% for Subcontractors: For Subcontractors, 5% of direct labor costs.

Expendables and consumables supplies directly associated with the change in Work must be itemized.

- v. <u>Allowance for overhead and profit</u>: This is defined as costs of any kind attributable to direct and indirect delay, acceleration, or impact, added to the total cost to Owner of any change in the Contract Sum. This allowance shall compensate Contractor for all non-craft labor, temporary construction facilities, field engineering, schedule updating, as-built drawings, home office cost, B&O taxes, office engineering, estimating costs, additional overhead because of extended time, profit, and any other cost incidental to the change in the Work. It shall be strictly limited in all cases to a reasonable amount, mutually acceptable, not to exceed the rates below:
  - 1. Additive or Deductive Change Orders Performed by Contractor: 7 percent overhead and profit
  - 2. Additive or Deductive Change Order for Work performed by Subcontractor(s): 5 percent overhead and profit for Contractor and 10 percent overhead and profit for Subcontractor(s).
- vi. <u>Insurance and bond premiums</u>: Cost of change in insurance or bond premium, which shall be added after overhead and profit are calculated in accordance with paragraph (v) above: This is defined as:

- 1. Contractor's liability insurance: The cost of any changes in Contractor's liability insurance arising directly from execution of the Change Order; and
- 2. Payment and Performance Bond: The cost of the additional premium for Contractor's bond arising directly from the changed Work.
- D. <u>Deductive Change or Credit</u>: The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

### 7.3 CHANGE IN THE CONTRACT TIME

- A. <u>Changes in Contract Time</u>: The Contract Time shall only be changed by a Change Order. Claims relating to time shall be made in accordance with Section 8.
- B. <u>Time extension permitted only if delay is not Contractor's fault</u>: If Contractor is delayed at any time in the commencement or progress of the Work (1) by an act or neglect of Owner or anyone for whose acts Owner is responsible; or (2) by changes ordered by Owner in the Work; or (3) by Force Majeure; or (4) by delay authorized by Owner pending dispute resolution; or (5) by other causes that Owner determines may justify delay, then Contractor shall reasonably attempt to mitigate the delay, and the Contract Time shall be extended by Change Order for such reasonable time as Owner may reasonably determine consistent with the provisions of the Contract Documents. No adjustment in the Contract Time shall be allowed to the extent Contractor's changed time of performance is due to the fault or negligence of Contractor or anyone for whose acts Contractor is responsible.
- C. <u>Contractor must demonstrate impact on critical path of schedule</u>: Any change in the Contract Time covered by a Change Order or Claim shall be limited to the change in the critical path of the Work attributable to the change or event(s) giving rise to the Change Order or Claim. Contractor shall be responsible for showing clearly on the Schedule that the change or event had a specific impact on the critical path and, except in case of concurrent delay, was the sole cause of such impact, and could not have been avoided by resequencing of the Work or other reasonable alternatives.
- D. <u>Cost arising from change in Contract Time</u>: Provided Contractor has strictly complied with the procedures set forth in Section 7 and Section 8, Contractor is entitled to compensation for the cost of a change in Contract Time only if all the following conditions are met:
  - 1. <u>Must be solely fault of Owner</u>: The change in Contract Time must solely be caused by the fault or negligence of Owner or others for whom Owner is responsible;
  - 2. <u>Demonstrate impact on critical path</u>: Contractor must establish the extent of the change in Contract Time in accordance with Section 7.3C. Owner is not obligated directly or indirectly for damages or an increase in the Contract Sum for any delay suffered by a Subcontractor that does not increase the Contract Time; and
  - 3. <u>Limitations on Costs</u>: Neither Contractor nor a Subcontractor of any tier is entitled to payment for costs arising out of actual or alleged loss of efficiency; morale, fatigue, attitude, or labor rhythm; home office overhead; expectant underrun; trade stacking; reassignment of workers; rescheduling of work; concurrent operations; dilution of supervision; learning curve; beneficial or joint occupancy; logistics; ripple; season change; extended overhead; profit upon damages for delay; impact damages, including cumulative impact; or similar damages.

## PART 8 – CLAIMS AND DISPUTE RESOLUTION

#### 8.1 CLAIMS

- A. <u>Definition</u>: A Claim is a demand or assertion by one of the parties seeking, as a matter of right, adjustment or interpretation of the Contract terms, payment of money, extension of time or other relief with respect to the terms of the Contract Documents. The term "Claim" also includes other disputes and matters in question between Owner and Contractor arising out of or relating to the Contract Documents. Claims must be initiated in writing and be made in accordance with the Contract Documents.
- B. <u>Continuing Contract performance</u>: Pending final resolution of a Claim, including the dispute resolution process, and except as otherwise agreed in writing or in the Contract Documents, Contractor shall proceed diligently with performance of the Work and maintain the Schedule, and Owner shall continue to make payments of undisputed amounts in accordance with the Contract Documents.
- C. <u>Claims for additional cost</u>: If Contractor wishes to make a Claim for an increase in the Contract Sum, written Notice as provided herein shall be given before proceeding to execute the Work, and written Notice and a written Claim must be made in accordance with this Part 8, or it will be waived.
- D. <u>Claims for additional time</u>: If Contractor wishes to make a Claim for an increase in the Contract Time, written Notice as provided herein shall be given, and a written Claim must be made in accordance with this Part 8, or it will be waived.
- E. <u>Claims for consequential damages</u>: Contractor and Owner waive certain Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes damages incurred by Owner for income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and damages incurred by Contractor for principal and home office overhead and expenses including but not limited to the compensation of personnel stationed there, for loss of financing, business and/or reputation, for losses on other projects, for loss of profit, and for interest or financing costs. This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination. Nothing contained in this subparagraph, however, shall be deemed to preclude an award of Owner's liquidated or other Owner delay damages, when applicable, in accordance with the Contract Documents, or to preclude or limit Contractor's obligation to indemnify Owner for damages, including direct, indirect or consequential damages, alleged by a third party.

### 8.2 CLAIMS PROCESS

A. <u>Notice and Claims</u>: Contractor shall provide Notice of any Claim within 14 Days of the event giving rise to the Claim. Contractor shall then provide its Claim, with substantiation as required in Paragraph B herein, no later than 20 Days after Contractor's submittal of its Notice of Claim. Any Notice and any Claim of Contractor, whether under the Contract or otherwise, must be made pursuant to and in strict accordance with the applicable provisions of the Contract Documents. No act, omission, or knowledge, actual or constructive, of Owner or anyone for whose acts Owner is responsible shall in any way be deemed to be a waiver of the requirement for timely written Notice and a timely written Claim unless Owner and Contractor sign an explicit, unequivocal written waiver. The fact that Owner and Contractor may consider, discuss, or negotiate a Claim that has or may have been procedurally or substantively defective or untimely under the Contract shall not constitute a waiver of the provisions of the Contract Documents unless Owner and Contractor sign an explicit, unequivocal written contract shall not constitute a waiver of the provisions of the Contract Documents unless Owner and Contractor sign an explicit, unequivocal written waiver.

Contractor acknowledges and agrees that Contractor's failure to timely submit required Notices and/or timely submit Claims has a substantial impact upon and prejudices Owner, including but not limited to its inability to fully investigate or verify the Claim, mitigate damages, choose alternative options, adjust the budget, delete or modify the impacted Work, and/or monitor time, cost and quantities, and shall result in waiver of Contractor's Claim.

- B. <u>Claim must cover all costs and be documented</u>: A Claim shall be deemed to cover all changes in cost and time (including direct, indirect, impact, and consequential) to which Contractor (and Subcontractors) may be entitled and may not contain reservations of rights without Owner's written approval; any such unapproved reservations of rights shall be without effect. At a minimum, a Claim shall contain the following information:
  - 1. <u>Factual statement of Claim</u>: A detailed factual statement of the Claim for additional compensation and/or time, if any, providing all necessary dates, locations, and items of Work affected by the Claim and confirming the damages asserted (time and cost) are actually caused by and/or a result of the act, event, or condition complained of;
  - 2. <u>Dates</u>: The date on which event(s) arose which gave rise to the Claim;
  - 3. <u>Individuals knowledgeable about Claim</u>: The name of each individual, including but not limited to employees of Contractor, Subcontractors, Owner and/or A/E believed to be knowledgeable about the Claim;
  - 4. <u>Support from Contract Documents</u>: The specific provisions of the Contract Documents that support the Claim;
  - 5. <u>Identification of other supporting information</u>: The identification of any documents and the substance of any oral communications that support the Claim;
  - 6. <u>Copies of supporting documentation</u>: Data and copies of any identified documents, other than the Contract Documents, that support the Claim;
  - 7. <u>Details on Claim for Contract Time</u>: If an adjustment in the Contract Time is sought, the specific days and dates for which it is sought; the specific reasons Contractor believes an extension in the Contract Time should be granted, and Contractor's analysis of its Progress Schedule to demonstrate the reason for the extension in Contract Time.
  - 8. <u>Details on Claim for adjustment of Contract Sum</u>: If an adjustment in the Contract Sum is sought, the exact amount sought and a breakdown of that amount into the categories and with the detail required by Section 7; and
  - 9. <u>Statement certifying Claim</u>: A statement certifying, under penalty of perjury, that the Claim is made in good faith, that the supporting cost and pricing data are true and accurate to the best of Contractor's knowledge and belief, that the Claim is fully supported by the accompanying data, and that the amount requested accurately reflects the adjustment in the Contract Sum or Contract Time for which Contractor believes Owner is liable.
- C. <u>Waiver of rights</u>: Any Claim of Contractor against Owner shall be conclusively deemed to have been waived by Contractor unless made in accordance with the requirements of Part 8.
- D. <u>Owner may investigate</u>: To assist in the review of a Claim, Owner may at any time visit the Project site, communicate directly with Subcontractors, or request additional information (including requesting an audit as authorized below) in order to fully evaluate the issues raised by the Claim.

- E. <u>Owner may audit Claims</u>: All Claims filed against Owner shall be subject to audit at any time following the filing of the Claim. Failure of Contractor or Subcontractors of any tier to permit Owner access to the books and records of Contractor or Subcontractors of any tier, or to maintain and retain sufficient records to allow Owner to verify all or a portion of the Claim, shall constitute a waiver of the Claim and shall bar any recovery. The audit may be performed by employees or representatives of Owner. Contractor and its Subcontractors shall provide adequate facilities acceptable to Owner for the audit during normal business hours. Contractor and all Subcontractors shall make a good faith effort to cooperate with Owner's auditors.
- F. <u>Reciprocal RCW 42.56 rights</u>: Contractor agrees, on behalf of itself and Subcontractors, that any invocation of RCW 42.56 at any time by Contractor or a Subcontractor, or their respective representatives, shall initiate an equivalent right to disclosures from Contractor and Subcontractors for the benefit of Owner. Failure to fully comply with these requirements shall constitute a material breach of the Contract and shall constitute a waiver of all Claims by Contractor and any Subcontractor that does not fully comply.

### 8.3 FORMAL RESOLUTION OF CLAIMS

- Mediation Required: To the extent a Claim is not resolved by Owner and Contractor, Claims, Α. disputes, or other matters in controversy arising out of or related to the Contract shall be subject to mediation as a condition precedent to the initiation of binding dispute resolution. This requirement cannot be waived except by an explicit written waiver signed by both Owner and Contractor. Unless Owner and Contractor mutually agree in writing otherwise, all unresolved Claims shall be considered at a single mediation session that shall occur after Substantial Completion and prior to Final Acceptance by Owner. A request for mediation shall be delivered in writing to the other party to the Contract, and the parties shall promptly attempt to mutually agree on a mediator. If the parties do not agree on a mediator within 30 Days of a party's demand, the mediation, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. Mediation shall proceed in advance of binding dispute resolution proceedings. The parties to the mediation shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction.
- Litigation: Contractor may not commence litigation on a Claim unless the Claim has been Β. raised and considered in accordance with the procedures of this Part 8, including mandatory mediation. Contractor shall have the burden to demonstrate in any litigation that it has complied with all requirements of this Part 8. All unresolved Claims of Contractor shall be waived and released unless Contractor has complied with the time limits of the Contract Documents, and litigation is served and filed within 180 Days after the Date of Substantial Completion approved in writing by Owner. This requirement cannot be waived except by an explicit, written waiver signed by Owner and Contractor. The pendency of a mediation, which shall mean the time period between a party's receipt of a written mediation demand and the date of the initial mediation session, shall stay this deadline for serving and filing a lawsuit. The deadline may also be stayed for an additional period by agreement of the parties or court order. Neither Contractor nor a Subcontractor, whether claiming under a bond or lien statute or otherwise, shall be entitled to attorneys' fees directly or indirectly from Owner (but may recover attorneys' fees from the bond or statutory retainage fund itself to the extent allowable under law).

#### PART 9 – TERMINATION OF THE WORK

### 9.1 TERMINATION BY OWNER FOR CAUSE

- A. <u>Notice to Terminate for Cause</u>: Owner may, upon 7 Days written notice to Contractor and to its surety, terminate (without prejudice to any right or remedy of Owner) the Work, or any part of it, for cause upon the occurrence of any one or more of the following events:
  - 1. Contractor repeatedly refuses or fails to prosecute the Work or any portion thereof with sufficient diligence to ensure Substantial Completion of the Work within the Contract Time;
  - 2. Contractor is adjudged bankrupt, makes a general assignment for the benefit of its creditors, or a receiver is appointed on account of its insolvency;
  - 3. Contractor repeatedly refuses or fails in a material way to replace or correct Work not in conformance with the Contract Documents;
  - 4. Contractor repeatedly refuses or fails to supply skilled workers or proper materials or equipment;
  - 5. Contractor repeatedly refuses or fails to make prompt payment due to Subcontractors or for labor;
  - 6. Contractor materially disregards or fails to comply with laws, ordinances, rules, regulations, or orders of any public authority having jurisdiction; or
  - 7. Contractor is otherwise in material breach of any provision of the Contract Documents.
- B. Owner's actions upon termination: Upon termination, Owner may at its option:
  - 1. Exclude the Contractor from the Site and/or take possession of the Project site and take possession of or use all materials, equipment, tools, and construction equipment and machinery thereon owned by Contractor to maintain the orderly progress of, and to finish, the Work;
  - 2. Accept assignment of subcontracts pursuant to Section 5; and
  - 3. Finish the Work by whatever other reasonable method it deems expedient.
- C. <u>Payment upon Termination</u>: If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for A/E's services and expenses made necessary thereby and any other extra costs or damages incurred by Owner in completing the Work, or as a result of Contractor's actions, or any other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall survive termination of the Contract.
- D. <u>Contractor and Surety still responsible for Work performed</u>: Termination of the Work in accordance with this section shall not relieve Contractor or its surety of any responsibilities for Work performed.
- E. <u>Conversion of "Termination for Cause" to "Termination for Convenience":</u> If Owner terminates Contractor for cause and it is later determined that none of the circumstances set forth in

paragraph 9.01A exist, then such termination shall be deemed a termination for convenience pursuant to Section 9.

#### 9.2 SUSPENSION OR TERMINATION BY OWNER FOR CONVENIENCE

- A. <u>Owner Notice of Suspension or Termination for Convenience</u>: Owner may, upon written notice, suspend or terminate (without prejudice to any right or remedy of Owner) the Work, or any part of it, for the convenience of Owner.
- B. <u>Contractor Response to Termination Notice</u>: Unless Owner directs otherwise, after receipt of a written notice of suspension or termination for either cause or convenience, Contractor shall promptly:
  - 1. Stop performing Work on the date and as specified in the notice of suspension or termination;
  - 2. Place no further orders or subcontracts for materials, equipment, services or facilities, except as may be necessary for completion of such portion of the Work as is not suspended or terminated;
  - 3. For Work terminated, cancel all orders and subcontracts, upon terms acceptable to Owner, to the extent that they relate to the performance of Work terminated;
  - 4. For Work terminated, assign to Owner all of the right, title, and interest of Contractor in all orders and subcontracts to the extent that they relate to the performance of Work terminated;
  - 5. Take such action as may be necessary or as directed by Owner to preserve and protect the Work, Project site, and any other property related to this Project in the possession of Contractor in which Owner has an interest; and
  - 6. Continue performance only to the extent not terminated or suspended.
- C. <u>Terms of adjustment in Contract Sum if Contract terminated or suspended</u>: If Owner terminates or suspends the Work or any portion thereof for convenience, Contractor shall be entitled to make a request for an equitable adjustment for its reasonable direct costs incurred during the period of suspension or prior to the effective date of the termination, plus reasonable allowance for overhead and profit on Work performed prior to termination, plus the reasonable administrative costs of the termination, but shall not be entitled to any other costs or damages, whatsoever, provided however, the total sum payable upon termination shall not exceed the Contract Sum reduced by prior payments. Contractor shall be required to make its request in accordance with the provisions of Part 7. Failure of Contractor to comply with the requirements of Part 7 shall result in waiver of Contractor's claim.
- D. <u>Owner to determine whether to adjust Contract Time</u>: If Owner terminates the Work or any portion thereof for convenience, the Contract Time shall be adjusted as determined by Owner.

#### 9.3 TERMINATION BY CONTRACTOR FOR CAUSE

- A. <u>Contractor termination</u>: Except as provided by RCW 60.28.080, Contractor may terminate the Contract for any of the following reasons:
  - 1. Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped permanently;

- 2. An act of government, such as a declaration of national emergency, that requires all Work to be stopped permanently; or
- 3. The Work is stopped for a period of 60 consecutive Days through no act or fault of Contractor, a Subcontractor, or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with Contractor.
- B. <u>Contractor termination procedure</u>: If one of the above reasons exists, Contractor may, upon seven (7) Days' written Notice to Owner (during which period Owner has the opportunity to cure), terminate the Contract and recover from Owner payment for Work executed in accordance with the Contract Documents, including reasonable overhead and profit on Work executed and costs incurred by reason of such termination. The total recovery of Contractor shall not exceed the unpaid balance of the Contract Sum.

### 9.4 OWNER'S RIGHT TO STOP AND/OR CARRY OUT THE WORK FOR CAUSE

- A. <u>Owner may stop Work for Contractor's failure to perform</u>: If Contractor fails or refuses to perform its obligations in accordance with the Contract Documents, Owner may order Contractor, in writing, to stop the Work, or any portion thereof, until Owner has accepted satisfactory corrective action.
- B. <u>Owner may carry out the Work after Contractor's failure to perform</u>: If Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a 14- Day period after receipt of written Notice from Owner to commence and continue to make reasonable progress toward the correction of such default or neglect with diligence and promptness, Owner may, without prejudice to other remedies Owner may have, correct such deficiencies, and an appropriate Change Order shall be issued deducting from payments then or thereafter due Contractor the reasonable cost of correcting the deficiencies, including Owner's expenses and compensation for A/E's additional services made necessary by the default, neglect or failure. If payments then or thereafter due Contractor shall pay the difference to Owner.
- C. <u>No equitable adjustment for Contractor's failure to perform</u>: Contractor shall not be entitled to an equitable adjustment in the Contract Time or Contract Sum for any increased cost or time of performance attributable to Contractor's failure or refusal to perform or from any reasonable remedial action taken by Owner based upon such failure.

#### PART 10 – MISCELLANEOUS PROVISIONS

### 10.1 MISCELLANEOUS PROVISIONS

- A. <u>Applicable law and venue</u>: The Contract Documents and the rights of the parties herein shall be governed by the laws of the state of Washington and the City of Kirkland, without regard to its choice-of-law provisions. Venue shall be in King County.
- B. <u>Bound to successors; Assignment of Contract</u>: Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to the other party hereto and to the partners, successors, assigns, and legal representatives of such other party in respect to covenants, agreements, and obligations contained in the Contract Documents. Neither party shall assign the Contract without written consent of the other, except that Contractor may assign the Work for security purposes to a bank or lending institution authorized to do business in the state of Washington and City of Kirkland. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations set forth in the Contract Documents.

- C. <u>Meaning of words used in Contract Documents</u>: Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings. Reference to standard Specifications, manuals, or codes of any technical society, organization, or association, or to the code of any governmental authority, whether such reference is specific or by implication, shall be to the latest standard specification, manual, or code in effect on the date for submission of bids, except as may be otherwise specifically stated. Wherever in the Drawings and Specifications an article, device, or piece of equipment is referred to in the singular manner, such reference shall apply to as many such items as are shown on the Drawings, or required to complete the installation.
- D. <u>No waiver of rights</u>: Waiver of any provisions of the Contract Documents must be in writing and authorized by Owner. No other waiver is valid on behalf of Owner. No action, delay in acting, or failure to act by Owner or A/E shall constitute a waiver of a right or duty afforded under the Contract Documents, nor shall action, delay in acting, or failure to act constitute approval or an acquiescence in a breach therein, or otherwise prejudice the right of Owner to enforce a right or remedy at any subsequent time, except as may be specifically agreed in writing.
- E. <u>Rights under Contract do not limit other rights</u>: Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.
- F. <u>Severability</u>: If any portion of this Contract is held to be void or unenforceable, the remainder of the Contract shall be enforceable without such portion.
- G. <u>Contractor must be registered and licensed</u>: Pursuant to RCW 39.06, Contractor shall be registered and licensed as required by the laws of the State of Washington, including but not limited to RCW 18.27. Contractor shall also have a current state unified business identifier number; have industrial insurance coverage for Contractor's employees working in Washington as required in Title 51 RCW; have an employment security department number as required in Title 50 RCW; have a state excise tax registration number as required in Title 82 RCW; and not be disqualified from bidding on any public works contract under RCW 39.06.010 (unregistered or unlicensed contractors) or RCW 39.12.065(3) (prevailing wage violations).
- H. <u>Employer contributions</u>: Pursuant to RCW 50.24, "Contributions by Employers," in general and RCW 50.24.130 in particular, Contractor shall pay contributions for wages for personal services performed under this Contract or arrange for a bond acceptable to the Commissioner.
- I. <u>Apprenticeship requirements</u>: If the Contract Sum for the Project exceeds one million dollars, Contractor shall comply with all applicable apprenticeship requirements, including but not limited to RCW 39.04.320. For each Project that has apprenticeship requirements, the Contractor shall submit a "Statement of Apprentice and Journeyman Participation" in a format approved by the City with every request for progress payment. The Contractor shall submit consolidated and cumulative data collected by the Contractor and collected from all subcontractors by the Contractor.
- J. <u>Computing time</u>: When computing any period of time, the day of the event from which the period of time begins shall not be counted. The last day is counted unless it falls on a weekend or legal holiday, in which event the period runs until the end of the next day that is not a weekend or holiday. When the period of time allowed is less than 7 days, intermediate Saturdays, Sundays, and legal holidays are excluded from the computation.

- K. <u>Six year records retention period</u>: The wage, payroll, and cost records of Contractor, and its Subcontractors, and all records subject to audit, shall be retained for a period of not less than 6 years after the date of Final Acceptance. The Contractor agrees to provide access to and copies of any records related to this Agreement as required by the City to audit expenditures and charges and/or to comply with the Washington State Public Records Act.
- L. <u>No third party relationships created</u>: The Contract Documents shall not be construed to create a contractual relationship of any kind between: A/E and Contractor; Owner and any Subcontractor; or any persons other than Owner and Contractor.
- M. <u>Contractor assigns overcharge amounts to Owner</u>: Owner and Contractor recognize that in actual economic practice, overcharges resulting from antitrust violations are in fact usually borne by the purchaser. Therefore, Contractor hereby assigns to Owner any and all claims for such overcharges as to goods, materials, and equipment purchased in connection with the Work performed in accordance with the Contract Documents, except as to overcharges which result from antitrust violations commencing after the Contract Sum is established and which are not passed on to Owner under a Change Order. Contractor shall put a similar clause in its Subcontracts, and require a similar clause in its sub- Subcontracts, such that all claims for such overcharges on the Work are passed to Owner by Contractor.
- N. <u>Headings for convenience only</u>: All headings and captions used in these General Conditions are only for convenience of reference, and shall not be used in any way in connection with the meaning, effect, interpretation, construction, or enforcement of the General Conditions, and do not define the limit or describe the scope or intent of any provision of these General Conditions.
- O. <u>Contractor is independent contractor</u>: Contractor shall be and operate as an independent contractor in the performance of the Work and shall have complete control over and responsibility for all personnel performing the Work. Contractor is not authorized to enter into any agreements or undertakings for or on behalf of Owner or to act as or be an agent or employee of Owner.
- P. <u>Owner's role is limited</u>. Owner will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely Contractor's responsibility under the Contract Documents. The presence of Owner at the Project site shall not in any manner be construed as assurance that the Work is being completed in compliance with the Contract Documents, nor as evidence that any requirement of the Contract Documents of any kind, including Notice, has been met or waived. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. Owner will not have control over or charge of and will not be responsible for acts or omissions of Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

### SUPPLEMENTAL CONDITIONS

UNLESS EXPRESSLY OTHERWISE INDICATED, THE FOLLOWING REQUIREMENTS SUPPLEMENT THE REFERENCED ARTICLES OF THE "GENERAL CONDITIONS" SECTION 00 70 00 AND SUPERCEDE THEM WHERE THEY CONTRADICT THE SAME.

### 1.1 COVID-19 Health and Safety Plan (CHSP)

The Contractor shall prepare a project specific COVID-19 health and safety plan (CHSP). The CHSP shall be prepared and submitted prior to beginning physical Work. The CHSP shall be based on and in compliance with the most current State and Federal requirements and applicable guidelines. If the State or Federal requirements are revised, the CHSP shall be promptly updated as necessary to conform to the current requirements. Contractor is responsible for staying informed of applicable State and Federal updates regarding COVID-19 requirements.

The Contractor shall update and resubmit the CHSP as the work progresses and new activities appear on the Progress Schedules. If the conditions change on the project, or for a particular activity, the Contractor shall update and resubmit the CHSP. Work on any activity shall cease if conditions prevent full compliance with the CHSP.

The CHSP shall address the health and safety of all people associated with the project including Owner, workers in the field, Contractor personnel, consultants, project staff, subcontractors, suppliers and anyone on the project site, staging areas, or yards.

The CHSP shall address all applicable state and federal regulation requirements and at a minimum contain the following information before Work begins:

- 1. Identify Designated Representative (Title and/or Name) Responsible for Compliance
  - a. Identify Designated Representative's responsibilities
  - b. Identify procedure which the designated representative will implement to screen employees for potential COVID-19 exposure.
- 2. Employee Responsibilities: Company policy addressing employee hygiene, illness or COVID-19 exposure.
- 3. Social Distancing
- 4. Jobsite/Office Best Practices
  - a. Project site cleaning protocol.
  - b. Operation specific protocols as needed to comply with federal and state regulations and applicable guidelines.
- 5. Managing Sick Employees
  - a. Process addressing employees that develop potential COVID-19 symptoms while at work (fever, cough, shortness of breath).
  - b. Process for managing employees before returning to work.
  - c. Process for response to employee notifying employer of positive test result for COVID-19.
- 6. Material Deliveries and Anyone Entering the Jobsite: Process to assure all outside vendors, suppliers and subcontractors comply with CHSP
- 7. Training, Education, and Communication: Process to inform and educate all employees of information contained in the CHSP.

#### COVID-19 Health and Safety Plan (CHSP) Inspection

The Contractor shall grant full and unrestricted access to the Owner for CHSP Inspections. The Owner (or designee) will conduct periodic compliance inspections on the project site, staging areas, or yards to verify that any ongoing work activity is following the CHSP plan.

If the Owner becomes aware of a noncompliance incident either through a site inspection or other means, the Contractor will be notified immediately. The Contractor shall immediately remedy the noncompliance incident or suspend all or part of the associated work activity. The Contractor shall satisfy the Owner that the noncompliance incident has been corrected before the suspension will end.

### CONTRACTOR'S AFFIDAVIT OF RELEASE OF CLAIMS AND LIENS

Τ.			ED.
10	ΟV	VN	EK:

City of Kirkland 123 5<sup>th</sup> Avenue Kirkland, WA 98033

Project Name: Virtual Service Center

Project Number: 49-22-PW

From CONTRACTOR:

CONDITIONAL RELEASE	UNCONDITIONAL RELEASE	
The undersigned does hereby acknowledge and certify that upon receipt by the undersigned of a check from, in the sum of \$ and when the check has been properly endorsed and has been paid by the bank upon which it was drawn, this document shall become effective to release any and all claims for compensation, impacts, additional time, costs, and rights of Claim or lien which the undersigned has on the above referenced Project for labor, services, equipment, materials furnished and/or claims through (Date:) except it does not cover any retention or items furnished thereafter. Before any recipient of this document relies on it, said party should verify evidence of payment to the undersigned. Items and Claims not waived and released by this Instrument:	The undersigned does hereby acknowledge and certify that the undersigned has been paid and has received progress payments in the sum of \$ for labor, services, equipment or materials furnished to the above referenced Project and does hereby release any and all claims for compensation, impacts, additional time, costs and rights of Claim or lien which the undersigned has on the above referenced Project, any state or federal statutory bond right and private bond right, any claim for payment. This release covers all payment for labor services, equipment, materials furnished and/or claims on the above referenced Project through (Date:) only and does not cover any retention or items furnished after that date. Items and Claims not waived and released by this Instrument: NOTICE: THIS DOCUMENT WAIVES RIGHTS UNCONDITIONALLY AND STATES THAT YOU HAVE BEEN PAID FOR GIVING UP THOSE RIGHTS. THIS DOCUMENT IS ENFORCEABLE AGAINST YOU IF YOU SIGN IT, EVEN IF YOU HAVE NOT BEEN PAID. IF YOU HAVE NOT BEEN PAID, USE A CONDITIONAL RELEASE FORM.	
I CERTIFY UNDER PENALTY OF PERJURY UNDER LAWS OF THE STATE OF WASHINGTON THAT THE ABOVE IS A TRUE AND CORRECT STATEMENT.	I CERTIFY UNDER PENALTY OF PERJURY UNDER LAWS OF THE STATE OF WASHINGTON THAT THE ABOVE IS A TRUE AND CORRECT STATEMENT.	
Signature:	Signature:	
(Authorized Corporate Officer/Partner/Owner)	(Authorized Corporate Officer/Partner/Owner)	
Printed Name:	Printed Name:	
Title:	Title:	
DATED:20at	DATED:20at	
(City, State)	(City, State)	

### DEPARTMENT OF LABOR WAGE RATES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Prevailing wage rates for the locality or localities of the Work, as described by the Industrial Statistician of the Department of Labor and Industries, are required for this contract. Contractor remains solely responsible for verifying that the rates are accurate, current, and inclusive for all parts of this Work. Any off-site prefabrication may also require prevailing wages and the Contractor should contact the Department of Labor and Industries to ascertain those rates.
- B. Contractor to provide the "Notice of Intent to Pay Prevailing Wage Rates", as required by RCW 39.04, 39.12, 43.19, and 49.28 as amended. All paperwork regarding "Notice of Intent to Pay Prevailing Wage Rates" shall be sent directly to the Owner. The rules and regulations of the Department of Labor and Industries and the schedule of prevailing wage rates for the locality or localities where this Contract will be performed as determined by the Industrial Statistician of the Department of Labor and Industries, are by reference made a part of this Contract as though fully set forth herein.

Current prevailing wage rates for King County will apply to this project. Current prevailing wage data are available online or at the following:

- ADDRESS: Department of Labor and Industries Prevailing Wage Section P.O. Box 44540 Olympia, Washington 98504-4540
- WEBSITE: https://secure.lni.wa.gov/wagelookup/

The General Contractor and his sub-contractors are to pay for all filing fees for Statements of Intent to Pay Prevailing Wages and Affidavits . Pay for any change in rate during the course of construction.

Submit forms to: Department of Labor and Industries Prevailing Wage Section P.O. Box 44540 Olympia, Washington 98504-4540

### 01 10 00 – SUMMARY

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Project information.
  - 2. Work covered by Contract Documents.
  - 3. Work performed by Owner.
  - 4. Multiple Work Packages.
  - 5. Work under Owner's separate contracts.
  - 6. Future work not part of this Project.
  - 7. Owner's product purchase contracts.
  - 8. Owner-furnished/Contractor-installed (OFCI) products.
  - 9. Owner-furnished/Owner-installed (OFOI) products.
  - 10. Contractor-furnished/Owner-installed (CFOI) products.
  - 11. Contractor's use of site and premises.
  - 12. Coordination with occupants.
  - 13. Work restrictions.
  - 14. Specification and Drawing conventions.
  - 15. Miscellaneous provisions.
- B. Related Requirements:
  - 1. Section 01 50 00 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.
  - 2. Section 01 73 00 "Execution" for coordination of Owner-installed products.

#### 1.3 DEFINITIONS

A. Work Package: A group of specifications, drawings, and schedules prepared by the design team to describe a portion of the Project Work for pricing, permitting, and construction.

#### 1.4 PROJECT INFORMATION

- A. Project Identification: Kirkland City Hall Virtual Service Center
  - 1. Project Location: 123 5th Ave, Kirkland, WA 98033.
- B. Owner: City of Kirkland.

Owner's Representative:

Hannah Evans, PE 123 5<sup>th</sup> Ave Kirkland, WA 98033

- C. Architect: ARC Architects.
  - 1. Architect's Representative:

Lauren Powers, Project Manager Jeff Wandasiewicz, Principal 119 S. Main St., Suite 200 Seattle WA 98104

- D. Architect's Consultants: Architect has retained the following design professionals, who have prepared designated portions of the Contract Documents:
  - a. As listed under the 'Design Team' section of 'Project Info' drawing sheet T1.0 in contract drawing set.
- E. Web-Based Project Software: Contractor-provided project software will be used for purposes of managing communication and documents during the construction stage.
  - 1. See Section 01 31 00 "Project Management and Coordination" for requirements for using web-based project software.

### 1.5 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and includes, but is not limited to, the following:
  - 1. Construction of a 1,705 SF addition to existing Kirkland City Hall. The addition is programmed to be a new entry, virtual services center and exhibit space. Scope includes new mechanical, electrical, fire alarm and fire suppression. Existing 80 SF vestibule to be demolished. Site work includes removal of existing paving and plantings, modifications and expansion of existing storm drainage system, new site lighting, flag poles, paving and landscaping.
- B. Type of Contract:
  - 1. Project will be constructed under a single prime contract.

#### 1.6 WORK PERFORMED BY OWNER

- A. Cooperate fully with Owner, so work may be carried out smoothly, without interfering with or delaying Work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.
- B. Preceding Work: Owner will perform the following construction operations at Project site. These operations are scheduled to be substantially complete before Work under this Contract begins.
  - 1. N/A

- C. Concurrent Work: Owner will perform the following construction operations at Project site. These operations will be conducted simultaneously with work under this Contract.
  - 1. N/A

## 1.7 OWNER-FURNISHED/CONTRACTOR-INSTALLED (OFCI) PRODUCTS

- A. Owner's Responsibilities: Owner will furnish products indicated and perform the following, as applicable:
  - 1. Provide to Contractor Owner-reviewed Product Data, Shop Drawings, and Samples.
  - 2. Provide for delivery of Owner-furnished products to Project site.
  - 3. Upon delivery, inspect, with Contractor present, delivered items.
    - a. If Owner-furnished products are damaged, defective, or missing, arrange for replacement.
  - 4. Obtain manufacturer's inspections, service, and warranties.
  - 5. Inform Contractor of earliest available delivery date for Owner-furnished products.
- B. Contractor's Responsibilities: The Work includes the following, as applicable:
  - 1. Designate delivery dates of Owner-furnished products in Contractor's construction schedule, utilizing Owner-furnished earliest available delivery dates.
  - 2. Review Owner-reviewed Product Data, Shop Drawings, and Samples, noting discrepancies and other issues in providing for Owner-furnished products in the Work.
  - 3. Receive, unload, handle, store, protect, and install Owner-furnished products.
  - 4. Make building services connections for Owner-furnished products.
  - 5. Protect Owner-furnished products from damage during storage, handling, and installation and prior to Substantial Completion.
  - 6. Repair or replace Owner-furnished products damaged following receipt.
- C. Owner-Furnished/Contractor-Installed (OFCI) Products, where indicated on drawings:
  - 1. Video Intercom Call Station

#### 1.8 OWNER-FURNISHED/OWNER-INSTALLED (OFOI) PRODUCTS

- A. The Owner will furnish and install products indicated.
- B. Owner-Furnished/Owner-Installed (OFOI) Products, where indicated on drawings:
  - 1. 24"x24" Touch Screen Kiosk(s)
  - 2. Voter/Mail Drop Box(es)
  - 3. Recycle Drop Box(es)
  - 4. LCD Screen(s)
  - 5. Projector Screen
  - 6. Telecommunications cabling
  - 7. Interior Curtains/Shades
  - 8. Furnishing and Equipment otherwise not noted in the Contract Documents.

### 1.9 CONTRACTOR'S USE OF SITE AND PREMISES

- A. Restricted Use of Site: Contractor shall have limited use of Project site for construction operations as indicated by requirements of this Section.
- B. Limits on Use of Site: Limit use of Project site to areas within the Contract limits. Do not disturb portions of Project site beyond areas in which the Work is indicated.
  - 1. Limits on Use of Site: Confine construction operations to areas identified on the Project Drawings.
  - 2. Driveways, Walkways and Entrances: Keep driveways, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, the Public, and emergency vehicles at all times. Do not use these areas for parking or for storage of materials.
    - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
    - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.
- D. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

### 1.10 COORDINATION WITH OCCUPANTS

- A. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing, unaffected exits and provide approved signage for reroute of existing, affected exits unless otherwise indicated.
  - 1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
  - 2. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.
- B. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.
  - 1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
  - 2. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.
  - 3. Before limited Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On

occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.

4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

### 1.11 WORK RESTRICTIONS

- A. Comply with restrictions on construction operations.
  - 1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.
  - 2. During the time of City Council meetings (approximately every other Thursday) from the hours of 4 p.m. to 8 p.m, construction activities will be limited. No noise, vibration, dust, odors, or other disruption will be allowed.
- B. On-Site Work Hours: Limit work to between 5 a.m. to 8 p.m., Monday through Friday, unless otherwise indicated. Work hours may be modified to meet Project requirements if approved by Owner and authorities having jurisdiction.
  - 1. Weekend Hours: 48 hours prior notification and approval by the Owner.
  - 2. Early Morning Hours: 48 hours prior notification and approval by the Owner
  - 3. Hours for Utility Shutdowns: 48 hours prior notification and approval by the Owner
  - 4. Hours for Core Drilling: 48 hours prior notification and approval by the Owner
  - 5. Evening Hours: Work hours regarding noise generating activities may be completed at night pending 48 hours prior notification and approval by Owner.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging for temporary utility services according to requirements indicated:
  - 1. Notify Owner not less than 48 hours in advance of proposed utility interruptions.
  - 2. Obtain Owner's written permission before proceeding with utility interruptions.
- D. Noise, Vibration, Dust, and Odors: Coordinate operations that may result in high levels of noise and vibration, dust, odors, or other disruption to Owner occupancy with Owner.
  - 1. Notify Owner not less than 48 hours in advance of proposed disruptive operations.
  - 2. Obtain Owner's written permission before proceeding with disruptive operations.
- E. Smoking and Controlled Substance Restrictions: Use of tobacco products, alcoholic beverages, and other controlled substances on Owner's property is not permitted.
- F. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.
- G. Site Construction Plan: Prior to the start of Work on the Site or within public rights-of-way, submit a project-specific traffic control plan for acceptance by the Owner. Following acceptance of the plan, traffic control shall comply with the accepted plan unless deviations are accepted by the Owner in writing, prior to implementing any such deviation.
- H. Site Work Sequence:
  - 1. Construct the Site Work in order to accommodate Owner's occupancy requirements and time restrictions. Coordinate construction schedule and operations with Owner.

2. Sequencing of Construction Plan: Prior to the start of Work on the Site, submit a construction plan regarding sequencing and related staging, storage, stockpiling, access and parking for acceptance by the Owner. Following acceptance of the plan, sequencing shall comply with the accepted plan unless deviations are accepted by the Owner in writing, prior to implementing any such deviation.

## 1.12 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
  - 1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
  - 2. Text Color: Text used in the Specifications, including units of measure, manufacturer and product names, and other text may appear in multiple colors or underlined as part of a hyperlink; no emphasis is implied by text with these characteristics.
  - 3. Hypertext: Text used in the Specifications may contain hyperlinks. Hyperlinks may allow for access to linked information that is not residing in the Specifications. Unless otherwise indicated, linked information is not part of the Contract Documents.
  - 4. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 00 Contracting Requirements: General provisions of the Contract, including General and Supplementary Conditions, apply to all Sections of the Specifications.
- C. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- D. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
  - 1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
  - 2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings.
  - 3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 10 00

SECTION 01 23 00 - ALTERNATES

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

#### 1.3 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if the Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
  - 1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
  - 2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternates into the Work. No other adjustments are made to the Contract Sum.

#### 1.4 PROCEDURES

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
  - 1. Include, as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation, whether or not indicated as part of alternate.
- B. Execute accepted alternates under the same conditions as other Work of the Contract.
- C. Schedule: A Part 3 "Schedule of Alternates" Article is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

### 3.1 SCHEDULE OF ALTERNATES

- A. Alternate No. 1: Sectional Roll Up Doors in lieu of Bi-Fold Hanger Doors.
  - 1. Base Bid: Hanger Doors, reference drawing sheet A7.0, door type 'B,' related contract documents.
  - 2. Deductive alternate: Replace specified, motorized door assembly with the following motorized Sectional Roll Up Doors of similar size.
    - a. Basis-of-Design Manufacturer: Clopay
    - b. Acceptable Supplier: As approved by manufacturer.
    - c. Substitutions: As approved by Architect.
    - d. Product: Model 902, Architectural Series Glazed Aluminum Full View Sectional Overhead Door
    - e. Construction: Extruded 6053-T5 Aluminum
    - f. Aluminum Finish: Black Anodized
    - g. Window Glazing Thickness: 1/2" Insulated
    - h. Glazing Type: Tempered Glass
    - i. Glazing Finish: Custom tint to match adjacent storefront glazing
    - j. Hardware: One inside slide lock
    - k. Safety: Door Drop Safety Device included
    - I. Track Size: As required for door opening, per schedule
    - m. Counterbalance Spring Cycle: Maximum cycles in a single shaft line
    - n. Electric Door Operators: High-starting torque, reversible, continuous-duty, Class A insulated, electric motor, complying with NEMA MG 1, with overload protection.
    - o. Remote Control Station: Continuous contact, 3-button control station with push button controls labeled "Open", "Close" and "Stop."
    - p. Radio Controls: 3 button radio transmitter providing remote open, close, stop functionality. External antenna and coaxial wiring to receiver enhancing radio control reception.
    - q. Obstruction Detection Device: For full width of the door opening. Each motorized door to have external automatic safety sensor.
- B. Alternate No. 2: Add Telecommunications cabling
  - 1. Base Bid: Telecommunications cabling is not in project scope, only pathways, raceways, outlet boxes and related components listed in the Contract Documents.
  - 2. Additive alternate: Provide telecommunications cabling, jacks and related parts utilizing the 2015 City Hall Remodel telecommunications spec (271100 Telecommunications System); attached.
    - a. Quantity/Layout: See E drawing sheets for pathways and outlet boxes.
    - b. Basis-of-Design General Information, Products, and Execution: see enclosed 271100 Telecommunications System spec (Kirkland City Hall Renovation, November 17, 2015).

END OF SECTION 01 23 00

PART 1 - GENERAL

- 1.1 SECTION INCLUDES
  - A. Description: Work includes the following:
    - 1. Structured Cabling System supporting various low-voltage systems
    - 2. Telecommunications Rooms and Spaces
    - 3. Grounding and Bonding Infrastructure
    - 4. Manufacturer Certification
  - B. General Requirements: Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 01 and 27 05 00 sections apply to Work in this section.

## 1.2 RELATED SECTIONS

- A. Related Sections
  - 1. 270500 General Telecommunications Provisions
  - 2. 270510 Basic Telecommunications Materials and Methods
  - 3. 270512 Telecommunications Demolition
  - 4. 270533 Telecommunications Raceway System
  - 5. 270534 Telecommunications Outlet Boxes

## 1.3 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with applicable city, county and state codes and ordinances.
- B. Codes and Standards:
  - 1. Installation Standards: Comply with following standards for cable and equipment installations. Publications shall be latest issue and addenda:
    - a. NEC, National Electric Code.
    - b. NESC, National Electric Safety Code.
    - c. TIA-568-C.0, Generic Telecommunications Cabling for Customer Premises.
    - d. TIA-568-C.1, Commercial Building Telecommunications Cabling Standard Part 1: General Requirements.
    - e. TIA-568-C.2, Balanced Twisted-Pair Telecommunications Cabling and Components Standards.
    - f. TIA-568-C.3, Optical Fiber Cabling Components Standards.
    - g. ANSI/TIA-569-D, Commercial Building Standard for Telecommunications Pathways and Spaces.
    - h. TIA-606-B, Administration Standard for the Telecommunications Infrastructure of Commercial Building.
    - i. TIA-607-B Generic Telecommunications Bonding and Grounding (Earthing) For Customer Premises.
    - j. TIA-862-A, Building Automation Systems Cabling.

- k. TIA-526-7, Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant – OFSTP-7.
- I. TIA-526-14-B, Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant-OFSTP-14.
- m. IEEE 802.3-2000. Ethernet Standard.
- n. BICSI Information Transport Systems Installation Methods Manual.
- o. BICSI Telecommunications Distribution Methods Manual.
- 2. Contractor shall have read the above documents and shall be familiar with the requirements that pertain to this installation. The documents may be obtained from:
  - a. Global Engineering Documents, 15 Inverness Way East, Englewood, CO, 80112-5776, 800-854-7179, <u>http://global.ihs.com/</u>
  - b. BICSI, 8610 Hidden River Parkway, Tampa, FL, 33637, 800-242-7405, www.bicsi.org
- 3. Materials:
  - a. UL listed and labeled. Install label to be visible.
  - b. Equipment: Regularly catalogued items of manufacturer and supplied as complete unit in accordance with manufacturer's standard specifications with optional items required for proper installation unless otherwise noted in this section.
  - c. Telecommunications connectivity and cabling independently tested to meet current TIA standards.
- C. Qualifications:
  - 1. The contractor performing work specified in this section is required to have special skills obtained by education, experience, or both.
  - 2. Contractors bidding work specified herein shall have a minimum of seven years of experience in the construction, testing, and servicing of systems of the type and magnitude specified in this section. The subcontractor shall have completed at least five projects of equal or larger size to this project within the past five years.
  - 3. Contractor shall be a certified installer of the telecommunications system and prequalified by the manufacturer for the purpose of offering the Applications Assurance warranty at the time of bid.
  - 4. Contractor shall have direct access to the tools and test equipment required to complete the telecommunications work when the work is bid.
  - 5. Project manager (in office) and superintendent (field) shall have 5 years of experience at project manager and superintendent levels, respectively, on completed telecommunications projects of like magnitude and complexity as to this project. Project manager shall be certified as a Registered Communications Distribution Designer (RCDD) through Building Industry Consulting Service International (BICSI).
    - a. RCDD shall be a direct employee of the company bidding on said work.
  - 6. Field technicians who will work independently at any given time during the project on the structured cabling system shall have a minimum of 3 years' experience on completed telecommunications projects of like magnitude and complexity as to this project. Field technicians working at job site shall have completed a copper technician installation training class conducted by the warranting manufacturer or BICSI.

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7. Field technicians who will work independently at any given time during the project on the optical fiber systems shall have a minimum of 3 years' experience on completed telecommunications projects of like magnitude and complexity as to this project. Field technicians working at the job site shall have completed an optical fiber technician installation training class conducted by the warranting manufacturer or BICSI.

## 1.4 SUBMITTALS

- A. Comply with requirements in Division 01, Section 013300 and Section 270500.
  - 1. Submit complete at one time. Partial product submittals not acceptable and will be returned unreviewed.
- B. Pre-Construction Submittal:
  - 1. Product Data:
    - a. Submit with data arranged under basic categories, such as, certifications, personnel training, manufacturer warranty, products, test equipment and calibration, and similar items. Include index with the submittals.
    - b. Organize by specification infrastructure component sections described in Part 1 and Part 2 of this section.
    - c. Submit Product Data information sheets for coordination with item and model number.
    - d. Where more than one product is shown on a page, mark product with arrow or by other means to identify exact product or products being submitted by specific part number.
    - e. Submit network test equipment proof of calibration by manufacturer.
    - f. Submit resumes and certifications of technicians and project manager who will support this project. Certifications shall include:
      - 1) RCDD certification
      - 2) Copper and optical fiber installation certification
      - 3) Approved manufacturer classes satisfactorily completed to provide manufacturer warrantied solution
- C. Test Reports:
  - 1. Prepare test reports and submit to the Owner's Representative an electronic copy of the detailed test results, including overall test summary report.
  - 2. Include a copy of the detailed test reports on CD-ROM in each Operation and Maintenance Manual.
  - 3. Include a hard copy of the summary test sheets in each Operation and Maintenance Manual.
  - 4. Submit electronic copies in PDF and LinkWare software formats, including LinkWare reader software.
- D. Record Drawings:
  - 1. Keep complete set of telecommunications drawings in job-site office updated within 3 days to show actual installation of cabling and equipment during construction.
  - 2. Use of this set of drawings for recording as-built conditions.

- 3. Indicate where material, equipment, and system component are installed differently from that shown on the Drawings, clearly and neatly using ink or indelible pencil in color red during construction.
- 4. Prepare electronic set of Record Drawings, incorporating changes during construction. Submit Record Drawings to the Owner's Representative for review and acceptance.
- 5. Submit Record Drawings using latest version of AutoCAD software or as approved by the Owner, and in PDF format. Request final architectural background drawing files that incorporate floor plan and program spaces numbering modifications.
- 6. AutoCAD drawings shall be e-transmitted to include backgrounds, title blocks and other associated files.
- 7. Submit electronic copy of Record Drawings in full-size PDF and AutoCAD format, on CD-ROM.
- 8. Prepare laminated hard copy of telecommunications floor plan drawings, telecommunications room layouts, and equipment rack elevations. Install in each telecommunications room for associated floor area served.
  - a. Floor plan drawings shall be full-size, scaled down drawings shall not be acceptable.
- E. Project Closeout:
  - 1. Submit closeout documentation to the Owner's Representative and Architect under provisions of Division 01, section 017700 and this section.
  - 2. Provide all project closeout documentation including but not limited to; test result documentation, Record Drawings, manufacturer warranty certificates and Operation and Maintenance Manuals.

## 1.5 DEFINITIONS

**Administration:** Methodology defining the documentation requirements of a cabling system and its containment, the labeling of functional elements, and the process by which moves, additions, and changes are recorded

**Bonding:** Permanent joining of metallic parts to form an electrically conductive path that will ensure electrical continuity and the capacity to conduct safely any current likely to be imposed

**Cable:** An assembly of one or more insulated conductors or optical fibers within an enveloping sheath

**Cable run:** Length of installed media, which may include other components along its path

Cabling: System of cables, cords, and connecting hardware

**Channel:** End-to-end transmission path between 2 points at which application-specific equipment is connected including test cords and patch cords for a maximum total distance of 328 feet (100 meters)

**Connecting hardware:** Device, or combination of devices, used to connect cables or cable elements

**Consolidation point:** Location for interconnection between horizontal cables extending from building pathways and horizontal cables extending into furniture pathways

**Cross-connection:** Connection scheme between cabling runs, subsystems, and equipment using patch cords or jumpers that attach to connecting hardware on each end

**Demarcation point:** Point where operational control or ownership changes

**Equipment room:** Environmentally controlled centralized space for telecommunications equipment that usually houses a main or intermediate cross-connect

**Ground:** Conducting connection, whether intentional or accidental, between an electrical circuit or equipment and the earth, or to some conducting body that serves in place of earth

**Horizontal cabling:** Distribution media that connects the telecommunications outlet/connector at the work area and the first piece of connecting hardware in the horizontal cross-connect

**Horizontal cross-connect:** Group of connectors that allows equipment and backbone cabling to be cross-connected with patch cords or jumpers

**Infrastructure (telecommunications):** Collection of those telecommunications components, excluding equipment, that together provides basic support for the distribution of information within a building or campus

**Local area network (LAN):** Standard industry term for a network installation that serves a relatively small area (for example, structured cabling installation serving a building)

**Main cross-connect:** Cross-connect normally located in the (main) equipment room for cross-connection and interconnection of entrance cables, first-level backbone cables, and equipment cables

**Metropolitan area network (MAN):** Data communications network that covers an area larger than a campus area and smaller than a wide area network

**Modular jack:** Female telecommunications connector that may be keyed or unkeyed and may have 6 or 8 contact positions

**Outlet/connector (telecommunications):** Connecting device in the work area on which a horizontal cable or outlet cable terminates

**Patch cord**: Length of cable with connectors on both ends used to join telecommunications circuits/links at the cross-connect

**Patch panel:** Connecting hardware system that facilitates cable terminations and cabling administration using patch cords

**Pathway:** Sequence of connections that provides connectivity between devices on a network or between networks on an internetwork; the vertical and horizontal route of the telecommunications cable; a facility for the placement of telecommunications cabling

**Permanent link:** Test configuration for link excluding test cords and patch cords for maximum total distance of 295 feet (90 meters)

**Plenum:** Compartment or chamber to which one or more air ducts are connected and that forms part of the air distribution system

**Telecommunications Room:** Enclosed architectural space for housing telecommunications equipment, cable terminations, and cross-connect cabling

**Storage Area Network (SAN):** Specialized high-speed network dedicated to the transport of data between storage devices and servers

**Star topology:** Network topology in which services are distributed from or through a central point

**Telecommunications:** Transmission, emission, and reception of signs, signals, writings, images, and sounds, that is information of any nature by cable, radio, optical, or other electromagnetic systems

**Unshielded twisted pair (UTP):** Cable made up of one or more pairs of twisted copper conductors with no metallic shielding; the entire assembly is covered with an insulating sheath (cable jacket)

**Wireless access point:** Stand-alone hardware device or computer wireless adapter with software that acts as a wireless communication hub for users of wireless devices to connect with each other and to bridge those devices to the cabled portion of the network

**Wide area network (WAN):** Data communications system that uses telecommunications circuits to link LANs that are distributed over large geographic distances

**Wireless local area network (WLAN):** Data communications system that uses using radio frequency technology, such networks transmit and receive data over the air, minimizing the need for wired connections; they combine data connectivity with user mobility

**Work area (workstation):** Building space where occupants interact with telecommunications terminal equipment

**Work area cable (cord):** Cable connecting the telecommunications outlet/connector to the terminal equipment

## 1.6 PRE-CONSTRUCTION MEETINGS

A. The telecommunications subcontractor shall attend the pre-construction meeting as required by the Contractor or the Owner's Representative.

#### 1.7 MANUFACTURER CERTIFICATION

- A. The structured cabling system shall be covered by an Extended Product and Application Assurance Warranty.
  - 1. Approved manufacturer partner is Ortronics/ Berk-Tek solution.
  - 2. Warranty shall cover passive telecommunications infrastructure copper and optical fiber connectivity and cabling products and performance for a minimum of 25 years from date of installation registration, and will support existing or future applications.
  - 3. Installation practices shall follow the installation guidelines and procedures specified in the manufacturer certified installer training course and current TIA standards.
  - 4. Submit closeout documentation in accordance with the manufacturer warranty requirements to comply for acceptance of warranty.
- B. The contractor shall provide the original hard copy certificate for the Application Assurance Warranty to the Owner.
# 1.8 MATERIAL PROVISIONS

- A. Deliver materials to the Owner under provisions of this section.
- B. Contractor shall be responsible to provide a material transmittal for all materials being provided to the Owner as described herein and that are not permanently installed. Transmittal shall be signed by the Owner receiving the materials. Transmittal shall be included as part of the O&M manuals.

# PART 2 - PRODUCTS

# 2.1 MANUFACTURERS

- A. Substitutions: The substitution of products shall not be considered under the terms and conditions of this Section.
- B. The basis of design for manufacturer partner and connectivity is Berk-Tek cabling and Ortronics connectivity as specified herein.
- C. All copper connectivity shall be Category 6:
- D. All optical fiber connectivity shall be OM3 Multimode Fiber and OS2 Singlemode Fiber:
- 2.2 OPEN CABLING SUPPORTS
  - A. Provide all accessories and mounting hardware required for a complete and working installation of open cabling supports. All tie wraps installed in the plenum spaces shall be plenum rated.
    - 1. Manufacturer Panduit or equal:
      - a. Plenum 7.4", Part No. PRT2S-M2
      - b. Non-Plenum 8.0", Part No. PLT2M
  - B. Circular Cable Retainer:
    - Cable retainers shall comply with TIA requirements for structured cabling systems and pathway supports. The cabling retainers shall be of plastic material with rounded edges, plenum rated, utilizing an easy-lock closure and an attachment base. Cable retainers shall be screwed into structure and shall not be attached with self-adhesive. Cable retainers shall only be utilized in spaces that are extremely tight and J-hooks do not have sufficient space to be mounted.
      a. Manufacturer Erico Caddy, Part No. CAT CR50
  - C. J-Hooks:
    - 1. J-hooks shall comply with TIA requirements for structured cabling systems and pathway supports. Galvanized finish. Follow manufacturer's recommendations for quantity of cables supported.
    - 2. Provide all hardware necessary for secure mounting to the structure.
      - a. Manufacturer Erico Caddy:

- 1) 1" Dia., Part No. CAT16HP
- 2) 1-5/16" Dia., Part No. CAT21HP
- 3) 2" Dia., Part No. CAT32HP
- 4) 3" Dia., Part No. CAT48HP
- D. Adjustable Cable Support:
  - 1. Cable supports shall comply with TIA requirements for structured cabling system and pathway supports. Follow manufacturer's recommendations for quantity of cables supported.
  - 2. Provide all hardware necessary for secure mounting to the structure.
    - a. Manufacturer Erico Caddy, Part No. CAT425
- E. Conduit Waterfalls:
  - Waterfalls shall be provided at the ends of 4-inch conduits and conduit sleeves installed horizontally where the pathways transition from conduit to ladder rack and cable tray pathways. Waterfalls shall be utilized to provide bend radius of all horizontal and backbone cabling. Waterfalls shall be UL Listed and rated for UL 94V-0. Material shall be glass reinforced flame retardant nylon 6.6.
    - a. Manufacturer Panduit, Part No. CWF400
- F. Cable Protective Devices:
  - 1. Split duct shall provide protection for cabling from the modular furniture feedthrough point devices to the modular furniture base channel. Split duct shall have a 1.88-inch inside diameter and a 2.17-inch outside diameter and be in the color black.
    - a. Manufacturer Panduit, Part No. CLT188F-C20 (per 100'-0" roll)

# 2.3 FIRE-RATED PATHWAY DEVICE

- A. The fire-rated pathway device shall consist of a heavy gauge galvanized steel raceway lined with intumescent firestopping material. The intumescent firestopping material shall automatically adjust to the size of the cabling bundle and shall permit cabling to be added or removed without the need to remove the firestopping material. Provide the necessary quantity of wall plates to support the pathway device. The pathway device shall be UL tested and classified in accordance with ASTM E814 (UL1479).
  - 1. On the 3-inch and 4-inch sleeves, provide radius control modules at the end of each sleeve through wall transitions and penetrations.
    - a. Manufacturer Specified Technologies, Inc. EZ Path:
      - 1) 1-Inch mini fire-rated pathway device, Part No. EZD22
      - 2) 3-Inch fire-rated pathway device, Part. No. EZD33FW
      - 3) 3-Inch radius control module, Part No. RCM33
      - 4) 4-Inch fire-rated pathway device, Part No. EZP144W
      - 5) 4-Inch radius control module, Part No. RCM44
- B. Firestopping putty shall be a one-part, two-stage intumescent, non-hardening compound. The putty, when exposed to high heat or flame shall be capable of expanding a minimum of five times. Range of continuing expansion shall be from 230°F to >1,000°F (110°C to >538°C). The putty shall be soft and pliable with aggressive adhesion and shall not

contain any water-soluble intumescent ingredients. The putty shall be UL Classified and/or FM Systems Approved and tested to the requirements of ASTM E814 (UL1479).

- 1. Manufacturer Specified Technologies, Inc. SpecSeal:
  - a. 24" putty bar, Part No. SSP28
  - b. 36" putty bar, Part No. SSP100

# 2.4 COPPER HORIZONTAL CABLING

- A. Category 6 UTP cabling for interior spaces:
  - 1. Each horizontal cable shall be constructed from 23 AWG insulated solid bare copper conductors formed into four individually twisted pairs with a crossfiller center spline.
  - 2. Cable shall be NFPA 262, CMP (plenum) rated as specified herein, unless otherwise noted. Cable diameter shall not exceed 0.23 inches.
  - 3. Each conductor shall have an impedance of  $100\Omega \pm 10\%$  / 100m.
  - 4. Each cable shall meet the most current technical characteristics of ANSI/TIA-568-C standard.
    - a. Wire map
    - b. Length
    - c. Insertion loss (Attenuation) 32.6dB/100m @ 250MHz
    - d. Near-end crosstalk (NEXT) loss 43.3dB/100m @ 250MHz
    - e. Attenuation to crosstalk ration far-end (ACRF) 24.8dB/100m @ 250 MHz
    - f. Power sum Attenuation to crosstalk ration far-end (PSACRF) 21.8dB/100m @ 250MHz
    - g. Power sum-near-end crosstalk (PS-NEXT) 41.3dB/100m @ 250MHz
    - h. Return loss (RL) 20.5dB/100m @ 250MHz
    - i. Propagation delay (PD) (CMP) 72% nom, (CMR) 68% nom
    - j. Delay skew (DS) 45ns/100m max
    - k. Balance (LCL/TCL) 27.0dB/100m @ 200MHz
    - I. Balance (EL-TCTL) 9.0dB/100m @ 20 MHz
  - 5. Manufacturer Berk-Tek LANmark-1000 series:
    - a. Yellow plenum rated, Part No. 10032090
- B. Category 6 UTP outside plant cabling for underground and exterior spaces:
  - 1. Each horizontal cable shall be constructed from 23 AWG insulated solid bare copper conductors formed into four individually twisted pairs with a crossfiller center spline and enclosed by a UV resistant polyethylene in the color black. Cable shall contain a gel-filled water resistant flooding compound.
  - 2. Cabling shall be utilized per the NEC for use where pathways are routed within or below building slabs and foundations, in outside plant underground pathways and for aerial applications.
  - 3. Provide cross-connect to rated Category 6 cabling in plenum rated enclosure in accessible ceiling space where required.
  - 4. Cable diameter shall not exceed 0.25 inches.
  - 5. Each conductor shall have an impedance of  $100\Omega \pm 10\%$  / 100m.
  - 6. Each cable shall meet the most current technical characteristics of ANSI/TIA-568-C standard.

- a. Wire map
- b. Length
- c. Insertion loss (Attenuation) 32.8dB/100m @ 250MHz
- d. Near-end crosstalk (NEXT) loss 38.3dB/100m @ 250MHz
- e. Attenuation to crosstalk far-end crosstalk (ACRF) 19.8dB/100m @ 250 MHz
- f. Power sum attenuation to crosstalk far-end crosstalk (PSACRF) 16.8dB/100m @ 250MHz
- g. Power sum-near-end crosstalk (PS-NEXT) 36.3dB/100m @ 250MHz
- h. Return loss (RL) 17.3dB/100m @ 250MHz
- i. Propagation delay (PD) 62% nom
- j. Delay skew (DS) 45ns/100m max
- 7. Manufacturer Berk-Tek LANmark-6 OSP, Part No. 10139885

# 2.5 INTRABUILDING BACKBONE INFRASTRUCTURE

- A. Optical Fiber Cabling:
  - Intrabuilding singlemode optical fiber backbone cabling shall be premise distribution, color coded tight buffered fibers, 900 μm buffered fibers with FGE/aramid yarns, overall yellow color jacket. Optical fiber cabling shall meet the following standards: ANSI/EIA/TIA-455-46, 53 or 61; Telcordia GR-409; ICEA S-83-596; ETL or UL OFNP (plenum) rated as specified herein, unless otherwise noted.
    - a. Singlemode optical fiber shall be Class IVa dispersion-unshifted per ANSI/EIA/TIA-492CAAB secondary coating diameter of 242  $\mu$ m. Zero dispersion wavelength shall be between 1300 nm and 1324 nm.
    - b. Nominal mode field diameter shall be 9.2  $\mu m$  with a tolerance of +/- 0.5  $\mu m$  at 1310 nm.
    - c. Singlemode optical fiber shall meet the following performance specifications.
      - 1) Maximum Attenuation: 0.7 dB/km @ 1310/1550 nm
      - 2) Transmission distance: 1 GbE  $\ge$  5 km @ 1310 nm
      - 3) Cutoff Wavelength: <1279 nm when measured in accordance with ANSI/EIA/TIA-455-170 or ANSI/EIA/TIA-455-80. Distance versus bandwidth shall be using a laser transmitter operating at a 1310 nm wavelength.
      - 4) Operating Temperature: -20C to +75C
      - 5) Storage Temperature: -40C to +85C
    - d. Manufacturer Berk-Tek:
      - 1) 24-strand plenum rated, Part No. PDP12B024AB0707
  - Intrabuilding 50/125 μm multimode optical fiber backbone cabling (OM3) shall be a tight buffered premise distribution cable with 900 μm buffered fibers surrounded by FGE/aramid yarns. Cable shall have an overall aqua color jacket and shall meet the following standards: ANSI/TIA-455-46, 53 or 61; ANSI/TIA-455-51 or 30; Telcordia GR-409; ICEA S-83-596; ETL or UL and OFNP (plenum) rated as specified herein, unless otherwise noted.
    - a. Multimode optical fiber shall meet the following performance specifications.
      - 1) Maximum Attenuation: 3.0 dB/km @ 850 nm, 1.0 dB/km @ 1300 nm

- Minimum Bandwidth: Effective Model Bandwidth using Differential 2) Mode Delay is 2000 MHz-km @ 850 nm; Overfilled launch is 500 MHz-km @ 1300 nm
- 3) Gigabit Ethernet distances of 1000 m @ 850 nm, 600 m @ 1300 nm
- 10 Gigabit Ethernet distances of 300 m @ 850 nm, 300 m @ 4) 1300 nm
- 5) Numeric Aperture: 0.200 +/- 0.015
- 6) Core Diameter: 50 +/- 2.5 µm
- 7) Cladding Diameter: 125.0 +/- 1.0 µm
- 8) Operating Temperature: -20C to +75C
- 9) Storage Temperature: -40C to +85C
- Manufacturer Berk-Tek: b.
  - 24-strand plenum rated, Part No. PDP024EB3010/25 1)

#### 2.6 TELECOMMUNICATIONS WORKSTATION DEVICES

- Α. Category 6 Modules:
  - 1. 8-Position 8-Conductor modules shall be Category 6, dual reactance technology, non-keyed, universal T568A/B, wired in accordance with the T568B pin configuration standard and used to terminate Category 6 UTP cables as specified herein. Module shall be high impact plastic housing, flame retardant UL 94V-O, modular contacts shall be beryllium copper, nickel plating under 50 micro-inches gold plating in contact area. IDC contacts shall be phosphor bronze, nickel under plating with tin lead over plate serving 22 through 24 AWG. a.
    - Manufacturer Ortronics:
      - Category 6 module: 1)
        - Cloud white, Part No. OR-TJ600-88 a)
      - 2) Blank module in package of 10:
        - Cloud white, Part No. OR-42100002-88 a)
  - 2. Provide Wiremold Ivory color, Category 6, 8P8C modules and blank modules for installation of modules in Wiremold raceway.
    - a. Manufacturer Ortronics:
      - Category 6 module, Part No. OR-TJ600-99 1)
      - 2) Blank module (pkg. of 10), Part No. OR-42100002-99
  - 3. Provide black color, Category 6, 8P8C modules and blank modules for installation of modules in Wiremold Furniture Outlet at Modular Furniture locations.
    - Manufacturer Ortronics: a.
      - Category 6 module, Part No. OR-TJ600-00 1)
      - 2) Blank module (pkg. of 10), Part No. OR-42100002-00
- Wall Phone Faceplate with Studs: Β.
  - 1. Wall phone faceplates shall be stainless steel single gang plates with top and bottom phone studs for mounting of telephony handsets. Provide 8P8C module in the category of infrastructure specified for the structured cabling system.
    - Manufacturer Ortronics, Part No. OR-403STJ1WP a.
- C. Faceplates:

- 1. Faceplate shall be thermoplastic or stainless steel manufactured to hold 8P8C modules with recessed designation strips with clear plastic covers in accordance with the ANSI/TIA-606-B labeling standard. Stainless where indicated on drawings or in plenum spaces.
  - a. Manufacturer Ortronics:
    - 1) 4-port thermoplastic:
      - a) Cloud white, Part No. OR-40300546-88
    - 2) 4-port stainless steel, Part No. OR-403STJ14
- D. Surface Mount Interface Boxes:
  - 1. Surface mount interface boxes shall be thermoplastic to hold 8P8C modules with recessed designation strips with clear plastic covers in accordance with the ANSI/TIA-606-B labeling standard.
    - a. Manufacturer Ortronics:
      - 1) 2-Port cloud white, Part No. OR-404TJ2-88
- E. Power Pole Bezel:
  - 1. Bezel shall hold 8P8C modules and shall utilize a 106-type configuration.
  - 2. Bezels shall utilize a color that matches the power pole; default color shall be Wiremold Ivory.
    - a. Manufacturer Ortronics, Part No. OR-40800019-99
- F. Floor Box and Poke-Thru Pedestal Frame:
  - 1. Frame shall hold 8P8C modules and shall utilize a Decora style configuration.
    - a. Manufacturer Ortronics:
      - 1) 3-port Decora bezel:
        - a) Cloud white, Part No. OR-41900017-88
      - 2) 4-port Decora bezel:
        - a) Cloud white, Part No. OR-41900018-88
- G. Modular Furniture Outlets
  - 1. Modular Furniture Plate shall provide mounting of TracJack Modules. Owner provided furniture manufacturer with base opening template for Modular Furniture Plate. Color shall be black.
    - a. Manufacturer Ortronics:
      - 1) OR-40300633-00

# 2.7 DIRECT CONNECT AND ALARM CONNECTIVITY

- A. Direct Connect Connectivity and Terminations:
  - 1. 8P8C Modular Plugs
    - a. Provide pre-approved Category 6 8-position, 8-conductor 8P8C plugs by the warranting manufacturer for the direct attach termination to solid conductor Category 6 cabling.
    - b. 8P8C plugs shall be field terminated with manufacturer approved termination tool. No other termination tools shall be authorized for the termination of these direct attach terminations.

- c. Plugs with a plastic boot shall be plenum rated when used in an air-plenum environment.
- d. Adhere to manufacturer's plug installation guidelines and testing procedures to ensure proper performance and signal transmission.
  - 1) Category 6 8P8C plug approved manufacturers:
    - a) Bel Stewart, Part No. SS-39100-021
      - b) Sentinel, Part No. 111-08080054L34
      - c) Allen Tel, Part No. AT8X8RCSC-24
  - 2) 8P8C termination tool approved manufacturers:
    - a) Bel Stewart, Part No. 2990003-01
    - b) Sentinel, Part No. 90015
    - c) Allen Tel, Part No. AT568 or AT680

# 2.8 TELECOMMUNICATIONS ROOMS AND SPACES

- A. Fire Retardant Plywood Backboards:
  - 1. Plywood backboards shall be 3/4" fire retardant ACX plywood backboard to cover walls as shown on drawings. Backboard shall bear a seal identifying the plywood is fire-rated.
- B. Ladder Rack:
  - 1. Ladder rack shall be prefabricated metal structure consisting of longitudinal stringer side rails with cross members welded at 12 inch intervals on center.
  - 2. Both stringer side rails and cross members shall be constructed of 3/8-inch x 1-1/2inch x 0.065-inch wall rectangular steel tubing. No portion of the cross member rungs shall protrude below the bottom or above the top plane of the side rails.
  - 3. All additional hardware required to construct the designed runway shall be those recommended by the manufacturer. Mounting supports shall be based upon the building conditions of the space. Utilize wall or ceiling/structural support mounting methods only, ladder rack shall not be attached to or supported by the equipment rack. Provide seismic bracing of the ladder rack as required by the AHJ. Cable loading shall meet the loading requirements of NEMA 12C.
    - a. Manufacturer CPI:
      - 1) Universal cable runway, Part No. 10250-712 and 10250-718
      - 2) Protective end caps, 1-pair, Part No. 10642-001
  - 4. Wall angle support kits shall be provided where cable runway terminates perpendicular to the wall. Wall angle support kits consist of one wall angle bracket, two j-bolts and attachment hardware.
    - a. Manufacturer CPI, Part No. 11421-7xx (xx = width of ladder rack)
  - 5. Triangular bracket support kits shall provide wall support for ladder tray. Supports shall be constructed of 1/4" x 2" aluminum bar and have a load rating of 100 lbs. Supports kits shall consist of one triangular bracket, j-bolts and attachment hardware.
    - a. Manufacturer CPI:
      - 1) Ladder rack width 4"-6", Part No. 11312-706
      - 2) Ladder rack width 6"-12", Part No. 11312-712
      - 3) Ladder rack width 12"-18", Part No. 11312-718

- 6. Threaded ceiling kits shall be provided where cable runway runs parallel to the wall and above equipment racks at intervals not to exceed 5-feet. Ceiling kits consists of one ceiling support bracket, one 5/8-inch x 6-foot long threaded rod, one runway support bracket and four 5/8-inch hex nuts. Provide (2) kits at each support location.
  - a. Manufacturer CPI:
    - 1) Threaded ceiling kit, 1 kit, Part No. 11310-003
    - For locations where the ceiling height exceeds the 6-foot threaded 2) rod length, provide 5/8-inch threaded rod coupling kit and 5/8-inch threaded rod.
      - Threaded rod coupling kit, Part No. 10697-002 a)
      - b) Threaded rod, 5/8-inch x 12-feet, Part No. 11440-004
      - C) Threaded rod, 5/8-inch x 8-feet, Part No. 11440-005
      - Threaded rod, 5/8-inch x 4-feet, Part No. 11440-006 d)
- 7. Radius drop out brackets shall be provided at all sections along the ladder rack where cabling enters and exits the horizontal pathway. Movable cross members shall be provide for radius drops where fixed rungs are not positioned directly over the side channels of the equipment rack.
  - a. Manufacturer CPI:
    - Cross member radius drops, Part No. 12100-7xx (xx = width of 1) ladder rack)
    - 2) Stringer radius drops, Part No. 12101-711
    - Movable cross member cable runway, Part No. 12115-7xx (xx = width 3) of ladder rack)
- 8. Splice kits shall be utilized to connect sections in accordance with manufacturer's recommendations.
  - Manufacturer CPI: a.
    - Butt-splice kit, Part No. 11301-701 1)
    - 2) Junction-splice kit, Part No. 11302-701
    - 45 degree runway splice kit, Part No. 11313-701 3)
- 9. Ground straps shall be provided to bond cable runway sections at butt and junction splice points. Ground strap kit consists of 8-inches of #6AWG green insulated wire attached at both ends to two-hole compression lugs and attachment hardware. The cable runway shall be bonded to the telecommunications grounding and bonding svstem.
  - Manufacturer CPI, Part No. 40164-001 a.
- 10. Elevation kits shall be installed above racks or cabinets to provide additional space between the tops of the racks or cabinets and the cable runway for radius drop fittings and maintaining cable bend radius at transitions from horizontal to vertical. a.
  - Manufacturer CPI:
    - 1) Elevation kit, (rack) Part No. 10506-702
- C. Grounding and Bonding:
  - 1. Telecommunications Bonding Backbone (TBB)
    - Telecommunications Bonding Backbone conductors shall be #3/0 AWG a. stranded insulated copper conductor, unless otherwise noted.
  - 2. Telecommunications Grounding Busbar (TGB)

- a. TGB shall be a copper plate, 1/4" thick x 4" wide x 10" long conforming to BICSI and ANSI/TIA standards.
- b. TGB shall be pre-drilled for bolts to secure bar to insulating standoffs. Mounting holes shall be 3/8" diameter spaced 5.75" apart. TGB shall include insulators to isolate busbars from the wall or other mounting surfaces.
- c. Busbar shall be pre-drilled with hole pattern to accommodate two-hole lugs as follows, (4) lugs with 5/8" hole centers and (3) lugs, 1" hole centers.
  - 1) Manufacturer CPI, Part No. 13622-010
- 3. Pipe Clamps:
  - a. Copper UL listed grounding connector with pre-drilled lug pad allowing 2-hold compression terminal; the size of connector will be dictated by pipe size.
    - 1) Manufacturer Burndy, T&B, Thermoweld or approved equal.
- 4. Exothermic Welding:
  - a. Manufacturer Erico Cadweld or Thermoweld, appropriate fittings as required.
- 5. C-type Compression Taps:
  - Bonding together two or more bonding backbones.
  - 1) Manufacturer Burndy, T&B, Thermoweld or approved equal.
- 6. Cable Terminals:

a.

- a. Cable terminal shall be two-hole, non-insulated copper compression long barrel terminal, requiring 3/8" bolts on 1" and 5/8" centers.
  - 1) Manufacturer Burndy, T&B, Thermoweld or approved equal.
- D. Free-Standing Equipment Racks:
  - 1. Standard Channel 2-Post Equipment Racks:
    - a. Equipment racks shall have 2.5" channel with standard EIA mounting hole pattern.
    - b. Equipment racks shall be 7'-0" high with 45 rack units of mounting space.
    - c. Equipment rack side rails shall have manufactured rack unit labeling on each side of the rails.
      - 1) Manufacturer CPI, Part No. 46353-703
- E. Peripheral Devices for Equipment Racks:
  - 1. Each equipment rack shall be equipped with the following equipment. Quantities shall be determined from applicable drawings.
    - a. Manufacturer CPI:
      - 1) Equipment mounting screws, Part No. 40605-005 (qty. 50)
  - 2. Equipment rack shall be anchored with a 1/2" anchor design for concrete and shall include (4) 1/2" anchors, (4) 3-3/4" long bolts, (4) washers and (4) nuts.
    - a. Manufacturer CPI, Part No. 40604-003 or approved equal
- F. Vertical Power Strips:
  - 1. Each equipment rack shall be equipped with the following. Quantities shall be determined from applicable drawings.
    - a. Vertical power strip shall be 66" vertically mounted power strip with (14) NEMA 5-20R receptacles and standard plug.

- 1) Manufacturer CPI:
  - a) Power strip, Part No. 12850-708
  - b) 9.1" mounting bracket, Part No. 35700-701 (per power strip)
- G. Rack Mounted Cable Management:
  - 1. Horizontal cable management panels shall distribution rings to secure copper and/or optical fiber patch cords.
    - a. Manufacturer CPI:
      - 1) 1RU panel with cover, Part No. 13930-701
      - 2) 2RU panel with cover, Part No. 13930-702
  - 2. Vertical cable management panels shall be 7'-0" high and have latches spaced 12 inches apart for securing cabling and patch cords to be provided in between and at the end of each equipment rack as indicated on applicable drawings. Panels shall have oval port feed through openings within the center separator for pass-thru of patch cords. Spacing at the separator shall be 11.62 inches.
    - a. Manufacturer CPI:
      - 1) 3.65" wide double sided, Part No. 12096-703
      - 2) 6" wide double sided, Part No. 11729-703
- H. Wall Mounted Cable Management:
  - 1. 110 Jumper Troughs shall have with legs and be mounted above and below each 100-pair or 300-pair 110 wiring block kit.
    - a. Manufacturer Ortronics, Part No. OR-30200140
  - 2. Flexible D-rings shall be provided for routing and managing cabling on backboards.
    - a. Manufacturer Panduit:
      - 1) Horizontal cabling D-ring, Part No. CMVDR1S
      - 2) Backbone cabling D-ring, Part No. CMVDR2
- I. Patch Panels:
  - 1. Category 6 Modular Patch Panels:
    - a. Category 6, 8-Position 8-Conductor module, non-keyed, dual reactance technology, 110 type printed circuit board style patch panels, universal T568A/B, wired in accordance with the T568B pin configuration standard and used to terminate UTP cables as specified herein. Patch panels shall be high density, 6-port modules, panel thickness at .125" aluminum with black powder coat finish; module shall be high impact plastic housing, flame retardant UL 94V-O, and fully encased protected printed circuitry. Modular contacts shall be beryllium copper, nickel under plating, 50 micro-inches of gold in contact area with IDC contacts phosphor bronze, nickel under plating with tin lead over plate, serving 22 through 24 AWG.
      - 1) Manufacturer Ortronics:
        - a) 24 port patch panel, Part No. OR-PHD66U24
        - b) 48 port patch panel, Part No. OR-PHD66U48
- J. Optical Fiber Cabinets and Adapter Panels:
  - 1. The optical fiber cabinet is a termination and administration point for the optical fiber cables in the network. The cabinet shall protect the connectorized optical

fiber from mechanical stress, macro-bending loss at the connection point and tampering with the circuits. The cabinet shall provide a place for circuit identification.

- 2. Rack Mount Fiber Cabinets (RMFC):
  - a. The RMFC shall provide terminating capability of 18 to 288 optical fiber strands.
  - b. The RMFC shall be stackable, wall or rack mountable depending on the location requirement. The cabinets shall fit into either 19" or 23" frame arrangements and shall be one, two or four rack units in height.
  - c. The RMFC shall consist of an enclosure with front and rear access and can be fully administered from the front or rear.
  - d. The RMFC shall have a clear, translucent, hinged Plexiglas door in the front with a dedicated locking mechanism and the rear door shall be a solid metallic cover.
    - 1) Manufacturer Ortronics:
      - a) 1RU patching, Part No. OR-FC01U-P
      - b) 2RU patching, Part No. OR-FC02U-P
- 3. Optical Fiber Adapter Panels:
  - a. Optical fiber adapter panels shall be located within surface mount and rack mount fiber cabinets. Panels shall securing lock into open positions with the patching frames. Panels shall have plunger / grommet fasteners.
  - b. Optical fiber adapter panels shall consist of LC connector types and shall be configured in either simplex or duplex connector arrangements.
  - c. Singlemode optical fiber connectors shall be in the color blue.
  - d. 50µm multimode optical fiber connectors shall be color aqua.
  - e. Within the adapter panels, multimode optical fiber connectors shall have phosphor-bronze alignment sleeves and singlemode optical fiber connectors shall have ceramic alignment sleeves.
  - f. All unfilled positions within the fiber cabinets shall contain blank panels.
    - 1) Manufacturer Ortronics:
      - a) Blank adapter panel, Part No. OR-61500020
      - b) 6-Duplex LC 50µm MM, Part No. OR-OFP-LCD12LC
      - c) 6-Duplex LC SM, Part No. OR-OFP-LCD12AC
- K. Optical Fiber Connectivity:
  - 1. Optical Fiber Fan Out Kits:
    - a. Buffer tube fan-out kits shall provide the means of field-install connectors on 250 µm coated fibers. Indoor kits shall have a 900 µm fan-out assembly that is color coded to match the fiber color scheme. The fan-out assembly shall be 47-inches in length.
      - 1) Manufacturer Corning:
        - a) 6-fiber kit, Part No. FAN-BT47-06
        - b) 12-fiber kit, Part No. FAN-BT47-12
  - 2. Singlemode Connectors:
    - a. Provide field installable singlemode connectors to terminate optical fiber cables from cable-to-cable, cable-to-equipment or equipment-to-equipment. Singlemode connector shall contain a factory bonded fiber strand insert, ceramic ferrule and factory polished.

- b. The connector shall be capable of mounting on 125 micron fiber. The connector shall meet IEC standards for repeatability and have a locking feature to the coupler and assure non-optical disconnect.
- c. Singlemode connectors that are straight tip shall be identified with the color blue.
  - 1) Manufacturer Ortronics:
    - a) LC, Part No. OR-205KAS9GA-09
  - 2) Manufacturer Corning:
    - a) LC, Part No. 95-200-96
- 3. Multimode Connectors:
  - a. Provide field installable multimode connectors to terminate optical fiber cables from cable-to-cable, cable-to-equipment or equipment-to-equipment. Multimode connector shall contain a factory bonded fiber strand insert, ceramic ferrule and factory polished.
  - b. The connector shall be capable of mounting on either 0.9 mm-buffered fiber or 3.0 mm cordage. The connector shall meet IEC standards for repeatability and have a locking feature to the coupler and assure non-optical disconnect.
    - 1) Manufacturer Ortronics:
      - a) LC 50 μm, Part No. OR-205KNT9GA-50T
    - 2) Manufacturer Corning:
      - a) LC 50 μm, Part No. 92-050-99-X

# 2.9 INNERDUCT AND CABLE IDENTIFICATION TAGS

- A. Optical Fiber Flexible Plastic Innerduct:
  - 1. Flexible duct/innerduct shall be UL 2024 with pull tape. Provide flexible duct/ innerduct for all optical fiber cabling routed in open cabling pathways and backbone riser applications.
    - a. Manufacturer Carlon:
      - 1) 1-inch plenum, Part No. CF4X1C-xxx (where xxx = feet)
- B. Copper and Optical Fiber Identification Tags:
  - 1. Identification tags shall be self-laminating, write-on, rigid, non-adhesive, measuring 3.50" x 2.00", and with a vinyl material strength of 0.20". Attach the tags to the associated innerduct or directly to the cabling utilizing specified cable ties. The legend and nomenclature for optical fiber cabling shall read "CAUTION: FIBER OPTIC CABLE" and for copper cabling shall read "CAUTION: TELEPHONE CABLE". Each tag shall have sub attribute lines for "TYPE" and "COUNT". The tag color for optical fiber cabling shall be yellow and the tag color copper cabling shall be orange.
    - a. Manufacturer ACP International:
      - 1) Optical fiber cabling tags, Part No. VCT-200 (yellow).
      - 2) Copper cabling tags, Part No. VCT-201 (orange)
  - 2. Cable tie shall be dome-top; barb type with stainless steel locking barb, material shall be Nylon 6.6 with a maximum width of .141".
    - a. Manufacturer Panduit:
      - 1) 6.1-inch length, Part No. BT1.5I-C0

2) 8.0-inch length, Part No. BT2I-C0

# 2.10 MATERIAL PROVISIONS

- A. Materials shall be provided to the Owner as specified herein. Deliver to the Owner Representative 21 days prior to Substantial Completion. Include a signed transmittal to the Owner or Owner's Representative for each type of patch cord, quantity, length, and color provided as part of the Final Acceptance.
  - 1. Copper Patch Cords:
    - a. Category 6 Patch Cords:
      - 1) Patch cords shall be constructed from Category 6 4-pair 24 AWG, stranded patch cable material.
      - 2) Patch cord cable assembly shall be UL<sup>®</sup> listed and meet FCC Part 65 plug and termination.

Item	Manufacturer	Part Number	Qty.	Length	Color	Description
1	Ortronics	OR-MC601-04	875	1'-0"	Yellow	Data/ Voice
2	Ortronics	OR-MC609-04	875	9'-0"	Yellow	Data/ Voice (Field)
3	Ortronics	OR-MC601-05	92	1'-0"	Green	Wireless
4	Ortronics	OR-MC603-05	92	3'-0"	Green	Wireless (Field)
5	Ortronics	OR-MC607-00	72	7'-0"	Black	OOBM

- 2. Optical Fiber Patch Cords:
  - a. Multimode Patch Cords (OM3):
    - 1) Optical fiber patch cords shall be  $50/125 \mu m$  with metal ferrules, constructed from OFNR rated dual fiber cordage, in the color aqua.

Item	Manufacturer	Part Number	Qty.	Length	Color	Description
1	Ortronics	OR- P0DF2LPAZAZ001M	48	1M	Aqua	LC – LC
2	Ortronics	OR- P0DF2LPAZAZ002M	24	2M	Aqua	LC – LC
3	Ortronics	OR- P0DF2LPAZAZ003M	24	3M	Aqua	LC – LC

- b. Singlemode Patch Cords (OS2):
  - Optical fiber patch cords shall be 9/125 μm with ceramic ferrules, constructed from OFNR rated dual fiber cordage, in the color yellow.

Item	Manufacturer	Part Number	Qty.	Length	Color	Description
1	Ortronics	OR- P0DC2IPUZUZ001M	6	1M	Yellow	LC – LC
2	Ortronics	OR- P0DC2IPUZUZ002M	6	2M	Yellow	LC – LC
3	Ortronics	OR- P0DC2IPUZUZ003M	6	3M	Yellow	LC – LC

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# 2.11 SPARE PARTS

A. Provide (25) 2-port telecommunications outlets with associated cabling, faceplates and jacks in bids to be used for additional devices in construction. Conduit, back boxes and cabling supports shall be provided for the aforementioned spare 2-port telecommunications outlets.

# PART 3 - EXECUTION

- 3.1 GENERAL
  - A. Include labor, materials, tools, equipment and services for installation as indicated on the Contract Documents.
  - B. Coordinate Work with other trades for complete and operational system.
  - C. Include supplementary and miscellaneous items, appurtenances, and devices incidental to and necessary for sound, secure, and complete installation, whether or not specifically indicated in the Contract Documents.
  - D. Provide suitable barriers and take any other safety precautions required by applicable codes.
  - E. The working area shall be kept free from debris of all types and remove all rubbish resulting from their work on the premises. Upon completion, vacuum and clean room floors, equipment racks, enclosures and cable management where work has been performed.
  - F. Contractor shall be responsible for any building repairs made necessary by their work or caused by negligence of their employees. No cutting, notching, drilling or altering of any kind shall be done to the building without first obtaining permission from the Owner.
  - G. The Owner may have other contracts in connection with this work for the installation of software and equipment. Contractor shall provide other Trade Contractors reasonable opportunity for the introduction and execution of their work and shall properly coordinate other trade's work with theirs as required.
  - H. Provide all patch panels and blocks shown on the telecommunications drawings whether or not they are fully populated with cables.
  - I. Provide all cables, devices and equipment racking systems as shown on the contract drawings.

# 3.2 ABANDONED CABLING

A. Contractor shall be responsible for the phased demolition, removal and disposal of all existing abandoned telecommunications cabling and infrastructure in its entirety per NEC Article 800 and as identified on the contract drawings. Abandoned cabling shall be defined as any telecommunications cabling that is not terminated at both ends at a module or other equipment and is not identified for future use with a tag.

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- B. Telecommunications cabling and infrastructure shall include but not limited to, faceplates, surface mount boxes, RJ11 and 8P8C modules, horizontal UTP cabling, copper and optical fiber backbone infrastructure, innerduct, cabling support systems, equipment racks, horizontal and vertical cable management, equipment shelving, ladder tray, dedicated telecommunications surface raceway, 110 and 66 blocks, rack mount and surface mount fiber cabinets and other related passive infrastructure.
- C. Contractor shall salvage all telecommunications equipment racks, patch panels, horizontal and vertical cable management and optical fiber connectivity being demolished. These items shall be returned to the Owner unless directed by the Owner to be disposed of by the contractor. All other telecommunications passive infrastructure shall be disposed of by the contractor.
- D. Provide blank cover plates for demolished flush mount outlets, surface mount boxes, modular furniture feed locations, and junction boxes.
- E. Provide blank cover plate for demolished modular furniture telecommunications devices. Field verify and match modular furniture manufacturer system, make and base channel color.
- F. Provide new cover plates for surface mount raceway systems after demolition of existing devices. Cover plate sections shall be seamless between new devices. Cover plates shall match existing base color.
- G. Provide fire stopping of existing horizontal and vertical conduit sleeve, after existing horizontal and backbone cabling has been demolished. Provide fire stopping of existing wall penetrations. Seal all penetrations with approved fire stopping materials.
- H. Provide (2) pull strings in each vertical conduit riser sleeves at the completion of demolition of existing cabling.

# 3.3 TELECOMMUNICATIONS ROOM EQUIPMENT INSTALLATION

- A. The primary function of a telecommunications room is the termination of horizontal, backbone and service entrance cabling to compatible connecting hardware.
- B. A telecommunications room also provides a controlled environment to house telecommunications equipment, connecting hardware, and splice enclosures serving a portion of the building.
- C. Install fire retardant plywood backboard vertically at 6" AFF painted with white latex paint as shown on drawings. Backboard shall be painted to leave fire seal exposed. See contract drawings for location of backboards in the telecommunications rooms and spaces.
- D. Provide equipment including the following, but not limited to the following, and shall be installed according to the contract drawings:
  - 1. Equipment racks and enclosures with cable management systems
  - 2. Cross-connect patch panels and termination blocks, whether they are populated or not

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- 3. Telecommunications workstation devices
- 4. Cable tray and ladder rack
- E. Where applicable, each freestanding equipment rack and/or server enclosure shall be seismically braced from the top to a structural component beam, column, bearing wall, etc. of the building. AHJ shall determine if seismic bracing is required and if structural engineering services are required.
- F. Equipment rack shall be secured to the concrete floor with a concrete floor mounting kit.
- G. All 110 blocks shall be securely fastened to the backboards in the telecommunications room. Provide all required D-rings or other approved cable guides as identified on the contract drawings.

# 3.4 LADDER RACK INSTALLATION

- A. Install ladder rack at locations indicated on the drawings. Installation shall be in accordance with manufacturer's instructions and with recognized industry practices to ensure that ladder rack equipment comply with requirements of NEC and applicable portions of NFPA 70B. Reference NEMA-VE2 for general cable tray installation guidelines.
- B. Support the ladder rack on 5' centers for a total of 2 supports for every 10' span when the ladder rack is supported from the ceiling. Support ladder rack at every transition. Support ladder rack utilizing wall mount brackets or Unistrut hangers.
- C. Provide additional brackets on ends, and two additional brackets at tees and corners. Securely fasten ladder rack to brackets and supports using clamps manufactured for the purpose. Provide all required hardware and supports.
- D. Fitting supports shall be located such that they meet the strength requirements of straight sections. Install fitting supports per NEMA VE-2 guidelines, or in accordance with manufacturer's instructions.

## 3.5 OPEN CABLING SUPPORT INSTALLATION

- A. All cabling shall be run exposed as "open cabling" in ceiling spaces and ceiling plenums, unless otherwise noted
- B. Provide all hanger supports and cable supports for cabling specified in this section. All support structures shall adhere to the requirements in the National Electrical Code.
- C. Cabling supports shall be spaced no further than 4'-0" apart.
- D. Cabling bundles shall not sag a maximum of two inches from the bottom of the cable support.
- E. Provide all additional cable management products as required to protect exposed cabling and complete the installation of cabling in a neat professional manner.
- F. All floor penetrations shall be at columns, exterior walls unless otherwise specified.

- G. Cabling supports shall be installed on their own support system. The use of ceiling grid supports shall be prohibited.
- H. Do not support cables from ductwork, sprinkler piping, water piping, waste piping, conduit or other system supports. Cabling shall never come in physical contact with these mechanical, fire protection and electrical systems and raceways.
- I. Cabling bundles and supports changing pathway direction shall maintain proper bend radius as to not impact the physical jacket construction of the cabling. Cabling that becomes damaged during this transition shall be replaced in its entirety.
- J. Follow manufacturer's recommendations for quantity of cables supported in J-hooks and adjustable cable supports.
- K. Installers shall observe the applicable requirements and recommended good practices contained within ANSI/TIA-568-C standard for cabling installation requirements.

# 3.6 CABLING INSTALLATION

- A. Each telecommunications device shall be connected to the horizontal cross-connect in a telecommunications room with horizontal cabling installed in star topology.
- B. Horizontal cabling shall be installed in continuous runs from the telecommunications rooms to telecommunications device locations. Splices are not permitted.
- C. Maximum length of horizontal cables shall be 295 feet (90 m) including all service loops.
- D. All cabling shall be installed in accordance with manufacturer's recommendations, including but not limited to maximum tensile loading and maximum bend radius.
- E. Cabling shall be organized and identified so as to facilitate locating and handling individual sheaths for maintenance functions.
- F. Each bundle shall be neatly tied without cinching or stressing the cabling, using plenum rated tie wraps in open cabling installations and Velcro straps in the telecommunications room. Tie wraps shall be loose enough so that the tie wrap can be easily rotated around the cabling bundle and does not impact the physical construction of the cabling.
- G. Bundles shall be clearly marked identifying the frame and terminal block to which routed, the station numbers served by the bundle, and any other information that may assist in administration.
- H. Provide machine typed label on both ends of the horizontal cabling jacket no more than 4-inches from each termination point.
- I. Great care shall be taken to protect all cabling from physical damage beneath floors, above ceilings or elsewhere. Cabling shall not be exposed to any forces or handling factors that will degrade performance, such as crushing, pull stressing, twisting, or damaging sheathing materials. When left unattended, all cabling shall be secured and protected to avoid damage.

- J. Velcro straps shall be utilized in the telecommunications room for all cabling bundles. Plenum tie wraps are prohibited in the telecommunications rooms and spaces.
- K. A spare pull string shall be installed at every outlet installed.
- L. Horizontal and backbone cabling shall be bundled and routed separately in dedicated cabling supports in a neat and organized fashion for routing from the telecommunications rooms utilizing cable trays and open cabling pathways to the telecommunications devices.
- M. Route cabling runs from workstations parallel to building grid lines and directly to open cabling pathways without passing over adjacent office spaces or cubicles.
- N. Provide 5 feet of slack in neatly suspended loops above each workstation and 10 feet of slack neatly coiled in the ladder rack or cable tray in the telecommunications room unless indicated otherwise on contract drawings. Service loops in the telecommunications room shall not be located above the equipment racks and server enclosures.
- O. Trim all excess length from Velcro straps.
- P. Cables shall contact only dedicated and properly protected cable accesses and support mechanisms.
- Q. Telecommunications unshielded twisted pair cabling supported utilizing open cabling methods shall maintain a minimum separation of three inches from fire alarm, intercom/paging, clocks and security cabling. Cabling supports shall maintain increased separation requirements when attaching to the same hanger rod to ensure cabling sag maintains the minimum three inch separation.
- R. Maintain the following distances between cabling and other building systems:
  - 1. One foot from fluorescent lights.
  - 2. Six feet from motors and transformers.
  - 3. Three feet from water piping or other mechanical equipment.
  - 4. One foot from electrical conduits or other electrical equipment.

# 3.7 CONNECTIVITY AND CABLING INSTALLATION

- A. All cabling shall be dressed and terminated in accordance with the cabling installation requirements identified in ANSI/TIA-568-C, BICSI Telecommunication Cabling Installation Manual, and the manufacturer's documentation.
- B. Cabling entering the telecommunications room and routing on the ladder rack or cable tray pathway shall be separated into cabling bundles specific to the patch panel in which it will be terminated to. Cable bundles shall be in increments of 24 cables.
- C. Cabling shall be neatly bundled and dressed to their respective panels or blocks. Each panel or block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the equipment rack, enclosure or backboard.

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- D. Cabling transitioning from ladder rack or cable tray pathway shall maintain proper bend radius utilizing waterfall device brackets for transitioning vertically down the side rail of an equipment rack or server enclosure as to not impact the physical jacket construction of the cable. Waterfall device brackets shall also be utilized for transitioning cabling to blocks mounted on plywood. Cabling that become damaged during this transition shall be replaced in their entirety.
- E. Each cable shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support straps. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.
- F. The installation of 8P8C modules into faceplates and attaching of the faceplates to the wall shall ensure that the faceplate and modules are flush. The faceplate shall be secured to the wall but shall not be secured to the wall with such force as to bow the faceplate.

# 3.8 WORK AREA

- A. 4-pair UTP horizontal cabling shall be terminated on 8-conductor 8-position modular jacks located at each telecommunications device shown on the applicable contract drawings.
- B. Each telecommunications device shall be provided with 1, 2, 3 or 4, 8-Position 8-Conductor modules as shown on the applicable contract drawings.

# 3.9 CABLING TERMINATIONS

- A. Provide all necessary installation materials, tools and equipment to perform insulation displacement type terminations at all the telecommunications outlets, patch panels and 110 cross-connect blocks.
- B. All pairs in each cable shall be terminated on a 110 block, modular patch panel or telecommunications modules in accordance with this specification.
- C. All cabling shall be terminated in accordance with the T568B pin configuration standard.
- D. Remove only as much of the cable sheath as is necessary to terminate the cabling on the connecting hardware.
- E. A maximum of 0.25" of cable pair twists shall be removed from a 4-pair UTP cable. Cabling and terminations exceed these dimensions shall be re-terminated.
- F. At the horizontal station patch panel, the cabling shall terminate from the center of the 110 IDC termination.
- G. Terminate cabling in accordance with connecting hardware manufacturer's recommendations. All cabling shall terminate in numerical sequence.

# 3.10 FIRESTOPPING

- A. All firestop systems shall be installed in accordance with the NEC and the manufacturer's recommendations and shall be accomplished in a manner acceptable to the local fire and building authorities having jurisdiction over this work.
- B. All cabling running through rated floors and walls shall be firestopped in accordance with the requirements within this Section.
- C. All penetrations through fire-rated building structures (walls and floors) shall be sealed with an appropriate firestop system. This requirement applies to through penetrations (complete penetration) and membrane penetrations (through one side of a hollow fire rated structure).
- D. Any penetrations created by or for the contractor and left unused shall also be sealed as part of the contractor's scope of work.
- E. Firestop putty or pillows shall be used inside conduits and cable trays to provide a re-enterable system allowing telecommunications cables to be easily removed or added in the future. Firestop putty shall not be water soluble.
- F. Firestop systems shall be UL Classified to ASTM E814 (UL 1479).
- G. All firestopping sleeved devices shall be installed according to the manufacturer's recommendations including, but not limited to;
  - 1. Wiring devices shall be installed in locations where indicated on the contract drawings, arranged in a single or multiple sleeve formation at the height specified. Sleeves shall be installed a minimum of 6 inches above the accessible ceiling grid.
  - 2. Install the devices in strict accordance with the approved shop drawings and the manufacturer's recommendations.
  - 3. Apply the factory supplied gasket material prior to the installation of the wall plates.
  - 4. Secure wall plates to devices per the equipment manufacturer's recommendations.

## 3.11 TELECOMMUNICATIONS GROUNDING AND BONDING

- A. Grounding and bonding connections to the building's structural steel, electrical service main building ground and telecommunications bonding backbone shall be terminated on the left side of the busbar to facilitate access for other grounding sources within the space to be terminated within the center and right side of the busbar.
- B. The bonding backbone shall route along the shortest and straightest pathway as possible with minimal bends. Any bend shall be sweeping. The conductors shall be continuous and shall not contain splices.
- C. A telecommunications bonding backbone shall connect the existing main telecommunications grounding busbar to each other telecommunications grounding busbar within the facility.
- D. Grounding and bonding conductor distances shall meet the distance requirements described within ANSI/TIA-J-STD-607-B.

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- E. Grounding and bonding connections shall be a stranded, insulated copper conductor with a minimum size of #6 AWG.
- F. Grounding and bonding connectors shall be 2-hole and made with a crimp or other non-reversible termination method.
- G. Provide a coupled bonding conductor for outside plant copper shielded cabling routing between buildings and ground to the busbar.
- H. Provide a dedicated grounding connection for the below floor and overhead ladder rack and/or cable tray pathways.
- I. Each equipment rack and server enclosure shall have a dedicated grounding connection.
- J. Provide grounding and bonding of all telecommunications pathways including conduit raceway systems and cable tray pathways.
- K. Coordinate with the flooring contractor to ensure that the grounding strip located below the anti-static dissipative vinyl composition tile flooring is located and terminated directly below the busbar to minimize the distance of the required grounding conductor.
- L. Ensure that all grounding and bonding connections break through and/or remove the paint to the bare metallic surface of all painted metallic hardware.

# 3.12 INSTALLATION OF OPTICAL FIBER CABLING SYSTEM

- A. Installation for Optical Fiber Cabling:
  - 1. Follow cable manufacturer's specifications regarding handling methods, bend radius and maximum pulling tension limitations.
- B. Securing Fiber Cabling:
  - 1. Immediately after cabling installation, a permanent identification tag as indicated shall be attached to visible cabling sections. Cabling shall be checked to ensure that the markings are intact.
  - 2. Cabling and equipment shall be supported and secured as indicated. Where the specific method of support is not shown, supports and fasteners shall be used to secure cabling and equipment in position. Metallic supports and fasteners shall have a corrosion resistant finish. All cabling shall be routed along the interior sides of manholes.
  - 3. Corrosion resistant clamps and straps shall be used as necessary to properly secure the cabling.
  - 4. All optical fiber cabling shall be secured to the optical fiber cabinet using the aramid strength yarn of the cabling to provide strain relief.
- C. Optical Fiber Cabling Bending:
  - 1. Caution shall be used when bending cabling to avoid kinks or other damage to the sheath. Bend radius shall be as large as possible with a minimum of 20 times the cabling diameter. Minimum radius shall be increased when necessary to meet

cable manufacturer's recommendation. Cabling shall not rest against any sharp edges.

- D. Optical Fiber Cabling Pulling:
  - 1. Pulling lines shall be attached to both cable ends when cabling is destined for bi-directional pull, and fitted with factory-installed pulling eyes where possible. Cabling not equipped with a pulling eye shall have the pulling line attached to the cable end by means of a cable grip. Core hitches shall not be used.
  - 2. Cable reels shall be located and aligned so that the cable is payed out from the top of the reel by rotating the reel in the feed direction at the rate of pull into the duct or conduit in a long, smooth bend without twisting. Cabling shall not be payed out from the bottom of the reel or by pulling. A cable feeder guide of proper dimensions shall be used at the mouth to guide the cable into the duct or conduit.
  - 3. Rigging shall be set up at the pulling end so that the pulling line and cable exit on a line parallel with the duct or conduit to prevent either from rubbing against the edge or mouth. Cable ends shall not be pulled around sheave wheels. When the sheave or pulley cannot be positioned to obtain sufficient cable end slack for proper racking and splicing with the pulling line attached to the end of the cable, a split cable grip may be used to obtain the necessary slack.
  - 4. All equipment and the pulling set shall be checked to minimize interruptions once pulling begins. Cabling shall be payed out without stopping until the required amount of the cabling has been placed. If the pulling operation is halted before the pull is completed, the tension of the pulling line shall not be released. When pulling is resumed, the inertia of the cabling shall be overcome by increasing the tension in small steps a few seconds apart until the cabling is in motion.
  - 5. Pulling tension shall not exceed 500 lbs or cable manufacturer's recommendation, whichever is less.
  - 6. Provide a 20' foot service loop for all optical fiber cabling located at both ends of the cabling run in all telecommunications rooms. Service loop shall be attached to the fire retardant plywood backboard and shall not be located on the ladder rack or cable tray.
  - 7. Do not pull optical fiber cables with copper cables.
  - 8. Do not pull optical fiber cables over existing cables.
  - 9. When pulling optical fiber cabling in an innerduct or conduit, do not exceed the 40% fill ratio.
  - 10. When installing optical fiber cabling in cable trays, use cable ties to secure the cable to the cable tray every 48"-60".
- E. Optical Fiber Cabling Terminations:
  - 1. All cabling terminations shall be made in optical fiber distribution units. All installed optical fiber strands shall be terminated.
  - 2. Optical fiber cabling terminations shall utilize enclosures and components in quantities consistent with the required fiber counts at each end of each segment. During optical fiber connector termination and polishing, visually inspect all terminations with a 400-power microscope. Follow all of the connector manufacturer's recommendations. Unacceptable flaws in the terminations will include, but not limited to, scratches, full or partial cracks, bubbles, pits, epoxy residual, dirt, dust, oil, moisture, grinding and sanding debris. The acceptable final polish will show a connector tip that is free of all imperfections in 100% of the core

and 80% of the cladding. All unacceptable connectors shall be inspected after rework.

- 3. Optical fiber cabling slack shall be neatly coiled within the optical fiber cabinet. No slack loops shall be allowed external to the optical fiber cabinet.
- 4. Each cable shall be clearly labeled at the entrance to the fiber adapter panel.
- 5. To maintain the correct polarity throughout the optical fiber cabling system, each cabling segment shall be installed in a pair-wise crossover orientation as defined in ANSI/TIA 568-C.
- 6. Dust caps shall be installed on the connectors and couplings.

# 3.13 LABELING

- A. General:
  - 1. Labeling shall be in accordance with ANSI/TIA-606-B, Administration Standard for Commercial Telecommunications Infrastructure.
  - 2. All labels shall be permanent typewritten labels produced by a labeling machine.
  - 3. Labels shall be installed on all cabling at each end. Ensure labels are securely fastened.
  - 4. All labels shall be located within 6 inches of cable termination and placed so they can be easily read.
  - 5. The font type for each type of label shall be Arial.
  - 6. Labeling information will be reviewed at the Pre-Construction Meeting.
  - 7. All labeling shall be completed prior to the substantial completion date of the project.
- B. Telecommunications Device Labeling:
  - 1. Each telecommunications device shall be labeled in accordance with ANSI/TIA-606-B, Administration Standard for Commercial Telecommunications Infrastructure and the Owner's standards.
  - 2. The label shall be produced to fit into the recess provided and covered with a clear plastic cover.
  - 3. The labeling shall be as follows for a tenant space with a single or multiple telecommunications rooms:
    - a. TR-2-03-04 where:
      - 1) TR = Telecommunications Room (I1N, I1C, and I2W as indicated on the construction drawings))
      - 2) -2 = Equipment rack number
      - 3) -03 = Patch panel number
      - 4) -04 = Port number
- C. Equipment Rack Labeling:
  - 1. Provide plastic lamacoid nameplate for each equipment rack and/or server enclosure in the telecommunications room.
  - 2. Plastic lamacoid nameplate shall be black with white letters. The nameplate shall be machine engraved with a size 36 font.
  - 3. Mount the name plate at the top of each equipment rack, server enclosure or wall mount enclosure.
  - 4. Labeling scheme is provided on the contract drawings.

- D. Patch Panel Labeling:
  - 1. Station Patch Panel:
    - a. 48-port modular patch panels shall be labeled with sequential numbering starting with "01" for the topmost patch panel and moving downward to the bottom of the rack. Patch panel labels shall be affixed to the left hand side of the patch panel.
    - b. Horizontal cabling distributed from station patch panels to specialty devices (i.e. wireless access points) shall have a label in the designation strip space directly below the 8P8C module identifying the device interconnect point, the designation label shall be as follows:
      - 1) "WAP #", where the "#" represents the Owner's wireless access point identification number.
- E. Rack Mount Fiber Cabinet Labeling:
  - 1. RMFC shall be labeled with sequential numbering starting with "RMFC1" for the topmost fiber cabinet and moving downward to the bottom of the rack. Labels shall be affixed to the left hand side of the RMFC.
- F. Optical Fiber Termination Labeling:
  - 1. Labeling shall be placed within the designation strip holder of the fiber connector panel where designation strips are provided with the connector panel.
  - 2. Labeling shall be placed on the inside of the front door for surface mount fiber cabinets and rack mount fiber cabinets where no designation label strips are provided. The label shall be in the same orientation of the connector panel.
  - 3. Labeling shall contain the originating telecommunications room designation, rack row if applicable, equipment rack number designation, rack mount fiber cabinet number, fiber adapter panel position(s) and the associated fiber strand numbers by individual strands and/or optical fiber subunit classification.
  - 4. The Main Cross-connect will have labeling associated for the distribution of optical fiber cabling to each telecommunications room and the telecommunications room (IC or HC) will have labeling associated from the Main Cross-connect.
  - 5. Backbone Optical Fiber Labeling:
    - a. The labeling shall be as follows in the originating telecommunications room:
      - 1) I1N-1-2:1-6 where:
        - a) I1C, I1N, I2W = telecommunications room
        - b) -1 = Equipment rack number
        - c) -2 = Connector panel position
        - d) :1-6 = Strand numbers per connector panel
- G. Cable Identification Tag Labeling:
  - Optical fiber cabling shall be clearly and visibly identified by the contractor in all manholes, pull boxes, riser room pull points, entrance points, service entrance and 3' before entering a free standing rack, wall mounted enclosure or surface mount fiber cabinet utilizing an optical fiber cable identification tag.
  - 2. Optical fiber cable identification tags shall contain the following information at a minimum.
    - a. Cable manufacturer and part number
    - b. Extent of cable run (i.e. "From: MDF To: IDF-I1C")

c. Cable type and description (i.e. "Indoor/Outdoor Loose Tube, OM3 24strand")

# 3.14 TESTING

- A. Test procedures shall be as prescribed by the ANSI/TIA, Insulated Cable Engineers Association and the National Electrical Testing Association.
- B. Test Equipment:
  - 1. The network testing equipment shall be a Fluke Networks DSX-5000 Cable Analyzer or equal and shall have a certified calibration from the manufacturer within the past six months. Proof of calibration shall be provided with the product submittal. Test equipment shall be utilized to test horizontal and backbone cabling.
  - 2. The field tester and adapters shall be certified by an independent laboratory as meeting or exceeding current level as defined in ANSI/TIA-1152.
  - 3. The 8P8C test plug for the network testing equipment adapters shall be in range of values defined in Annex C with ANSI/TIA-568-C for Near-end Crosstalk, Far-end Crosstalk and Return Loss.
  - 4. The test equipment shall support the complete suite of Resistance Unbalanced standards for PoE per IEEE 802.3af, IEEE 802.3at and ANSI/TIA-568-C.2.
  - 5. The test equipment shall be able to test up to a 1000 MHz frequency range.
  - 6. The test equipment shall be ISO 9001 certified.
  - 7. The contractor shall maintain an electronic copy of the manufacturer's testing procedures in the job site office.
  - 8. The test equipment batteries shall be charged daily and a level of greater than twenty-five percent of capacity shall be maintained during the testing.
  - 9. The test equipment shall be calibrated daily before the start of testing.
- C. Horizontal Cabling:
  - 1. All horizontal cabling shall be certified to meet or exceed the permanent link performance specifications for Category 6 horizontal cabling tested with a frequency range from 1MHz to 250 MHZ as defined in ANSI/TIA-568-C.
  - 2. Certifications shall include the following parameters for each pair of each cable installed:
    - a. Building identification
    - b. Cable identification
    - c. Date of test
    - d. Test equipment manufacturer and model number
    - e. Wire map:
      - 1) Continuity to the remote end.
      - 2) Shorts between any two or more conductors
      - 3) Reversed pairs
      - 4) Split pairs
      - 5) Transposed pairs
      - 6) Any other miswiring
    - f. Length
    - g. Near-end crosstalk (NEXT)
    - h. Attenuation to crosstalk ration far-end (ACRF)
    - i. Power sum Attenuation to crosstalk ration far-end (PSACRF)

- j. Power sum-near-end crosstalk (PS-NEXT)
- k. Return loss (RL)
- I. Propagation delay (PD)
- m. Delay skew (DS)
- 3. All horizontal cabling shall be tested using a Permanent Link configuration as defined in ANSI/TIA-568-C.
- 4. Test reports with an asterisk (\*) or fails, shall be documented identifying the reason for the test failure and a corrective action plan developed.
- 5. After corrective action has been completed, the permanent link shall be retested.
- 6. It is the Telecommunications Contractor's responsibility to ensure 100 percent of the network horizontal cabling system links pass all tests.
- 7. The test results shall be organized by building identification and cable identification number. The test results shall contain the date and time of when each test was saved in the memory of the tester. The test results shall be recorded on a CD-ROM in both PDF and LinkWare software formats.
- D. Optical Fiber:
  - 1. Acceptance Testing:
    - a. After terminating optical fiber cabling, one of the individual fibers of each cable segment shall be tested using an OTDR to determine the actual length. One strand of each optical fiber buffer tube shall be tested with an OTDR.
    - b. Multimode optical fiber attenuation shall be tested and recorded at a minimum of three times on all individual fiber strands of each cable using the power meter tester configuration to determine the actual loss and the connector repeatability. Each of the three tests shall be recorded in the test form and a final value with the average of the three tests shall also be recorded. The connector repeatability shall not exceed 0.2 dB as defined by Telcordia GR-326-CORE. These tests shall be performed at the 850nm and 1300nm windows in bi-directional testing. Test set up and performance shall be in accordance with ANSI/TIA/EIA-526-14A, Method B, and ANSI/TIA-568C.0.
    - c. Singlemode optical fiber attenuation shall be tested and recorded at a minimum of three times on all individual fiber strands of each cable using the power meter tester configuration to determine the actual loss and the connector repeatability. Each of the three tests shall be recorded in the test form and a final value with the average of the three tests shall also be recorded. The connector repeatability shall not exceed 0.2 dB as defined by Telcordia GR-326-CORE. These tests shall be performed at the 1310 nm and 1550 nm windows in bi-directional testing. Test set up and performance shall be in accordance with ANSI/TIA/EIA-526-7, Method A.1.
    - d. A reference power measurement shall be obtained by connecting one end of test jumper 1 to the light source and the other end to the power meter tester. After recording the reference power measurement, test jumper 1 shall be disconnected from the power meter tester without disturbing the light source and attached to the cable plant. The power meter tester shall be moved to the far end of the cable plant and attached to the cable plant with test jumper 2.
    - e. The optical fiber test jumper shall be properly cleaned at both ends prior to the start of testing for each backbone segment.

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END OF SECTION 27 11 00

TELECOMMUNICATIONS SYSTEM SECTION 27 11 00

27 11 00 - 33

# SECTION 01 25 00 - SUBSTITUTION PROCEDURES

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
  - 1. Section 00 63 00 "Clarification, Modification, and Closeout Forms" for Substitution Request Form.
  - 2. Section 00 70 00 "General Conditions".
  - 3. Section 01 23 00 "Alternates" for products selected under an alternate.
  - 4. Section 01 60 00 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

#### 1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents.
  - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
  - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required to meet other Project requirements but may offer advantage to Contractor or Owner.

## 1.4 ACTION SUBMITTALS

- A. Substitution Requests: Submit documentation identifying product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
  - 1. Substitution Request Form: Use form provided in Project Manual (CSI Substitution Request Form 1.5C).
  - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
    - a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.
    - b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.

- c. Detailed comparison of significant qualities of proposed substitutions with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes, such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
- d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
- e. Samples, where applicable or requested.
- f. Certificates and qualification data, where applicable or requested.
- g. List of similar installations for completed projects, with project names and addresses as well as names and addresses of architects and owners.
- h. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
- i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
- j. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
- k. Cost information, including a proposal of change, if any, in the Contract Sum.
- I. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
- m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
- 3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within 7 days of receipt of a request for substitution. Architect will notify Contractor through Construction Manager of acceptance or rejection of proposed substitution withing 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.
  - a. Forms of Acceptance: Change Order or Architect's Supplemental Instructions for changes in the Work.
  - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

## 1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

## 1.6 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

## 1.7 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
  - 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
    - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    - b. Substitution request is fully documented and properly submitted.
    - c. Requested substitution will not adversely affect Contractor's construction schedule.
    - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
    - e. Requested substitution is compatible with other portions of the Work.
    - f. Requested substitution has been coordinated with other portions of the Work.
    - g. Requested substitution provides specified warranty.
    - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Architect will consider requests for substitution if received within 60 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.
  - 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
    - a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
    - b. Requested substitution does not require extensive revisions to the Contract Documents.
    - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    - d. Substitution request is fully documented and properly submitted.
    - e. Requested substitution will not adversely affect Contractor's construction schedule.
    - f. Requested substitution has received necessary approvals of authorities having jurisdiction.
    - g. Requested substitution is compatible with other portions of the Work.
    - h. Requested substitution has been coordinated with other portions of the Work.
    - i. Requested substitution provides specified warranty.
    - j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

KIRKLAND CITY HALL – VIRTUAL SERVICE CENTER CONTRACT DOCUMENTS

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 25 00

# SECTION 01 26 00 - CONTRACT MODIFICATION PROCEDURES

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

#### B. Related Requirements:

- 1. Section 00 63 00 "Clarification, Modification, and Closeout Forms" for Substitution Request Form.
- 2. Section 00 70 00 "General Conditions".
- 3. Section 01 25 00 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.
- 4. Section 01 31 00 "Project Management and Coordination" for requirements for forms for contract modifications provided as part of web-based Project management software.

## 1.3 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710.

## 1.4 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time, on AIA Document G709. If necessary, the description will include supplemental or revised Drawings and Specifications.
  - 1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
  - 2. Within time specified in Proposal Request or 20 days maximum, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
    - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    - c. Include costs of labor and supervision directly attributable to the change.

- d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
- e. Quotation Form: Use forms acceptable to Architect.
- B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.
  - 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
  - 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
  - 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
  - 4. Include costs of labor and supervision directly attributable to the change.
  - 5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
  - 6. Comply with requirements in Section 01 25 00 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
  - 7. Proposal Request Form: Use form acceptable to Architect.

# 1.5 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Change Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

## 1.6 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work immediately, for subsequent inclusion in a Change Order.
  - 1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
  - 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

KIRKLAND CITY HALL – VIRTUAL SERVICE CENTER CONTRACT DOCUMENTS

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 26 00

# SECTION 01 29 00 - PAYMENT PROCEDURES

## PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

#### B. Related Requirements:

- 1. Section 00 63 00 "Clarification, Modification, and Closeout Forms" for Substitution Request Form.
- 2. Section 00 70 00 "General Conditions".
- 3. Section 01 26 00 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
- 4. Section 01 32 00 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

#### 1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

## 1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
  - 1. Coordinate line items in the schedule of values with items required to be indicated as separate activities in Contractor's construction schedule.
  - 2. Submit the schedule of values to Architect at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
  - 3. Sub-schedules for Separate Elements of Work: Where the Contractor's construction schedule defines separate elements of the Work, provide sub-schedules showing values coordinated with each element.
- B. Format and Content: Use Project Manual (aka Project Specifications) table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
  - 1. Identification: Include the following Project identification on the schedule of values:

- a. Project name and location.
- b. Owner's name.
- c. Owner's Project number.
- d. Name of Architect.
- e. Architect's Project number.
- f. Contractor's name and address.
- g. Date of submittal.
- 2. Arrange schedule of values consistent with format of AIA Document G703S.
- 3. Arrange the schedule of values in tabular form, with separate columns to indicate the following for each item listed:
  - a. Related Specification Section or division.
  - b. Description of the Work.
  - c. Name of subcontractor.
  - d. Name of manufacturer or fabricator.
  - e. Name of supplier.
  - f. Change Orders (numbers) that affect value.
  - g. Dollar value of the following, as a percentage of the Contract Sum to nearest onehundredth percent, adjusted to total 100 percent. Round dollar amounts to whole dollars, with total equal to Contract Sum.
    - 1) Labor.
    - 2) Materials.
    - 3) Equipment.
- 4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
- 5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
  - a. Differentiate between items stored on-site and items stored off-site.
- 6. Schedule of Values Revisions: Revise the schedule of values when Change Orders or Architectural Supplemental Instructions result in a change in the Contract Sum. Include at least one separate line item for each Change Order and Architectural Supplemental Instruction.

## 1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments, as certified by Architect and paid for by Owner.
- B. Payment Application Times: The date for each progress payment is indicated in the Owner/Contractor Agreement. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Times: Submit approved Application for Payment to Owner/Architect by the 25th of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.
  - 1. Submit draft copy of Application for Payment two days prior to due date for review by Owner and Architect.
- D. Application for Payment Forms: Use AIA Document G702S and AIA Document G703S, or adopted contractor forms of similar format as allowed by Architect, as form for Applications for Payment.
  - 1. Other Application for Payment forms proposed by the Contractor may be acceptable to Architect and Owner. Submit forms for approval with initial submittal of schedule of values.
- E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
  - 1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
  - 2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
  - 3. Include amounts of Change Orders and Architectural Supplemental Instruction issued before last day of construction period covered by application.
  - 4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.
- F. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
  - 1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment for stored materials.
  - 2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
  - 3. Provide summary documentation for stored materials indicating the following:
    - a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
    - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
    - c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
- G. Transmittal: Submit electronic signed and notarized copy of each Application for Payment to Architect. Copy shall include waivers of lien and similar attachments if required.
  - 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- H. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.
  - 1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
  - 2. When an application shows completion of an item, submit conditional final or full waivers.
  - 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.

- 4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
- 5. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.
- I. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
  - 1. List of subcontractors.
  - 2. Schedule of values.
  - 3. Contractor's construction schedule (preliminary if not final).
  - 4. Combined Contractor's construction schedule (preliminary if not final) incorporating Work of multiple contracts, with indication of acceptance of schedule by each Contractor.
  - 5. Products list (preliminary if not final).
  - 6. Submittal schedule (preliminary if not final).
  - 7. List of Contractor's staff assignments.
  - 8. List of Contractor's principal consultants.
  - 9. Copies of building permits.
  - 10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
  - 11. Initial progress report.
  - 12. Report of preconstruction conference.
- J. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
  - 1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
    - a. Complete administrative actions, submittals, and Work preceding this application, as described in Section 01 77 00 "Closeout Procedures."
  - 2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- K. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
  - 1. Evidence of completion of Project closeout requirements.
  - 2. Certification of completion of final punch list items.
  - 3. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
  - 4. Updated final statement, accounting for final changes to the Contract Sum.
  - 5. Evidence that claims have been settled.
  - 6. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
  - 7. Final liquidated damages settlement statement.
  - 8. Proof that taxes, fees, and similar obligations are paid.
  - 9. Waivers and releases.

KIRKLAND CITY HALL – VIRTUAL SERVICE CENTER CONTRACT DOCUMENTS

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 29 00

# SECTION 01 31 00 - PROJECT MANAGEMENT AND COORDINATION

## PART 1 - GENERAL

# 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project, including, but not limited to, the following:
  - 1. General coordination procedures.
  - 2. Coordination drawings.
  - 3. RFIs.
  - 4. Digital project management procedures.
  - 5. Web-based Project management software package.
  - 6. Project meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.
- C. Related Requirements:
  - 1. Section 00 63 00 "Clarification, Modification, and Closeout Forms" for Substitution Request Form.
  - 2. Section 00 70 00 "General Conditions".
  - 3. Section 01 32 00 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
  - 4. Section 01 73 00 "Execution" for procedures for coordinating general installation and fieldengineering services, including establishment of benchmarks and control points.
  - 5. Section 01 77 00 "Closeout Procedures" for coordinating closeout of the Contract.

# 1.3 DEFINITIONS

- A. BIM: Building Information Modeling.
- B. RFI: Request for Information. Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

# 1.4 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.

- 1. Schedule construction operations in sequence required to obtain the best results, where installation of one part of the Work depends on installation of other components, before or after its own installation.
- 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
- 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
  - 1. Preparation of Contractor's construction schedule.
  - 2. Preparation of the schedule of values.
  - 3. Installation and removal of temporary facilities and controls.
  - 4. Delivery and processing of submittals.
  - 5. Progress meetings.
  - 6. Preinstallation conferences.
  - 7. Project closeout activities.
  - 8. Startup and adjustment of systems.

# 1.5 REQUEST FOR INFORMATION (RFI)

- A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents.
  - 1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
  - 2. Coordinate and submit RFIs in a prompt manner to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
  - 1. Project name.
  - 2. Owner name.
  - 3. Owner's Project number.
  - 4. Name of Architect.
  - 5. Architect's Project number.
  - 6. Date.
  - 7. Name of Contractor.
  - 8. RFI number, numbered sequentially.
  - 9. RFI subject.
  - 10. Specification Section number and title and related paragraphs, as appropriate.
  - 11. Drawing number and detail references, as appropriate.
  - 12. Field dimensions and conditions, as appropriate.
  - 13. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
  - 14. Contractor's signature.
  - 15. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
    - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

- C. RFI Forms: Software-generated form by Contractor with substantially the same content as AIA Document G716, deemed acceptable to Architect.
  - 1. Attachments shall be electronic files in PDF format.
- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
  - 1. The following Contractor-generated RFIs will be returned without action:
    - a. Requests for approval of submittals.
    - b. Requests for approval of substitutions.
    - c. Requests for approval of Contractor's means and methods.
    - d. Requests for coordination information already indicated in the Contract Documents.
    - e. Requests for adjustments in the Contract Time or the Contract Sum.
    - f. Requests for interpretation of Architect's actions on submittals.
    - g. Incomplete RFIs or inaccurately prepared RFIs.
  - 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect of additional information.
  - 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 01 26 00 "Contract Modification Procedures."
    - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 5 days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly, electronically in PDF format.
  - 1. Project name.
  - 2. Name and address of Contractor.
  - 3. Name and address of Architect.
  - 4. RFI number, including RFIs that were returned without action or withdrawn.
  - 5. RFI description.
  - 6. Date the RFI was submitted.
  - 7. Date Architect's response was received.
  - 8. Identification of related Change in the Work and Proposal Request, as appropriate.
  - 9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.
- F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

# 1.6 DIGITAL PROJECT MANAGEMENT PROCEDURES

- A. Use of Architect's Digital Data Files: Digital data files of Architect's BIM model and CAD drawings will be provided by Architect for Contractor's use during construction.
  - 1. Digital data files may be used by Contractor in preparing coordination drawings, Shop Drawings, and Project Record Drawings.
  - 2. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Contract Drawings.
  - 3. Digital Drawing Software Program: Contract Drawings are available in Revit/AutoCAD.

- 4. Contractor shall execute a data licensing agreement in the form of Agreement form acceptable to Architect.
  - a. Subcontractors and other parties granted access by Contractor to Architect's digital data files shall execute a data licensing agreement in the form of Agreement(s) acceptable to Architect.
- B. Web-Based Project Management Software Package: Provide, administer, and manage webbased Project management software package for purposes of hosting and managing Project communication and documentation until Final Completion. Contractor FTP, OneDrive, Dropbox (or similar) or e-mail is **not** an acceptable means of Project Management Software.
  - 1. Web-based Project management software includes, at a minimum, the following features:
    - a. Compilation of Project data, including Contractor, subcontractors, Architect, Architect's consultants, Owner, and other entities involved in Project. Include names of individuals and contact information.
    - b. Access control for each entity for each workflow process, to determine entity's digital rights to create, modify, view, and print documents.
    - c. Document workflow planning, allowing customization of workflow between project entities.
    - d. Creation, logging, tracking, and notification for Project communications required in other Specification Sections, including, but not limited to, RFIs, submittals, Changes in Work (Architectural Supplemental Instruction), and Change Orders.
    - e. Track status of each Project communication in real time, and log time and date when responses are provided.
    - f. Procedures for handling PDFs or similar file formats, allowing markups by each entity. Provide security features to lock markups against changes once submitted.
    - g. Processing and tracking of payment applications.
    - h. Processing and tracking of contract modifications.
    - i. Creating and distributing meeting minutes.
    - j. Document management for Drawings, Specifications, and coordination drawings, including revision control.
    - k. Management of construction progress photographs.
  - 2. Provide full access to Architect, and Architect's consultants and the Owner. Provide training for web-based Project software users.
  - 3. At completion of Project, provide digital archive in format that is readable by common desktop software applications in format acceptable to Architect. Provide data in locked format to prevent further changes.
  - 4. Provide one of the following Project management software packages under their current published licensing agreements:
    - a. Procore Technologies, Inc.
    - b. Autodesk; Constructware. Plangrid. BIM 360.
    - c. Corecon Technologies, Inc.
    - d. Meridian Systems; Prolog.
    - e. Newforma, Inc.
    - f. Viewpoint, Inc.
    - g. No substitutions allowed after bid award.
- C. PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare as follows:
  - 1. Assemble complete submittal package into a single indexed file, incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
  - 2. Name file with submittal number or other unique identifier, including revision identifier.

3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

# 1.7 PROJECT MEETINGS

- A. General: Contractor to schedule and conduct meetings and conferences at Project site unless otherwise indicated.
  - 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times a minimum of 10 working days prior to meeting.
  - 2. Agenda: Contractor to prepare the meeting agenda; previous, recorded and distributed meeting minutes may act as agenda for following meeting. Distribute the agenda to all invited attendees.
  - 3. Minutes: Contractor is responsible for conducting meeting and will record meeting minutes. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within 3 days of the meeting for review and comment.
- B. Preconstruction Conference: Contractor to schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 10 working days after execution of the Agreement.
  - 1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
  - 2. Agenda: Discuss items of significance that could affect progress, including the following:
    - a. Responsibilities and personnel assignments.
    - b. Tentative construction schedule.
    - c. Phasing.
    - d. Critical work sequencing and long lead items.
    - e. Designation of key personnel and their duties.
    - f. Lines of communications.
    - g. Use of web-based Project software.
    - h. Procedures for processing field decisions and Change Orders.
    - i. Procedures for RFIs.
    - j. Procedures for testing and inspecting.
    - k. Procedures for processing Applications for Payment.
    - I. Distribution of the Contract Documents.
    - m. Submittal procedures.
    - n. Sustainable design requirements.
    - o. Preparation of Record Documents.
    - p. Use of the premises and existing building.
    - q. Work restrictions.
    - r. Working hours.
    - s. Owner's occupancy requirements.
    - t. Responsibility for temporary facilities and controls.
    - u. Procedures for moisture and mold control.
    - v. Procedures for disruptions and shutdowns.
    - w. Construction waste management and recycling.
    - x. Parking availability.
    - y. Office, work, and storage areas.
    - z. Equipment deliveries and priorities.
    - aa. First aid.

- bb. Security.
- cc. Progress cleaning.
- 3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other Sections and when required for coordination with other construction.
  - 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
  - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
    - a. Contract Documents.
    - b. Options.
    - c. Related RFIs.
    - d. Related Change Orders.
    - e. Purchases.
    - f. Deliveries.
    - g. Submittals.
    - h. Sustainable design requirements.
    - i. Review of mockups.
    - j. Possible conflicts.
    - k. Compatibility requirements.
    - I. Time schedules.
    - m. Weather limitations.
    - n. Manufacturer's written instructions.
    - o. Warranty requirements.
    - p. Compatibility of materials.
    - q. Acceptability of substrates.
    - r. Temporary facilities and controls.
    - s. Space and access limitations.
    - t. Regulations of authorities having jurisdiction.
    - u. Testing and inspecting requirements.
    - v. Installation procedures.
    - w. Coordination with other work.
    - x. Required performance results.
    - y. Protection of adjacent work.
    - z. Protection of construction and personnel.
  - 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
  - 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
  - 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 10 working days prior to the scheduled date of Substantial Completion.
  - 1. Conduct the conference to review requirements and responsibilities related to Project closeout.

- 2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
- 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
  - a. Preparation of Record Documents.
  - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
  - c. Procedures for completing and archiving web-based Project software site data files.
  - d. Submittal of written warranties.
  - e. Requirements for completing sustainable design documentation.
  - f. Requirements for preparing operations and maintenance data.
  - g. Requirements for delivery of material samples, attic stock, and spare parts.
  - h. Requirements for demonstration and training.
  - i. Preparation of Contractor's punch list.
  - j. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
  - k. Submittal procedures.
  - I. Coordination of separate contracts.
  - m. Owner's partial occupancy requirements.
  - n. Installation of Owner's furniture, fixtures, and equipment.
  - o. Responsibility for removing temporary facilities and controls.
- 4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- E. Progress Meetings: Conduct progress meetings at weekly intervals.
  - 1. Coordinate dates of meetings with preparation of payment requests.
  - 2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities may be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  - 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
      - 1) Review schedule for next period.
    - b. Review present and future needs of each entity present, including the following:
      - 1) Interface requirements.
      - 2) Sequence of operations.
      - 3) Resolution of BIM component conflicts.
      - 4) Status of submittals.
      - 5) Status of sustainable design documentation.
      - 6) Deliveries.
      - 7) Off-site fabrication.
      - 8) Access.
      - 9) Site use.
      - 10) Temporary facilities and controls.
      - 11) Progress cleaning.

- 12) Quality and work standards.
- 13) Status of correction of deficient items.
- 14) Field observations.
- 15) Status of RFIs.
- 16) Status of Proposal Requests.
- 17) Pending changes.
- 18) Status of Change Orders.
- 19) Pending claims and disputes.
- 20) Documentation of information for payment requests.
- 4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
  - a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
- F. Coordination Meetings: Conduct Project coordination meetings at regular intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
  - 1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.
  - 2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    - a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
    - b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
      - Review present and future needs of each contractor present, including the following:
        - 1) Interface requirements.
        - 2) Sequence of operations.
        - 3) Resolution of BIM component conflicts.
        - 4) Status of submittals.
        - 5) Deliveries.

C.

- 6) Off-site fabrication.
- 7) Access.
- 8) Site use.
- 9) Temporary facilities and controls.
- 10) Work hours.
- 11) Hazards and risks.
- 12) Progress cleaning.
- 13) Quality and work standards.
- 14) Status of RFIs.
- 15) Proposal Requests.
- 16) Change Orders.
- 17) Pending changes.

3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00

# SECTION 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION

# PART 1 - GENERAL

# 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

# 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
  - 1. Startup construction schedule.
  - 2. Contractor's Construction Schedule.
  - 3. Construction schedule updating reports.
  - 4. Daily construction reports.
  - 5. Material location reports.
  - 6. Site condition reports.
  - 7. Unusual event reports.
- B. Related Requirements:
  - 1. Section 00 63 00 "Clarification, Modification, and Closeout Forms" for Substitution Request Form.
  - 2. Section 00 70 00 "General Conditions".
  - 3. Section 01 40 00 "Quality Requirements" for schedule of tests and inspections.
  - 4. Section 01 29 00 "Payment Procedures" for schedule of values and requirements for use of cost-loaded schedule for Applications for Payment.

# 1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction Project. Activities included in a construction schedule consume time and resources.
  - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
  - 2. Predecessor Activity: An activity that precedes another activity in the network.
  - 3. Successor Activity: An activity that follows another activity in the network.
- B. Cost Loading: The allocation of the schedule of values for completing an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum.
- C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine the critical path of Project and when activities can be performed.

- D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- E. Event: The starting or ending point of an activity.
- F. Float: The measure of leeway in starting and completing an activity.
  - 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
  - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
  - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- G. Resource Loading: The allocation of manpower and equipment necessary for completing an activity as scheduled.

## 1.4 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
  - 1. Working electronic copy of schedule file.
  - 2. PDF file.
- B. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
  - 1. Submit a working digital copy of schedule, using software indicated, and labeled to comply with requirements for submittals.
- C. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
- D. Daily Construction Reports: Submit no less frequently than at weekly intervals.
- E. Material Location Reports: Submit at weekly intervals.

# 1.5 QUALITY ASSURANCE

A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect's request.

# 1.6 COORDINATION

A. Coordinate Contractor's Construction Schedule with the schedule of values, submittal schedule, progress reports, payment requests, and other required schedules and reports.

- 1. Secure time commitments for performing critical elements of the Work from entities involved.
- 2. Coordinate each construction activity in the network with other activities, and schedule them in proper sequence.

# 1.7 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.
  - 1. Use Microsoft Project or Architect-approved software for current Windows operating system.
- B. Scheduling Consultant: Engage a consultant to provide planning, evaluation, and reporting, using CPM scheduling.
  - 1. In-House Option: Owner may waive requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.
  - 2. Meetings: Scheduling consultant or In-House employee shall attend all meetings related to Project progress, alleged delays, and time impact.
- C. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Final Completion.
  - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- D. Activities: Treat each separate area as a separate numbered activity for each main element of the Work. Comply with the following:
  - 1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
  - 2. Temporary Facilities: Indicate start and completion dates for the following as applicable:
    - a. Securing of approvals and permits required for performance of the Work.
      - b. Temporary facilities.
      - c. Construction of mock-ups, prototypes and samples.
      - d. Owner interfaces and furnishing of items.
      - e. Interfaces with Separate Contracts.
      - f. Regulatory agency approvals.
      - g. Punch list.
  - 3. Procurement Activities: Include procurement process activities for the following long leadtime items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
  - 4. Submittal Review Time: Include review and resubmittal times indicated in Section 01 33 00 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with submittal schedule.
  - 5. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
  - 6. Commissioning Time: Include no fewer than 15 days for commissioning.
  - 7. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.

- 8. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and Final Completion.
- 9. Owner-related items: Show coordination and/or overlap of OFCI or OFOI scope.
- E. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
  - 1. Phasing: Arrange list of activities on schedule by phase.
  - 2. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
  - 3. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 01 10 00 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
  - 4. Work Restrictions: Show the effect of the following items on the schedule:
    - a. Coordination with existing construction.
    - b. Limitations of continued occupancies.
    - c. Uninterruptible services.
    - d. Partial occupancy before Substantial Completion.
    - e. Use-of-premises restrictions.
    - f. Provisions for future construction.
    - g. Seasonal variations.
    - h. Environmental control.
  - 5. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
    - a. Subcontract awards.
    - b. Submittals.
    - c. Purchases.
    - d. Mockups.
    - e. Fabrication.
    - f. Sample testing.
    - g. Deliveries.
    - h. Installation.
    - i. Tests and inspections.
    - j. Adjusting.
    - k. Curing.
    - I. Building flush-out.
    - m. Startup and placement into final use and operation.
    - n. Commissioning.
  - 6. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
    - a. Structural completion.
    - b. Temporary enclosure and space conditioning.
    - c. Permanent space enclosure.
    - d. Completion of mechanical installation.
    - e. Completion of electrical installation.
    - f. Substantial Completion.
- F. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final.
- G. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule with the monthly payment application. Payment application is not considered complete without a provided, updated overall schedule.

- H. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
  - 1. Post copies in Project meeting rooms and temporary field offices.
  - 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

# 1.8 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
  - 1. List of subcontractors at Project site.
  - 2. List of separate contractors at Project site.
  - 3. Approximate count of personnel at Project site.
  - 4. Equipment at Project site.
  - 5. Material deliveries.
  - 6. High and low temperatures and general weather conditions, including presence of rain or snow.
  - 7. Testing and inspection.
  - 8. Accidents.
  - 9. Meetings and significant decisions.
  - 10. Unusual events.
  - 11. Stoppages, delays, shortages, and losses.
  - 12. Meter readings and similar recordings.
  - 13. Emergency procedures.
  - 14. Orders and requests of authorities having jurisdiction.
  - 15. Change Orders received and implemented.
  - 16. Architectural Supplemental Instructions received and implemented.
  - 17. Services connected and disconnected.
  - 18. Equipment or system tests and startups.
  - 19. Partial completions and occupancies.
  - 20. Substantial Completions authorized.
- B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:
  - 1. Material stored prior to previous report and remaining in storage.
  - 2. Material stored prior to previous report and since removed from storage and installed.
  - 3. Material stored following previous report and remaining in storage.
- C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.
- D. Unusual Event Reports: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of

events, persons participating, responses by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

1. Submit unusual event reports directly to Owner within one day of an occurrence. Distribute copies of report to parties affected by the occurrence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 32 00

# SECTION 01 32 33 - PHOTOGRAPHIC DOCUMENTATION

## PART 1 - GENERAL

# 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
  - 1. Preconstruction photographs.
  - 2. Concealed Work photographs.
  - 3. Periodic construction photographs.
- B. Related Requirements:
  - 1. Section 01 77 00 "Closeout Procedures" for submitting photographic documentation as Project Record Documents at Project closeout.
  - 2. Section 02 41 19 "Selective Demolition" for photographic documentation before selective demolition operations commence.
  - 3. Section 31 10 00 "Site Clearing" for photographic documentation before site clearing operations commence.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Digital Photographs: Submit image files within three days of taking photographs.
  - 1. Submit photos by uploading to web-based Project management software site. Include copy of key plan indicating each photograph's location and direction.
  - 2. Identification: Provide the following information with each image description in web-based Project management software site:
    - a. Date photograph was taken.

#### 1.4 QUALITY ASSURANCE

A. Photographer Qualifications: An individual with access to and knowledge of digital camera.

# 1.5 FORMATS AND MEDIA

A. Digital Photographs: Provide color images in JPG format, produced by a digital camera with minimum sensor size of 12 megapixels, and at an image resolution of not less than 3200 x 2400 pixels. Use flash in low light levels or backlit conditions.

- B. Digital Images: Submit digital media as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
- C. File Names: Name media files with date and sequential numbering suffix.

# 1.6 CONSTRUCTION PHOTOGRAPHS

- A. Photographer: Engage a qualified photographer to take construction photographs.
- B. General: Take photographs with maximum depth of field and in focus.
  - 1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- C. Preconstruction Photographs: Before commencement of the Work, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points.
  - 1. Flag construction limits before taking construction photographs.
  - 2. Take 20 minimum photographs to show existing conditions adjacent to property before starting the Work.
  - 3. Take 20 minimum photographs of existing buildings either on or adjoining property, to accurately record physical conditions at start of construction.
  - 4. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.
- D. Concealed Work Photographs: Before proceeding with installing work that will conceal other work, take photographs sufficient in number, with annotated descriptions, to record nature and location of concealed Work, including, but not limited to, the following:
  - 1. Underground utilities.
  - 2. Underslab services.
  - 3. Piping.
  - 4. Electrical conduit.
  - 5. Wall cavities.
  - 6. Waterproofing and weather-resistant barriers.
- E. Periodic Construction Photographs: Take 10 photographs weekly. Select vantage points to show status of construction and progress since last photographs were taken.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 32 33

# SECTION 01 33 00 - SUBMITTAL PROCEDURES

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Submittal schedule requirements.
  - 2. Administrative and procedural requirements for submittals.

### B. Related Requirements:

- 1. Section 00 70 00 "General Conditions".
- 2. Section 01 29 00 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
- 3. Section 01 31 00 "Project Management and Coordination" for submitting coordination drawings and subcontract list and for requirements for web-based Project software.
- 4. Section 01 32 00 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
- 5. Section 01 32 33 "Photographic Documentation" for submitting preconstruction photographs, periodic construction photographs, and Final Completion construction photographs.
- 6. Section 01 40 00 "Quality Requirements" for submitting test and inspection reports, and schedule of tests and inspections.
- 7. Section 01 77 00 "Closeout Procedures" for submitting closeout submittals and maintenance material submittals.
- 8. Section 01 78 23 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
- 9. Section 01 78 39 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
- 10. Section 01 79 00 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

# 1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

# 1.4 SUBMITTAL SCHEDULE

- A. Submittal Schedule: Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.
  - 1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
  - 2. Initial Submittal Schedule: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
  - 3. Final Submittal Schedule: Submit concurrently with the first complete submittal of Contractor's construction schedule.
    - a. Submit revised submittal schedule as required to reflect changes in current status and timing for submittals.
  - 4. Format: Arrange the following information in a tabular format:
    - a. Scheduled date for first submittal.
    - b. Specification Section number and title.
    - c. Submittal Category: Action; informational.
    - d. Name of subcontractor.
    - e. Description of the Work covered.
    - f. Scheduled date for Architect's final release or approval.
    - g. Activity or event number.

# 1.5 SUBMITTAL FORMATS

- A. Submittal Information: Include the following information in each submittal:
  - 1. Project name.
  - 2. Date.
  - 3. Name of Architect.
  - 4. Name of Contractor.
  - 5. Name of firm or entity that prepared submittal.
  - 6. Names of subcontractor, manufacturer, and supplier.
  - 7. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier and alphanumeric suffix for resubmittals.
  - 8. Category and type of submittal.
  - 9. Submittal purpose and description.
  - 10. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
  - 11. Drawing number and detail references, as appropriate.
  - 12. Indication of full or partial submittal.
  - 13. Location(s) where product is to be installed, as appropriate.
  - 14. Other necessary identification.
  - 15. Remarks.
  - 16. Signature of transmitter.
- B. Options: Identify options requiring selection by Architect.
- C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include

relevant additional information and revisions, other than those requested by Architect on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

- D. Electronic Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.
- E. Submittals Utilizing Web-Based Project Software: Prepare submittals as PDF files or other format indicated by Project management software.

# 1.6 SUBMITTAL PROCEDURES

- A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
  - 1. Web-Based Project Management Software: Prepare submittals in PDF form, and upload to web-based Project management software website. Enter required data in web-based software site to fully identify submittal and notify Architect and Owner of posted date(s).
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
  - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  - 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
  - 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
  - 4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections, so processing will not be delayed because of need to review submittals concurrently for coordination.
    - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
  - 1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
  - 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
  - 3. Resubmittal Review: Allow 15 days for review of each resubmittal.
  - 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
  - 5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 15 working days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.
- D. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
  - 1. Note date and content of previous submittal.

- 2. Note date and content of revision in label or title block, and clearly indicate extent of revision.
- 3. Resubmit submittals until they are marked with approval notation from Architect's stamp.
- E. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- F. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

# 1.7 SUBMITTAL REQUIREMENTS

- A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
  - 1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.
  - 2. Mark each copy of each submittal to show which products and options are applicable.
  - 3. Include the following information, as applicable:
    - a. Manufacturer's catalog cuts.
    - b. Manufacturer's product specifications.
    - c. Standard color charts.
    - d. Statement of compliance with specified referenced standards.
    - e. Testing by recognized testing agency.
    - f. Application of testing agency labels and seals.
    - g. Notation of coordination requirements.
    - h. Availability and delivery time information.
  - 4. For equipment, include the following in addition to the above, as applicable:
    - a. Wiring diagrams that show factory-installed wiring.
    - b. Printed performance curves.
    - c. Operational range diagrams.
    - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
  - 5. Submit Product Data before Shop Drawings, and before or concurrently with Samples.
- B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
  - 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
    - a. Identification of products.
    - b. Schedules.
    - c. Compliance with specified standards.
    - d. Notation of coordination requirements.
    - e. Notation of dimensions established by field measurement.
    - f. Relationship and attachment to adjoining construction clearly indicated.
    - g. Seal and signature of professional engineer if specified.
  - 2. Paper Sheet Size: Except for templates, patterns, and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches.
  - 3. BIM Incorporation: not required.
- C. Samples: Submit Samples for review of type, color, pattern, and texture for a check of these characteristics with other materials.

- 1. Transmit Samples that contain multiple, related components, such as accessories together in one submittal package.
- 2. Identification: Permanently attach label on unexposed side of Samples that includes the following:
  - a. Project name and submittal number.
  - b. Generic description of Sample.
  - c. Product name and name of manufacturer.
  - d. Sample source.
  - e. Number and title of applicable Specification Section.
  - f. Specification paragraph number and generic name of each item.
- 3. Digital Transmittal: Provide PDF transmittal. Include digital image file illustrating Sample characteristics and identification information for record.
- 4. Web-Based Project Management Software: Prepare submittals in PDF form, and upload to web-based Project software website. Enter required data in web-based software site to fully identify submittal.
- 5. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
  - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
  - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
- 6. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units, showing the full range of colors, textures, and patterns available.
  - a. Number of Samples: Submit one full set of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
- 7. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
  - a. Number of Samples: Submit one set of Samples. Architect will retain one Sample set; mark up and retain identical Sample set as a project record Sample.
    - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
- D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
  - 1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
  - 2. Manufacturer and product name, and model number if applicable.
  - 3. Number and name of room or space.
  - 4. Location within room or space.
- E. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

- F. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.
- G. Certificates:
  - 1. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.
  - 2. Installer Certificates: Submit written statements on manufacturer's letterhead, certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
  - 3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead, certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
  - 4. Material Certificates: Submit written statements on manufacturer's letterhead, certifying that material complies with requirements in the Contract Documents.
  - 5. Product Certificates: Submit written statements on manufacturer's letterhead, certifying that product complies with requirements in the Contract Documents.
  - 6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of AWS B2.1/B2.1M on AWS forms. Include names of firms and personnel certified.
- H. Test and Research Reports:
  - 1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for substrate preparation and primers required.
  - 2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
  - 3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
  - 4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
  - 5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
  - 6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
    - a. Name of evaluation organization.
    - b. Date of evaluation.
    - c. Time period when report is in effect.
    - d. Product and manufacturers' names.
    - e. Description of product.
    - f. Test procedures and results.
    - g. Limitations of use.

# 1.8 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
  - 1. If criteria indicated are insufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF file of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
  - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

# 1.9 CONTRACTOR'S REVIEW

- A. Action Submittals and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp. Include name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
  - 1. Architect will not review submittals received from Contractor that do not have Contractor's review and approval.

# 1.10 ARCHITECT'S REVIEW

- A. Action Submittals: Architect will review each submittal, indicate corrections or revisions required, and return.
  - 1. PDF Submittals: Architect will indicate, via markup on each submittal, the appropriate action, as follows:
    - a. Approved Submittal is approved without comment or correction
    - b. Approved as Noted Submittal is approved with comment(s) or correction(s) as noted.
    - c. Revise & Resubmit Submittal is not approved and requires corrections and resubmittal for approval as noted.
    - d. Rejected Submittal is incomplete or similar, is rejected and requires resubmittal for approval.
- B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.

- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Architect will without review submittals received from sources other than Contractor.
- F. Submittals not required by the Contract Documents will be returned by Architect without action.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 33 00

# SECTION 01 35 16 - ALTERATION PROJECT PROCEDURES

### PART 1 - GENERAL

# 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

# 1.2 SUMMARY

A. Section includes special procedures for alteration work.

### 1.3 DEFINITIONS

- A. Alteration Work: This term includes remodeling, renovation, repair, and maintenance work performed within existing spaces or on existing surfaces as part of the Project.
- B. Consolidate: To strengthen loose or deteriorated materials in place.
- C. Design Reference Sample: A sample that represents the Architect's pre-bid selection of work to be matched; it may be existing work or work specially produced for the Project.
- D. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.
- E. Match: To blend with adjacent construction and manifest no apparent difference in material type, species, cut, form, detail, color, grain, texture, or finish; as approved by Architect.
- F. Refinish: To remove existing finishes to base material and apply new finish to match original, or as otherwise indicated.
- G. Repair: To correct damage and defects, retaining existing materials, features, and finishes. This includes patching, piecing-in, splicing, consolidating, or otherwise reinforcing or upgrading materials.
- H. Replace: To remove, duplicate, and reinstall entire item with new material. The original item is the pattern for creating duplicates unless otherwise indicated.
- I. Replicate: To reproduce in exact detail, materials, and finish unless otherwise indicated.
- J. Reproduce: To fabricate a new item, accurate in detail to the original, and from either the same or a similar material as the original, unless otherwise indicated.
- K. Retain: To keep existing items that are not to be removed or dismantled.
- L. Reuse: To retain, protect, and reinstall within the project site.

Μ. Strip: To remove existing finish down to base material unless otherwise indicated.

#### 1.4 COORDINATION

- Α. Alteration Work Sub-schedule: A construction schedule coordinating the sequencing and scheduling of alteration work for entire Project, including each activity to be performed, and based on Contractor's Construction Schedule. Secure time commitments for performing critical construction activities from separate entities responsible for alteration work.
  - 1. Schedule construction operations in sequence required to obtain best Work results. 2.
    - Coordinate sequence of alteration work activities to accommodate the following:
      - Owner's continuing occupancy of portions of existing building. a.
      - Owner's partial occupancy of completed Work. b.
      - C. Other known work in progress.
      - d. Tests and inspections.
  - 3. Detail sequence of alteration work, with start and end dates.
  - Utility Services: Indicate how long utility services will be interrupted. Coordinate shutoff, 4. capping, and continuation of utility services.
  - 5. Use of elevator and stairs.
  - 6. Equipment Data: List gross loaded weight, axle-load distribution, and wheel-base dimension data for mobile and heavy equipment proposed for use in existing structure. Do not use such equipment without certification from Contractor's professional engineer that the structure can support the imposed loadings without damage.
- Pedestrian and Vehicular Circulation: Coordinate alteration work with circulation patterns within Β. Project building(s) and site. Some work is near circulation patterns and adjacent to restricted areas. Circulation patterns cannot be closed off entirely and in places can be only temporarily redirected around small areas of work. Access to restricted areas may not be obstructed. Plan and execute the Work accordingly.

#### 1.5 PROJECT MEETINGS FOR ALTERATION WORK

- Preliminary Conference for Alteration Work: Before starting alteration work, conduct conference Α. at Project site.
  - 1. Attendees: In addition to representatives of Owner and Contractor shall be represented at the meeting.
  - 2. Agenda: Discuss items of significance that could affect progress of alteration work, including review of the following:
    - Alteration Work Sub-schedule: Discuss and finalize; verify availability of materials, а specialists' personnel, equipment, and facilities needed to make progress and avoid delays.
    - Fire-prevention plan. b.
    - Governing regulations. C.
    - d. Areas where existing construction is to remain and the required protection.
    - e. Hauling routes.
    - Sequence of alteration work operations. f.
    - Storage, protection, and accounting for salvaged and specially fabricated items. g.
    - h. Existing conditions, staging, and structural loading limitations of areas where materials are stored.
    - i. Qualifications of personnel assigned to alteration work and assigned duties.
    - j. Requirements for extent and quality of work, tolerances, and required clearances.

- k. Embedded work such as flashings and lintels, special details, collection of waste, protection of occupants and the public, and condition of other construction that affects the Work or will affect the work.
- 3. Reporting: Record conference results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from conference.
- B. Coordination Meetings: Conduct coordination meetings specifically for alteration work at weekly intervals. Coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
  - 1. Attendees: In addition to representatives of Owner, Architect, and Contractor, each specialist, supplier, installer, and other entity concerned with progress or involved in planning, coordination, or performance of alteration work activities shall be represented at these meetings. All participants at conference shall be familiar with Project and authorized to conclude matters relating to alteration work.
  - 2. Agenda: Review and correct or approve minutes of previous coordination meeting. Review other items of significance that could affect progress of alteration work. Include topics for discussion as appropriate to status of Project.
    - a. Alteration Work Sub-schedule: Review progress since last coordination meeting. Determine whether each schedule item is on time, ahead of schedule, or behind schedule. Determine how construction behind schedule will be expedited with retention of quality; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities are completed within the Contract Time.
    - b. Schedule Updating: Revise Contractor's Alteration Work Sub-schedule after each coordination meeting where revisions to schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
    - c. Review present and future needs of each entity present, including review items listed in the "Preliminary Conference for Alteration Work" Paragraph in this article and the following:
      - 1) Interface requirements of alteration work with other Project Work.
      - 2) Status of submittals for alteration work.
      - 3) Access to alteration work locations.
      - 4) Effectiveness of fire-prevention plan.
      - 5) Quality and work standards of alteration work.
      - 6) Change Orders for alteration work.
  - 3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

# 1.6 MATERIALS OWNERSHIP

- A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered or uncovered during the Work, regardless of whether they were previously documented, remain Owner's property.
  - 1. Carefully dismantle and salvage each item or object in a manner to prevent damage and protect it from damage, then promptly deliver it to Owner where directed at Project site.

# 1.7 INFORMATIONAL SUBMITTALS

A. Alteration Work Sub-schedule:

- 1. Submit alteration work sub-schedule within seven days of date established for commencement of alteration work.
- B. Preconstruction Documentation: Show preexisting conditions of adjoining construction and site improvements that are to remain, including finish surfaces, that might be misconstrued as damage caused by Contractor's alteration work operations.
- C. Alteration Work Program: Submit 7 days before work begins.
- D. Fire-Prevention Plan: Submit 7 days before work begins.

# 1.8 QUALITY ASSURANCE

- A. Specialist Qualifications: An experienced firm regularly engaged in specialty work similar in nature, materials, design, and extent to alteration work as specified in each Section and that has completed a minimum of five recent projects with a record of successful in-service performance that demonstrates the firm's qualifications to perform this work.
  - 1. Field Supervisor Qualifications: Full-time supervisors experienced in specialty work similar in nature, material, design, and extent to that indicated for this Project. Supervisors shall be on-site when specialty work begins and during its progress. Supervisors shall not be changed during Project except for causes beyond the control of the specialist firm.
- B. Title X Requirement: Each firm conducting activities that disturb painted surfaces shall be a "Lead-Safe Certified Firm" according to 40 CFR 745, Subpart E, and use only workers that are trained in lead-safe work practices.
- C. Alteration Work Program: Prepare a written plan for alteration work for whole Project, including each phase or process and protection of surrounding materials during operations. Show compliance with indicated methods and procedures specified in this and other Sections. Coordinate this whole-Project alteration work program with specific requirements of programs required in other alteration work Sections.
  - 1. Dust and Noise Control: Include locations of proposed temporary dust- and noise-control partitions and means of egress from occupied areas coordinated with continuing on-site operations and other known work in progress.
  - 2. Debris Hauling: Include plans clearly marked to show debris hauling routes, turning radii, and locations and details of temporary protective barriers.
- D. Fire-Prevention Plan: Prepare a written plan for preventing fires during the Work, including placement of fire extinguishers, fire blankets, rag buckets, and other fire-control devices during each phase or process. Coordinate plan with Owner's fire-protection equipment and requirements. Include fire-watch personnel's training, duties, and authority to enforce fire safety.
- E. Safety and Health Standard: Comply with ANSI/ASSE A10.6.

#### 1.9 STORAGE AND HANDLING OF SALVAGED MATERIALS

- A. Salvaged Materials:
  - 1. Clean loose dirt and debris from salvaged items unless more extensive cleaning is indicated.

- 2. Pack or crate items after cleaning; cushion against damage during handling. Label contents of containers.
- 3. Store items in a secure area until delivery to Owner.
- 4. Transport items to Owner's storage area designated by Owner.
- 5. Protect items from damage during transport and storage.
- B. Salvaged Materials for Reinstallation:
  - 1. Repair and clean items for reuse as indicated.
  - 2. Pack or crate items after cleaning and repairing; cushion against damage during handling. Label contents of containers.
  - 3. Protect items from damage during transport and storage.
  - 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment unless otherwise indicated. Provide connections, supports, and miscellaneous materials to make items functional for use indicated.
- C. Existing Materials to Remain: Protect construction indicated to remain against damage and soiling from construction work. Where permitted by Architect, items may be dismantled and taken to a suitable, protected storage location during construction work and reinstalled in their original locations after alteration and other construction work in the vicinity is complete.
- D. Storage: Catalog and store items within a weathertight enclosure where they are protected from moisture, weather, condensation, and freezing temperatures.
  - 1. Identify each item for reinstallation with a nonpermanent mark to document its original location. Indicate original locations on plans, elevations, sections, or photographs by annotating the identifying marks.
  - 2. Secure stored materials to protect from theft.
  - 3. Control humidity so that it does not exceed 85 percent. Maintain temperatures 5 deg F or more above the dew point.
- E. Storage Space:
  - 1. Owner will arrange for limited on-site location(s) for free storage of salvaged material. This storage space does not include security or climate control for stored material.
  - 2. Arrange for off-site locations for storage and protection of salvaged material that cannot be stored and protected on-site.

# 1.10 FIELD CONDITIONS

- A. Survey of Existing Conditions: Record existing conditions that affect the Work by use of measured drawings.
  - 1. Comply with requirements specified in Section 01 32 33 "Photographic Documentation."
- B. Discrepancies: Notify Architect of discrepancies between existing conditions and Drawings before proceeding with removal and dismantling work.
- C. Size Limitations in Existing Spaces: Materials, products, and equipment used for performing the Work and for transporting debris, materials, and products shall be of sizes that clear surfaces within existing spaces, areas, rooms, and openings, including temporary protection, by 12 inches or more.

- D. Protection Plan: Contractor to provide Owner with protection plan for adjacent features and facilities onsite that are outside of the project scope of this project.
- PART 2 PRODUCTS (Not Used)

# PART 3 - EXECUTION

# 3.1 PROTECTION

- A. Protect persons, motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm resulting from alteration work.
  - 1. Use only proven protection methods, appropriate to each area and surface being protected.
  - 2. Provide temporary barricades, barriers, and directional signage to exclude the public from areas where alteration work is being performed.
  - 3. Erect temporary barriers to form and maintain fire-egress routes.
  - 4. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during alteration work.
  - 5. Contain dust and debris generated by alteration work, and prevent it from reaching the public or adjacent surfaces.
  - 6. Provide shoring, bracing, and supports as necessary. Do not overload structural elements.
  - 7. Protect floors and other surfaces along hauling routes from damage, wear, and staining.
  - 8. Provide supplemental sound-control treatment to isolate demolition work from other areas of the building.
- B. Temporary Protection of Materials to Remain:
  - 1. Protect existing materials with temporary protections and construction. Do not remove existing materials unless otherwise indicated.
  - 2. Do not attach temporary protection to existing surfaces except as indicated as part of the alteration work program.
- C. Comply with each product manufacturer's written instructions for protections and precautions. Protect against adverse effects of products and procedures on people and adjacent materials, components, and vegetation.
- D. Utility and Communications Services:
  - 1. Notify Owner, Architect, authorities having jurisdiction, and entities owning or controlling wires, conduits, pipes, and other services affected by alteration work before commencing operations.
  - 2. Disconnect and cap pipes and services as required by authorities having jurisdiction, as required for alteration work.
  - 3. Maintain existing services unless otherwise indicated; keep in service, and protect against damage during operations. Provide temporary services during interruptions to existing utilities.
- E. Existing Drains: Prior to the start of work in an area, test drainage system to ensure that it is functioning properly. Notify Architect immediately of inadequate drainage or blockage. Do not begin work in an area until the drainage system is functioning properly.

- 1. Prevent solids such as adhesive or mortar residue or other debris from entering the drainage system. Clean out drains and drain lines that become sluggish or blocked by sand or other materials resulting from alteration work.
- 2. Protect drains from pollutants. Block drains or filter out sediments, allowing only clean water to pass.
- F. Existing Roofing: Prior to the start of work in an area, install roofing protection.

# 3.2 PROTECTION FROM FIRE

- A. General: Follow fire-prevention plan and the following:
  - 1. Comply with NFPA 241 requirements unless otherwise indicated. Perform duties titled "Owner's Responsibility for Fire Protection."
  - 2. Remove and keep area free of combustibles, including rubbish, paper, waste, and chemicals, unless necessary for the immediate work.
    - a. If combustible material cannot be removed, provide fire blankets to cover such materials.
- B. Heat-Generating Equipment and Combustible Materials: Comply with the following procedures while performing work with heat-generating equipment or combustible materials, including welding, torch-cutting, soldering, brazing, removing paint with heat, or other operations where open flames or implements using high heat or combustible solvents and chemicals are anticipated:
  - 1. Obtain Owner's approval for operations involving use of open-flame or welding or other high-heat equipment. Notify Owner at least 72 hours before each occurrence, indicating location of such work.
  - 2. As far as practicable, restrict heat-generating equipment to shop areas or outside the building.
  - 3. Do not perform work with heat-generating equipment in or near rooms or in areas where flammable liquids or explosive vapors are present or thought to be present. Use a combustible gas indicator test to ensure that the area is safe.
  - 4. Use fireproof baffles to prevent flames, sparks, hot gases, or other high-temperature material from reaching surrounding combustible material.
  - 5. Prevent the spread of sparks and particles of hot metal through open windows, doors, holes, and cracks in floors, walls, ceilings, roofs, and other openings.
  - 6. Fire Watch: Before working with heat-generating equipment or combustible materials, station personnel to serve as a fire watch at each location where such work is performed. Fire-watch personnel shall have the authority to enforce fire safety. Station fire watch according to NFPA 51B, NFPA 241, and as follows:
    - a. Train each fire watch in the proper operation of fire-control equipment and alarms.
    - b. Prohibit fire-watch personnel from other work that would be a distraction from firewatch duties.
    - c. Cease work with heat-generating equipment whenever fire-watch personnel are not present.
    - d. Have fire-watch personnel perform final fire-safety inspection each day beginning no sooner than 30 minutes after conclusion of work to detect hidden or smoldering fires and to ensure that proper fire prevention is maintained.
    - e. Maintain fire-watch personnel at Project site until 60 minutes after conclusion of daily work.
- C. Fire-Control Devices: Provide and maintain fire extinguishers, fire blankets, and rag buckets for disposal of rags with combustible liquids. Maintain each as suitable for the type of fire risk in each

work area. Ensure that nearby personnel and the fire-watch personnel are trained in fireextinguisher and blanket use.

- D. Sprinklers: Where sprinkler protection exists and is functional, maintain it without interruption while operations are being performed. If operations are performed close to sprinklers, shield them temporarily with guards.
  - 1. Remove temporary guards at the end of work shifts, whenever operations are paused, and when nearby work is complete.

# 3.3 PROTECTION DURING APPLICATION OF CHEMICALS

- A. Protect motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm or spillage resulting from applications of chemicals and adhesives.
- B. Cover adjacent surfaces with protective materials that are proven to resist chemicals selected for Project unless chemicals being used will not damage adjacent surfaces as indicated in alteration work program. Use covering materials and masking agents that are waterproof and UV resistant and that will not stain or leave residue on surfaces to which they are applied. Apply protective materials according to manufacturer's written instructions. Do not apply liquid masking agents or adhesives to painted or porous surfaces. When no longer needed, promptly remove protective materials.
- C. Do not apply chemicals during winds of sufficient force to spread them to unprotected surfaces.
- D. Neutralize alkaline and acid wastes and legally dispose of off Owner's property.
- E. Collect and dispose of runoff from chemical operations by legal means and in a manner that prevents soil contamination, soil erosion, undermining of paving and foundations, damage to landscaping, or water penetration into building interior.

# 3.4 GENERAL ALTERATION WORK

- A. Have specialty work performed only by qualified specialists.
- B. Ensure that supervisory personnel are present when work begins and during its progress.
- C. Record existing work before each procedure (preconstruction), and record progress during the work. Use digital preconstruction documentation photographs. Comply with requirements in Section 01 32 33 "Photographic Documentation."
- D. Perform surveys of Project site as the Work progresses to detect hazards resulting from alterations.
- E. Notify Architect of visible changes in the integrity of material or components whether from environmental causes including biological attack, UV degradation, freezing, or thawing or from structural defects including cracks, movement, or distortion.
  - 1. Do not proceed with the work in question until directed by Architect.

END OF SECTION 01 35 16
# SECTION 01 40 00 - QUALITY REQUIREMENTS

### PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
  - 1. Specific quality-assurance and quality-control requirements for individual work results are specified in their respective Specification Sections. Requirements in individual Sections may also cover production of standard products.
  - 2. Specified tests, inspections, and related actions do not limit Contractor's other qualityassurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
  - 3. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, Commissioning Authority, or authorities having jurisdiction are not limited by provisions of this Section.

## 1.3 DEFINITIONS

- A. Experienced: When used with an entity or individual, "experienced," unless otherwise further described, means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- B. Field Quality-Control Tests and Inspections: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, subcontractor, or sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.
  - 1. Use of trade-specific terminology in referring to a Work result does not require that certain construction activities specified apply exclusively to specific trade(s).
- D. Mockups: Full-size physical assemblies that are constructed either as freestanding temporary built elements or as part of permanent construction. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not

Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

- 1. In-Place Mockups: Mockups constructed on-site in their actual final location as part of permanent construction.
- E. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria. Unless otherwise indicated, copies of reports of tests or inspections performed for other than the Project do not meet this definition.
- F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- G. Source Quality-Control Tests and Inspections: Tests and inspections that are performed at the source (e.g., plant, mill, factory, or shop).
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. The term "testing laboratory" shall have the same meaning as the term "testing agency."
- I. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work, to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- J. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work, to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect.
- K. A. When cited, the WSDOT Standard Specifications 2018 edition, and related modifications and supplements in the Amendments to the Standard Specifications shall apply to the Work.
- L. Incorporated by reference are:
  - 1. Manual on Uniform Traffic Control Devices for Streets and Highways, currently adopted edition with Washington State amendments, if any.
  - 2. WSDOT Standard Plans for Road, Bridge and Municipal Construction, WSDOT/APWA, current edition.
  - 3. City of Kirkland Standard Details.

## 1.4 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
  - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Statement: Submit a statement signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

# 1.5 CONFLICTING REQUIREMENTS

- A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements is specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, inform the Architect regarding the conflict and obtain clarification prior to proceeding with the Work. Refer conflicting requirements that are different, but apparently equal, to Architect for clarification before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

# 1.6 CONTRACTOR'S QUALITY-CONTROL PLAN

- A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice to Proceed and not less than 5 days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities and to coordinate Owner's quality-assurance and quality-control activities. Coordinate with Contractor's Construction Schedule.
- B. Quality-Control Personnel Qualifications: Engage qualified personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
  - 1. Project quality-control manager may also serve as Project superintendent.
- C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
  - 1. Contractor-performed tests and inspections, including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections. Distinguish source quality-control tests and inspections from field quality-control tests and inspections.
  - 2. Special inspections required by authorities having jurisdiction and indicated on the Statement of Special Inspections.
  - 3. Owner-performed tests and inspections indicated in the Contract Documents, including tests and inspections indicated to be performed by Commissioning Authority.
- E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and

inspection specified. Indicate types of corrective actions to be required to bring the Work into compliance with standards of workmanship established by Contract requirements and approved mockups.

F. Monitoring and Documentation: Maintain testing and inspection reports, including log of approved and rejected results. Include Work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming Work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

# 1.7 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
  - 1. Date of issue.
  - 2. Project title and number.
  - 3. Name, address, telephone number, and email address of testing agency.
  - 4. Dates and locations of samples and tests or inspections.
  - 5. Names of individuals making tests and inspections.
  - 6. Description of the Work and test and inspection method.
  - 7. Identification of product and Specification Section.
  - 8. Complete test or inspection data.
  - 9. Test and inspection results and an interpretation of test results.
  - 10. Record of temperature and weather conditions at time of sample-taking and testing and inspection.
  - 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
  - 12. Name and signature of laboratory inspector.
  - 13. Recommendations on retesting and reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
  - 1. Name, address, telephone number, and email address of technical representative making report.
  - 2. Statement on condition of substrates and their acceptability for installation of product.
  - 3. Statement that products at Project site comply with requirements.
  - 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
  - 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  - 6. Statement of whether conditions, products, and installation will affect warranty.
  - 7. Other required items indicated in individual Specification Sections.
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
  - 1. Name, address, telephone number, and email address of factory-authorized service representative making report.
  - 2. Statement that equipment complies with requirements.
  - 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.

- 4. Statement of whether conditions, products, and installation will affect warranty.
- 5. Other required items indicated in individual Specification Sections.

### 1.8 QUALITY ASSURANCE

- A. Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that is similar in material, design, and extent to those indicated for this Project.
- F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged in the activities indicated.
  - 1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Testing and Inspecting Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented in accordance with ASTM E329, and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
- H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect, demonstrate, repair, and perform service on installations of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following Contractor's responsibilities, including the following:

- 1. Provide test specimens representative of proposed products and construction.
- 2. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
- 3. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
- 4. Build site-assembled test assemblies and mockups, using installers who will perform same tasks for Project.
- 5. Build laboratory mockups at testing facility, using personnel, products, and methods of construction indicated for the completed Work.
- 6. When testing is complete, remove test specimens and test assemblies; do not reuse products on Project.
- 7. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect with copy to Contractor. Interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from the Contract Documents.
- K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
  - 1. Build mockups of size indicated.
  - 2. Build mockups in location indicated or, if not indicated, as directed by Architect.
  - 3. Notify Architect seven days in advance of dates and times when mockups will be constructed.
  - 4. Employ supervisory personnel who will oversee mockup construction. Employ workers who will be employed to perform same tasks during the construction at Project.
  - 5. Demonstrate the proposed range of aesthetic effects and workmanship.
  - 6. Obtain Architect's approval of mockups before starting corresponding Work, fabrication, or construction.
    - a. Allow seven days for initial review and each re-review of each mockup.
  - 7. Promptly correct unsatisfactory conditions noted by Architect's preliminary review, to the satisfaction of the Architect, before completion of final mockup.
  - 8. Approval of mockups by the Architect does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
  - 9. Demolish and remove mockups when directed unless otherwise indicated.
- L. Integrated Exterior Mockups: Construct integrated exterior mockup. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials. Comply with requirements in "Mockups" Paragraph.
  - 1. Coordinate construction of the mockup to allow observation of air barrier installation, flashings, air barrier integration with fenestration systems, and other portions of the building air/moisture barrier and drainage assemblies, prior to installation of veneer, cladding elements, and other components that will obscure the work.

# 1.9 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

- 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
- 2. Costs for retesting and reinspecting construction that replaces or is necessitated by Work that failed to comply with the Contract Documents will be charged to Contractor.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.
  - 1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
  - 2. Engage a qualified testing agency to perform quality-control services.
    - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
  - 3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.
  - 4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
  - 5. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
  - 6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- D. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
  - 1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
  - 2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
  - 3. Conduct and interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from requirements.
  - 4. Submit a certified written report, in duplicate, of each test, inspection, and similar qualitycontrol service through Contractor.
  - 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
  - 6. Do not perform duties of Contractor.
- E. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 33 00 "Submittal Procedures."
- F. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

- G. Contractor's Associated Requirements and Services: Cooperate with agencies and representatives performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
  - 1. Access to the Work.
  - 2. Incidental labor and facilities necessary to facilitate tests and inspections.
  - 3. Adequate quantities of representative samples of materials that require testing and inspection. Assist agency in obtaining samples.
  - 4. Facilities for storage and field curing of test samples.
  - 5. Delivery of samples to testing agencies.
  - 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
  - 7. Security and protection for samples and for testing and inspection equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.
  - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar qualitycontrol services required by the Contract Documents. Coordinate and submit concurrently with Contractor's Construction Schedule. Update and submit with each Application for Payment.
  - 1. Schedule Contents: Include tests, inspections, and quality-control services, including Contractor- and Owner-retained services, commissioning activities, and other Project-required services paid for by other entities.
  - 2. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

# 1.10 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Owner will engage a qualified special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:
  - 1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures, and reviewing the completeness and adequacy of those procedures to perform the Work.
  - 2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
  - 3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
  - 4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
  - 5. Interpreting tests and inspections, and stating in each report whether tested and inspected Work complies with or deviates from the Contract Documents.
  - 6. Retesting and reinspecting corrected Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

# 3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
  - 1. Date test or inspection was conducted.
  - 2. Description of the Work tested or inspected.
  - 3. Date test or inspection results were transmitted to Architect.
  - 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.
  - 1. Submit log at Project closeout as part of Project Record Documents.

## 3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspection, sample-taking, and similar services, repair damaged construction and restore substrates and finishes.
  - Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 73 00 "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 40 00

SECTION 01 42 00 - REFERENCES

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

# 1.2 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.
- J. Substantial Completion of Site Work and Work in the public right-of-way: The day the Engineer or Architect determines the Contracting Agency Owner has full and unrestricted use and benefit of the facilities, both from the operational and safety standpoint, any remaining traffic disruptions will be rare and brief, and only minor incidental work, replacement of temporary substitute facilities, plant establishment periods, or correction or repair remains for the Physical Completion of the total Contract.

### 1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
  - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

### 1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."
- B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Abbreviations and acronyms not included in this list shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States." The information in this list is subject to change and is believed to be accurate as of the date of the Contract Documents.
  - 1. AABC Associated Air Balance Council; www.aabc.com.
  - 2. AAMA American Architectural Manufacturers Association; www.aamanet.org.
  - 3. AAPFCO Association of American Plant Food Control Officials; www.aapfco.org.
  - 4. AASHTO American Association of State Highway and Transportation Officials; www.transportation.org.
  - 5. AATCC American Association of Textile Chemists and Colorists; www.aatcc.org.
  - 6. ABMA American Bearing Manufacturers Association; www.americanbearings.org.
  - 7. ABMA American Boiler Manufacturers Association; www.abma.com.
  - 8. ACI American Concrete Institute; (Formerly: ACI International); www.concrete.org.
  - 9. ACPA American Concrete Pipe Association; www.concrete-pipe.org.
  - 10. AEIC Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
  - 11. AF&PA American Forest & Paper Association; www.afandpa.org.
  - 12. AGA American Gas Association; www.aga.org.
  - 13. AHAM Association of Home Appliance Manufacturers; www.aham.org.
  - 14. AHRI Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
  - 15. AI Asphalt Institute; www.asphaltinstitute.org.
  - 16. AIA American Institute of Architects (The); www.aia.org.
  - 17. AISC American Institute of Steel Construction; www.aisc.org.
  - 18. AISI American Iron and Steel Institute; www.steel.org.
  - 19. AITC American Institute of Timber Construction; www.aitc-glulam.org.
  - 20. AMCA Air Movement and Control Association International, Inc.; www.amca.org.
  - 21. ANSI American National Standards Institute; www.ansi.org.

- 22. APWA: American Public Works Association
- 23. AOSA Association of Official Seed Analysts, Inc.; www.aosaseed.com.
- 24. APA APA The Engineered Wood Association; www.apawood.org.
- 25. APA Architectural Precast Association; www.archprecast.org.
- 26. API American Petroleum Institute; www.api.org.
- 27. ARI Air-Conditioning & Refrigeration Institute; (See AHRI).
- 28. ARI American Refrigeration Institute; (See AHRI).
- 29. ARMA Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
- 30. ASCE American Society of Civil Engineers; www.asce.org.
- 31. ASCE/SEI American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
- 32. ASHRAE American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
- 33. ASME ASME International; (American Society of Mechanical Engineers); www.asme.org.
- 34. ASSE American Society of Sanitary Engineering; www.asse-plumbing.org.
- 35. ASSP American Society of Safety Professionals (The); www.assp.org.
- 36. ASTM ASTM International; www.astm.org.
- 37. ATIS Alliance for Telecommunications Industry Solutions; www.atis.org.
- 38. AVIXA Audiovisual and Integrated Experience Association; (Formerly: Infocomm International); www.soundandcommunications.com.
- 39. AWEA American Wind Energy Association; www.awea.org.
- 40. AWI Architectural Woodwork Institute; www.awinet.org.
- 41. AWMAC Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
- 42. AWPA American Wood Protection Association; www.awpa.com.
- 43. AWS American Welding Society; www.aws.org.
- 44. AWWA American Water Works Association; www.awwa.org.
- 45. BHMA Builders Hardware Manufacturers Association; www.buildershardware.com.
- 46. BIA Brick Industry Association (The); www.gobrick.com.
- 47. BICSI BICSI, Inc.; www.bicsi.org.
- 48. BIFMA BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.org.
- 49. BISSC Baking Industry Sanitation Standards Committee; www.bissc.org.
- 50. BMP Best Management Practice
- 51. BWF Badminton World Federation; (Formerly: International Badminton Federation); www.bissc.org.
- 52. CDA Copper Development Association; www.copper.org.
- 53. CE Conformite Europeenne; http://ec.europa.eu/growth/single-market/ce-marking/.
- 54. CEA Canadian Electricity Association; www.electricity.ca.
- 55. CFFA Chemical Fabrics and Film Association, Inc.; www.chemicalfabricsandfilm.com.
- 56. CFSEI Cold-Formed Steel Engineers Institute; www.cfsei.org.
- 57. CGA Compressed Gas Association; www.cganet.com.
- 58. CIMA Cellulose Insulation Manufacturers Association; www.cellulose.org.
- 59. CISCA Ceilings & Interior Systems Construction Association; www.cisca.org.
- 60. CISPI Cast Iron Soil Pipe Institute; www.cispi.org.
- 61. CLFMI Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
- 62. CoK: City of Kirkland
- 63. CPA Composite Panel Association; www.compositepanel.org.
- 64. CRI Carpet and Rug Institute (The); www.carpet-rug.org.
- 65. CRRC Cool Roof Rating Council; www.coolroofs.org.
- 66. CRSI Concrete Reinforcing Steel Institute; www.crsi.org.
- 67. CSA CSA Group; www.csa-group.org.
- 68. CSI Construction Specifications Institute (The); www.csiresources.org.
- 69. CSSB Cedar Shake & Shingle Bureau; www.cedarbureau.org.
- 70. CTA Consumer Technology Association; www.cta.tech.

- 71. CTI Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.coolingtechnology.org .
- 72. CWC Composite Wood Council; (See CPA).
- 73. DASMA Door and Access Systems Manufacturers Association; www.dasma.com.
- 74. DHA Decorative Hardwoods Association; (Formerly: Hardwood Plywood & Veneer Association); www.decorativehardwoods.org.
- 75. DHI Door and Hardware Institute; www.dhi.org.
- 76. DIPRA: Ductile Iron Pipe Research Association
- 77. ECA Electronic Components Association; (See ECIA).
- 78. ECAMA Electronic Components Assemblies & Materials Association; (See ECIA).
- 79. ECIA Electronic Components Industry Association; www.eciaonline.org.
- 80. ECY: Washington State Department of Ecology.
- 81. EIA Electronic Industries Alliance; (See TIA).
- 82. EIMA EIFS Industry Members Association; www.eima.com.
- 83. EJMA Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
- 84. EOS/ESD Association; (Electrostatic Discharge Association); www.esda.org.
- 85. ESTA Entertainment Services and Technology Association; (See PLASA).
- 86. ETL Intertek (See Intertek); www.intertek.com.
- 87. EVO Efficiency Valuation Organization; www.evo-world.org.
- 88. FCI Fluid Controls Institute; www.fluidcontrolsinstitute.org.
- 89. FHWA: Federal Highway Administration
- 90. FIBA Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
- 91. FIVB Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
- 92. FM Approvals FM Approvals LLC; www.fmglobal.com.
- 93. FM Global FM Global; (Formerly: FMG FM Global); www.fmglobal.com.
- 94. FOP: Field Operating Procedure
- 95. FRSA Florida Roofing, Sheet Metal Contractors Association, Inc.; www.floridaroof.com.
- 96. FSA Fluid Sealing Association; www.fluidsealing.com.
- 97. FSC Forest Stewardship Council U.S.; www.fscus.org.
- 98. GA Gypsum Association; www.gypsum.org.
- 99. GANA Glass Association of North America; (See NGA).
- 100. GS Green Seal; www.greenseal.org.
- 101. HI Hydraulic Institute; www.pumps.org.
- 102. HI/GAMA Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
- 103. HMMA Hollow Metal Manufacturers Association; (See NAAMM).
- 104. HPVA Hardwood Plywood & Veneer Association; (See DHA).
- 105. HPW H. P. White Laboratory, Inc.; www.hpwhite.com.
- 106. IAPSC International Association of Professional Security Consultants; www.iapsc.org.
- 107. IAS International Accreditation Service; www.iasonline.org.
- 108. ICBO International Conference of Building Officials; (See ICC).
- 109. ICC International Code Council; www.iccsafe.org.
- 110. ICEA Insulated Cable Engineers Association, Inc.; www.icea.net.
- 111. ICPA International Cast Polymer Alliance; www.icpa-hq.org.
- 112. ICRI International Concrete Repair Institute, Inc.; www.icri.org.
- 113. IEC International Electrotechnical Commission; www.iec.ch.
- 114. IEEE Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
- 115. IES Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
- 116. IESNA Illuminating Engineering Society of North America; (See IES).
- 117. IEST Institute of Environmental Sciences and Technology; www.iest.org.
- 118. IGMA Insulating Glass Manufacturers Alliance; www.igmaonline.org.
- 119. IGSHPA International Ground Source Heat Pump Association; www.igshpa.org..
- 120. II Infocomm International; (See AVIXA).

- 121. ILI Indiana Limestone Institute of America, Inc.; www.iliai.com.
- 122. Intertek Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
- 123. ISA International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
- 124. ISAS Instrumentation, Systems, and Automation Society (The); (See ISA).
- 125. ISFA International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
- 126. ISO International Organization for Standardization; www.iso.org.
- 127. ISSFA International Solid Surface Fabricators Association; (See ISFA).
- 128. ITU International Telecommunication Union; www.itu.int/home.
- 129. KCMA Kitchen Cabinet Manufacturers Association; www.kcma.org.
- 130. LMA Laminating Materials Association; (See CPA).
- 131. LPI Lightning Protection Institute; www.lightning.org.
- 132. MBMA Metal Building Manufacturers Association; www.mbma.com.
- 133. MCA Metal Construction Association; www.metalconstruction.org.
- 134. MFMA Maple Flooring Manufacturers Association, Inc.; www.maplefloor.org.
- 135. MFMA Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
- 136. MHIA Material Handling Industry of America; www.mhia.org.
- 137. MIA Marble Institute of America; (See NSI).
- 138. MMPA Moulding & Millwork Producers Association; www.wmmpa.com.
- 139. MPI Master Painters Institute; www.paintinfo.com.
- 140. MSS Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; www.mss-hq.org.
- 141. MUTCD: Manual on Uniform Traffic Control Devices
- 142. NAAMM National Association of Architectural Metal Manufacturers; www.naamm.org.
- 143. NACE NACE International; (National Association of Corrosion Engineers International); www.nace.org.
- 144. NADCA National Air Duct Cleaners Association; www.nadca.com.
- 145. NAIMA North American Insulation Manufacturers Association; www.naima.org.
- 146. NALP National Association of Landscape Professionals; www.landscapeprofessionals.org.
- 147. NBGQA National Building Granite Quarries Association, Inc.; www.nbgqa.com.
- 148. NBI New Buildings Institute; www.newbuildings.org.
- 149. NCAA National Collegiate Athletic Association (The); www.ncaa.org.
- 150. NCMA National Concrete Masonry Association; www.ncma.org.
- 151. NEBB National Environmental Balancing Bureau; www.nebb.org.
- 152. NECA National Electrical Contractors Association; www.necanet.org.
- 153. NeLMA Northeastern Lumber Manufacturers Association; www.nelma.org.
- 154. NEMA National Electrical Manufacturers Association; www.nema.org.
- 155. NETA InterNational Electrical Testing Association; www.netaworld.org.
- 156. NFHS National Federation of State High School Associations; www.nfhs.org.
- 157. NFPA National Fire Protection Association; www.nfpa.org.
- 158. NFPA NFPA International; (See NFPA).
- 159. NFRC National Fenestration Rating Council; www.nfrc.org.
- 160. NGA National Glass Association (The); (Formerly: Glass Association of North America); www.glass.org.
- 161. NHLA National Hardwood Lumber Association; www.nhla.com.
- 162. NLGA National Lumber Grades Authority; www.nlga.org.
- 163. NOFMA National Oak Flooring Manufacturers Association; (See NWFA).
- 164. NOMMA National Ornamental & Miscellaneous Metals Association; www.nomma.org.
- 165. NRCA National Roofing Contractors Association; www.nrca.net.
- 166. NRMCA National Ready Mixed Concrete Association; www.nrmca.org.
- 167. NSF NSF International; www.nsf.org.

- 168. NSI National Stone Institute; (Formerly: Marble Institute of America); www.naturalstoneinstitute.org.
- 169. NSPE National Society of Professional Engineers; www.nspe.org.
- 170. NSSGA National Stone, Sand & Gravel Association; www.nssga.org.
- 171. NTMA National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
- 172. NWFA National Wood Flooring Association; www.nwfa.org.
- 173. PCI Precast/Prestressed Concrete Institute; www.pci.org.
- 174. PDI Plumbing & Drainage Institute; www.pdionline.org.
- 175. PLASA PLASA; (Formerly: ESTA Entertainment Services and Technology Association); www.plasa.org.
- 176. PPI: Plastic Pipe Institute
- 177. QPL: Qualified Products List.
- 178. RAM: Request for Approval of Material.
- 179. RCSC Research Council on Structural Connections; www.boltcouncil.org.
- 180. RFCI Resilient Floor Covering Institute; www.rfci.com.
- 181. RIS Redwood Inspection Service; www.redwoodinspection.com.
- 182. SAE SAE International; www.sae.org.
- 183. SCTE Society of Cable Telecommunications Engineers; www.scte.org.
- 184. SDI Steel Deck Institute; www.sdi.org.
- 185. SDI Steel Door Institute; www.steeldoor.org.
- 186. SEFA Scientific Equipment and Furniture Association (The); www.sefalabs.com.
- 187. SEI/ASCE Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
- 188. SIA Security Industry Association; www.siaonline.org.
- 189. SJI Steel Joist Institute; www.steeljoist.org.
- 190. SMA Screen Manufacturers Association; www.smainfo.org.
- 191. SMACNA Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
- 192. SMPTE Society of Motion Picture and Television Engineers; www.smpte.org.
- 193. SPFA Spray Polyurethane Foam Alliance; www.sprayfoam.org.
- 194. SPIB Southern Pine Inspection Bureau; www.spib.org.
- 195. SPRI Single Ply Roofing Industry; www.spri.org.
- 196. SRCC Solar Rating & Certification Corporation; www.solar-rating.org.
- 197. SSINA Specialty Steel Industry of North America; www.ssina.com.
- 198. SSPC SSPC: The Society for Protective Coatings; www.sspc.org.
- 199. STI Steel Tank Institute; www.steeltank.com.
- 200. SWI Steel Window Institute; www.steelwindows.com.
- 201. SWPA Submersible Wastewater Pump Association; www.swpa.org.
- 202. TCA Tilt-Up Concrete Association; www.tilt-up.org.
- 203. TCNA Tile Council of North America, Inc.; www.tileusa.com.
- 204. TEMA Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.
- 205. TIA Telecommunications Industry Association (The); (Formerly: TIA/EIA Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
- 206. TIA/EIA Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
- 207. TMS The Masonry Society; www.masonrysociety.org.
- 208. TPI Truss Plate Institute; www.tpinst.org.
- 209. TPI Turfgrass Producers International; www.turfgrasssod.org.
- 210. TRI Tile Roofing Institute; www.tileroofing.org.
- 211. UL Underwriters Laboratories Inc.; www.ul.com.
- 212. UNI Uni-Bell PVC Pipe Association; www.uni-bell.org.
- 213. USAV USA Volleyball; www.usavolleyball.org.
- 214. USGBC U.S. Green Building Council; www.usgbc.org.
- 215. USITT United States Institute for Theatre Technology, Inc.; www.usitt.org.

- 216. WA Wallcoverings Association; www.wallcoverings.org.
- 217. WASTEC Waste Equipment Technology Association; www.wastec.org.
- 218. WCLIB West Coast Lumber Inspection Bureau; www.wclib.org.
- 219. WCMA Window Covering Manufacturers Association; www.wcmanet.org.
- 220. WDMA Window & Door Manufacturers Association; www.wdma.com.
- 221. WI Woodwork Institute; www.wicnet.org.
- 222. WSDOT: Washington State Department of Transportation
- 223. WSRCA Western States Roofing Contractors Association; www.wsrca.com.
- 224. WWPA Western Wood Products Association; www.wwpa.org.
- C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.
  - 1. DIN Deutsches Institut fur Normung e.V.; www.din.de.
  - 2. IAPMO International Association of Plumbing and Mechanical Officials; www.iapmo.org.
  - 3. ICC International Code Council; www.iccsafe.org.
  - 4. ICC-ES ICC Evaluation Service, LLC; www.icc-es.org.
- D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.
  - 1. COE Army Corps of Engineers; www.usace.army.mil.
  - 2. CPSC Consumer Product Safety Commission; www.cpsc.gov.
  - 3. DOC Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
  - 4. DOD Department of Defense; www.quicksearch.dla.mil.
  - 5. DOE Department of Energy; www.energy.gov.
  - 6. EPA Environmental Protection Agency; www.epa.gov.
  - 7. FAA Federal Aviation Administration; www.faa.gov.
  - 8. FG Federal Government Publications; www.gpo.gov/fdsys.
  - 9. GSA General Services Administration; www.gsa.gov.
  - 10. HUD Department of Housing and Urban Development; www.hud.gov.
  - 11. LBL Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; www.eetd.lbl.gov.
  - 12. OSHA Occupational Safety & Health Administration; www.osha.gov.
  - 13. SD Department of State; www.state.gov.
  - 14. TRB Transportation Research Board; National Cooperative Highway Research Program; The National Academies; www.trb.org.
  - 15. USDA Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
  - 16. USDA Department of Agriculture; Rural Utilities Service; www.usda.gov.
  - 17. USDOJ Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
  - 18. USP U.S. Pharmacopeial Convention; www.usp.org.
  - 19. USPS United States Postal Service; www.usps.com.
- E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
  - 1. CFR Code of Federal Regulations; Available from Government Printing Office; www.govinfo.gov.

- 2. DOD Department of Defense; Military Specifications and Standards; Available from DLA Document Services; www.quicksearch.dla.mil.
- 3. DSCC Defense Supply Center Columbus; (See FS).
- 4. FED-STD Federal Standard; (See FS).
- 5. FS Federal Specification; Ávailable from DLA Document Services; www.quicksearch.dla.mil.
  - a. Available from Defense Standardization Program; www.dsp.dla.mil.
  - b. Available from General Services Administration; www.gsa.gov.
  - c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org.
- 6. MILSPEC Military Specification and Standards; (See DOD).
- 7. USAB United States Access Board; www.access-board.gov.
- 8. USATBCB U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).
- F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

## 1.5 SUPPLEMENTS TO WSDOT STANDARD SPECIFICATIONS 1-01.3 DEFINITIONS

- A. All references in the Standard Specifications, Amendments, to the terms "Department of Transportation", "Washington State Transportation Commission", "Commission", "Secretary of Transportation", "Secretary", "Headquarters", and "State Treasurer" shall be revised to read "Owner".
- B. All references to the terms "State" or "state" shall be revised to read "Owner" unless the reference is to an administrative agency of the State of Washington, a State statute or regulation, or the context reasonably indicates otherwise.
- C. All references to "State Materials Laboratory" shall be revised to read "Owner designated location".
- D. All references to "final contract voucher certification" shall be interpreted to mean the Owner form(s) by which final payment is authorized, and final completion and acceptance granted.
- E. Business Day: A business day is any day from Monday through Friday except holidays as listed in WSDOT Standard Specifications Section 1-08.5.
- F. Contract Documents: See definition for "Contract."
- G. Traffic: Both vehicular and non-vehicular traffic, such as pedestrians, bicyclists, wheelchairs, and equestrian traffic.

KIRKLAND CITY HALL – VIRTUAL SERVICE CENTER CONTRACT DOCUMENTS

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 42 00

# SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

### PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Section also includes:
  - 1. Temporary Utilities:
    - a. Water.
    - b. Power.
  - 2. Construction Facilities:
    - a. Pedestrian access.
    - b. Vehicular access.
    - c. Parking.
    - d. Staging, storage, stockpiling.
    - e. Traffic regulation.
    - f. Progress cleaning and waste removal.
  - 3. Temporary Controls:
    - a. Barriers.
    - b. Enclosures and fencing.
    - c. Security.
    - d. Water control.
    - e. Erosion and sediment control.
    - f. Dust control.
  - 4. Removal of utilities, facilities, and controls.
- C. Related Requirements:
  - 1. Section 01 10 00 "Summary" for work restrictions and limitations on utility interruptions.
  - 2. WSDOT Standard Specifications Section 1-07.7 Load Limits
  - 3. WSDOT Standard Specifications Section 1-07.23 Public Convenience and Safety

# 1.3 USE CHARGES

- A. Installation, removal, and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.
- B. Sewer Service: Owner will pay sewer-service use charges for sewer usage by all entities for construction operations.

- C. Water Service: Owner will pay water-service use charges for water used by all entities for construction operations.
- D. Electric Power Service: Owner will pay electric-power-service use charges for electricity used by all entities for construction operations.
- E. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use with a hydrant permit; water must be metered. No fees will be charged for the site water use or the hydrant permit, but Contractor must make application for the permit. Provide connections and extensions of services and metering as required for construction operations.
- F. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

### 1.4 INFORMATIONAL SUBMITTALS

- A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.
- B. Implementation and Termination Schedule: Within 15 days of date established for commencement of the Work, submit schedule indicating implementation and termination dates of each temporary utility.
- C. Project Identification and Temporary Signs: Show fabrication and installation details, including plans, elevations, details, layouts, typestyles, graphic elements, and message content.
- D. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
- E. Moisture- and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold. Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.
  - 1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and requirements for replacing water-damaged Work.
  - 2. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
  - 3. Indicate methods to be used to avoid trapping water in finished work.
- F. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dustand HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Include the following:
  - 1. Locations of dust-control partitions at each phase of work.
  - 2. HVAC system isolation schematic drawing.
  - 3. Location of proposed air-filtration system discharge.
  - 4. Waste-handling procedures.
  - 5. Other dust-control measures.

- G. Noise and Vibration Control Plan: Identify construction activities that may impact the occupancy and use of existing spaces within the building or adjacent existing buildings, whether occupied by others, or occupied by the Owner. Include the following:
  - 1. Methods used to meet the goals and requirements of the Owner.
  - 2. Concrete cutting method(s) to be used.
  - 3. Location of construction devices on the site.
  - 4. Show compliance with the use and maintenance of quieted construction devices for the duration of the Project.
  - 5. Indicate activities that may disturb building occupants and that are planned to be performed during non-standard working hours as coordinated with the Owner.
  - 6. Indicate locations of sensitive areas or other areas requiring special attention as identified by Owner. Indicate means for complying with Owner's requirements.

## 1.5 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.
- C. Accessible Temporary Egress: Comply with applicable provisions in the United States Access Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

# 1.6 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

# 1.7 SITE CONSTRUCTION FACILITIES

- A. Pedestrian access.
  - 1. Pedestrian access to/egress from the Building's entrances shall always be maintained.
- B. Vehicular access.
  - 1. Provide unimpeded access for emergency vehicles. Maintain 20 feet wide minimum driveways with turning space between and around combustible materials.
  - 2. Provide and maintain access to fire hydrants, control valves, fire department connections, pad-mounted transformers and switching gear free of obstructions.
  - 3. Construct stabilized construction entrances and sediment control BMPs in accordance with the accepted TESC plan.
  - 4. Metal tracked equipment is not allowed.
  - 5. Bases for permanent roads and parking areas may be used for construction traffic.
- C. Parking.
  - 1. Construction personnel:

SECTION 01 50 00

- a. Retain parking for the public.
- b. Retain parking for Owner.
- c. Use of parking area by construction personnel is prohibited.
- 2. Owner and tenant employees and the public: shall always be maintained, either on the Site or in the public right-of-way.
- 3. Maintenance:
  - a. Maintain traffic and parking areas in sound condition.
  - b. Maintain existing and permanent paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies.
- D. Staging, storage, stockpiling
  - 1. Contractor shall designate area on the Site to be utilized for staging, storage, and stockpiling.
  - 2. Under no circumstance shall the public rights-of-ways be utilized for staging, storage, or stockpiling of equipment, materials, debris or rubbish.
- E. Traffic regulation.
  - 1. Load Limits (*March 13, 1995*) WSDOT Standard Specifications Section 1-07.7 is supplemented with the following:
    - a. If the sources of materials provided by the Contractor necessitates hauling over roads other than State Highways, the Contractor shall, at the Contractor's expense, make all arrangements for the use of the haul routes.
  - 2. Work Zone Clear Zone (*January 2, 2012 WSDOT GSP*) WSDOT Standard Specifications Section 1-07.23(1) is supplemented with the following:
    - a. The Work Zone Clear Zone (WZCZ) applies during working and nonworking hours. The WZCZ applies only to temporary roadside objects introduced by the Contractor's operations and does not apply to preexisting conditions or permanent Work. Those work operations that are actively in progress shall be in accordance with adopted and approved Traffic Control Plans, and other contract requirements.
    - b. During nonworking hours equipment or materials shall not be within the WZCZ unless they are protected by permanent guardrail or temporary concrete barrier. The use of temporary concrete barrier shall be permitted only if the Engineer approves the installation and location.
    - c. During actual hours of work, unless protected as described above, only materials absolutely necessary to construction shall be within the WZCZ and only construction vehicles absolutely necessary to construction shall be allowed within the WZCZ or allowed to stop or park on the shoulder of the roadway.
    - d. The Contractor's nonessential vehicles and employees private vehicles shall not be permitted to park within the WZCZ at any time unless protected as described above.
    - e. Deviation from the above requirements shall not occur unless the Contractor has requested the deviation in writing and the Engineer has provided written approval.
    - f. Minimum WZCZ distances are measured from the edge of traveled way and will be determined as follows:

Regulatory Posted Speed	Distance From Traveled Way (Feet)
35 mph or less	10 *
40 mph	15
45 to 55 mph	20
60 mph or greater	30

\* or 2-feet beyond the outside edge of sidewalk

# Minimum Work Zone Clear Zone Distance

- F. Progress cleaning and waste removal.
  - 1. Maintain Site and public rights-of-ways in clean and orderly condition.
  - 2. Sweep and remove debris in accordance with the accepted TESC and Dust control plans.

### 1.8 TEMPORARY CONTROLS

- A. Barriers
  - 1. Protect non-owned vehicular traffic, stored materials, Site, and structures from damage.
- B. Enclosures and fencing.
- C. Security.
- D. Water control.
  - 1. Maintain excavations free of water. Provide, operate, and maintain necessary pumping equipment.
  - 2. Protect Site from puddles or running water.
- E. Dust control.
  - 1. Execute Work by methods that prevent dust from becoming airborne.
  - 2. Provide positive means to prevent airborne dust from dispersing into atmosphere.
- F. Erosion and sediment control.
  - 1. Comply with erosion and sediment control plan indicated on Drawings.
  - 2. Work shall be in accordance with WSDOT Standard Specifications Section 8-01 Erosion Control and Water Pollution Control.
  - 3. Appropriate erosion and sedimentation control shall be installed prior to Construction.
  - 4. All erosion control measures shall be maintained in place until vegetation is planted.
  - 5. Plan and execute construction by methods to control surface drainage from cuts and fills from borrow and waste disposal areas. Prevent erosion and sedimentation.
  - 6. Minimize surface area of bare soil exposed at one time.
  - 7. Provide temporary measures including berms, dikes, drains, and other devices to prevent water flow.
  - 8. Periodically inspect earthwork to detect evidence of erosion and sedimentation. Promptly apply corrective measures.
  - 9. Clean the Site and public rights-of-ways and install all permanent vegetation before Final Application for Payment inspection.
- G. REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS
  - 1. Remove temporary utilities, equipment, facilities, and materials before Final Application for Payment inspection.
  - 2. Clean and repair damage caused by installation or use of temporary Work.
  - 3. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

PART 2 - PRODUCTS

# 2.1 MATERIALS

- A. Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts with 1-5/8-inch OD top rails.
- B. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide bases for supporting posts.
- C. Fencing Windscreen Privacy Screen: Polyester fabric scrim with grommets for attachment to chain-link fence, sized to height of fence, in color selected by Architect from manufacturer's standard colors. See architectural site plan for applicable custom printed visual display mesh barrier requirements.
- D. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flamespread rating of 15 or less in accordance with ASTM E84 and passing NFPA 701 Test Method 2.
- E. Dust-Control Adhesive-Surface Walk-Off Mats: Provide mats, minimum 36 by 60 inches.
- F. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

# 2.2 TEMPORARY FACILITIES

- A. Field Offices: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:
  - 1. Furniture required for Project-site documents, including file cabinets, plan tables, plan racks, and bookcases.
  - 2. Conference room of sufficient size to accommodate meetings of 6 individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- square tack and marker boards.
  - 3. Drinking water and private toilet.
  - 4. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.
  - 5. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.
- C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
  - 1. Store combustible materials apart from building.

### 2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
  - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
  - 2. Heating, Cooling, and Dehumidifying Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
- C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

## PART 3 - EXECUTION

### 3.1 TEMPORARY FACILITIES, GENERAL

- A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
  - 1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

### 3.2 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
  - 1. Locate facilities to limit site disturbance.
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

#### 3.3 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
  - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
  - 1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- D. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- E. Sanitary Facilities: Provide temporary toilets, wash facilities, safety shower and eyewash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
  - 1. Use of Permanent Toilets: Use of Owner's existing or new toilet facilities is not permitted.
- F. Temporary Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
  - 1. Provide temporary dehumidification systems when required to reduce ambient and substrate moisture levels to level required to allow installation or application of finishes and their proper curing or drying.
- G. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
  - 1. Prior to commencing work, isolate the HVAC system in area where work is to be performed.
    - a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
    - b. Maintain negative air pressure within work area, using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
  - 2. Maintain dust partitions during the Work. Use vacuum collection attachments on dustproducing equipment. Isolate limited work within occupied areas using portable dustcontainment devices.
  - 3. Perform daily construction cleanup and final cleanup using approved, HEPA-filterequipped vacuum equipment.
- H. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.
- I. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
  - 1. Install electric power service underground unless otherwise indicated.
  - 2. Connect temporary service to Owner's existing power source, as directed by Owner.
- J. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
  - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

- K. Telephone Service: Landline phone for use by Architect or Owner not required.
- L. Electronic Communication Service: Secure WiFi wireless connection to internet for use by Architect and Owner not required.
- M. Project Computer: Computer for use by Architect or Owner not required.

# 3.4 SUPPORT FACILITIES INSTALLATION

- A. Comply with the following:
  - 1. Provide construction for temporary field offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible in accordance with ASTM E136. Comply with NFPA 241.
  - 2. Utilize designated area within existing building for temporary field offices.
  - 3. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Traffic Controls: Comply with requirements of authorities having jurisdiction.
  - 1. Protect existing site improvements to remain, including curbs, pavement, and utilities.
  - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- C. Parking: Use designated areas of Owner's existing parking areas for construction personnel.
- D. Storage and Staging: Use designated areas of Project site for storage and staging needs.
- E. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
  - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
  - 2. Remove snow and ice as required to minimize accumulations.
- F. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
  - 1. Provide Project Identification Signs:
    - a. Sign Surfaces: Large scale color output adhesive vinyl mounted to ½" gatorboard (white)
      - b. Size: 4'x8'
      - c. Image: Provided by Architect.
      - d. Quantity: 2; relocated during Phasing as required.
    - e. Hardware: Galvanized..
  - 2. Temporary Signs: Provide signs as required to inform public and individuals seeking entrance to Project.
    - a. Provide temporary, directional signs for construction personnel and visitors.
  - 3. Maintain and touch up signs, so they are legible at all times.
- G. Waste Disposal Facilities: Comply with requirements specified in Section 01 74 19 "Construction Waste Management and Disposal."

- H. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 01 73 00 "Execution."
- I. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
  - 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- J. Existing Elevator Use: Use of Owner's existing elevators will be permitted, provided elevators are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore elevators to condition existing before initial use, including replacing worn cables, guide shoes, and similar items of limited life.
  - 1. Do not load elevators beyond their rated weight capacity.
  - 2. Provide protective coverings, barriers, devices, signs, or other procedures to protect elevator car and entrance doors and frame. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work, so no evidence remains of correction work. Return items that cannot be refinished in field to the shop, make required repairs and refinish entire unit, or provide new units as required.
- K. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.
  - 1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas, so no evidence remains of correction work.

# 3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
  - 1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
  - 1. Comply with work restrictions specified in Section 01 10 00 "Summary."
- C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings, requirements of EPA Construction General Permit, or authorities having jurisdiction, whichever is more stringent.
  - 1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant-protection zones.

- 2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
- 3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
- 4. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.
- D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- E. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion. See Drawings for more direction.
- F. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals, so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using materials approved by authorities having jurisdiction.
- G. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people from easily entering site except by entrance gates.
  - 1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
  - 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.
- H. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.
- I. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- J. Temporary Egress: Provide temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction. Provide signage directing occupants to temporary egress.
- K. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
  - 1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.
- L. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner and tenants from fumes and noise.
  - 1. Construct dustproof partitions with gypsum wallboard, with joints taped on occupied side, and fire-retardant-treated plywood on construction operations side.
  - 2. Construct dustproof partitions with two layers of 6-mil polyethylene sheet on each side. Cover floor with two layers of 6-mil polyethylene sheet, extending sheets 18 inches up the

sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant-treated plywood.

- a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches between doors. Maintain water-dampened foot mats in vestibule.
- 3. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
- 4. Insulate partitions to control noise transmission to occupied areas.
- 5. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
- 6. Protect air-handling equipment.
- 7. Provide walk-off mats at each entrance through temporary partition.
- M. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
  - 1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
  - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition in accordance with requirements of authorities having jurisdiction.
  - 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
  - 4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign, stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

# 3.6 MOISTURE AND MOLD CONTROL

- A. Moisture and Mold Protection: Protect stored materials and installed Work in accordance with Moisture and Mold Protection Plan.
- B. Exposed Construction Period: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
  - 1. Protect porous materials from water damage.
  - 2. Protect stored and installed material from flowing or standing water.
  - 3. Keep porous and organic materials from coming into prolonged contact with concrete.
  - 4. Remove standing water from decks.
  - 5. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction Period: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
  - 1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
  - 2. Keep interior spaces reasonably clean and protected from water damage.
  - 3. Periodically collect and remove waste containing cellulose or other organic matter.
  - 4. Discard or replace water-damaged material.
  - 5. Do not install material that is wet.
  - 6. Discard and replace stored or installed material that begins to grow mold.

- 7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.
- D. Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
  - 1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
  - 2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
  - 3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
    - a. Hygroscopic materials that may support mold growth, including wood and gypsumbased products, that become wet during the course of construction and remain wet for 48 hours are considered defective and require replacing.
    - b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours.
    - c. Remove and replace materials that cannot be completely restored to their manufactured moisture level within 48 hours.

# 3.7 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
  - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
  - 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
  - 2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
  - At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 77 00 "Closeout Procedures."

END OF SECTION 01 50 00

# SECTION 01 60 00 - PRODUCT REQUIREMENTS

### PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
  - 1. Section 00 70 00 "General Conditions".
  - 2. Section 01 10 00 "Summary" for Contractor requirements related to Owner-furnished products.
  - 3. Section 01 23 00 "Alternates" for products selected under an alternate.
  - 4. Section 01 25 00 "Substitution Procedures" for requests for substitutions.
  - 5. Section 01 42 00 "References" for applicable industry standards for products specified.
  - 6. Section 01 77 00 "Closeout Procedures" for submitting warranties.

## 1.3 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
  - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
  - 2. New Products: Items that have not previously been incorporated into another project or facility. Salvaged items or items reused from other projects are not considered new products. Items that are manufactured or fabricated to include recycled content materials are considered new products, unless indicated otherwise.
  - 3. Comparable Product: Product by named manufacturer that is demonstrated and approved through the comparable product submittal process described in Part 2 "Comparable Products" Article, to have the indicated qualities related to type, function, dimension, inservice performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. Published attributes and characteristics of basis-of-design product establish salient characteristics of products.

- 1. Evaluation of Comparable Products: In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification.
- C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications; submit a comparable product request or substitution request, if applicable.
- D. Comparable Product Request Submittal: An action submittal requesting consideration of a comparable product, including the following information:
  - 1. Identification of basis-of-design product or fabrication or installation method to be replaced, including Specification Section number and title and Drawing numbers and titles.
  - 2. Data indicating compliance with the requirements specified in Part 2 "Comparable Products" Article.
- E. Basis-of-Design Product Specification Submittal: An action submittal complying with requirements in Section 01 33 00 "Submittal Procedures."
- F. Substitution: Refer to Section 01 25 00 "Substitution Procedures" for definition and limitations on substitutions.

# 1.4 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
  - 1. Resolution of Compatibility Disputes between Multiple Contractors:
    - a. Contractors are responsible for providing products and construction methods compatible with products and construction methods of other contractors.
    - b. If a dispute arises between the multiple contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.
- B. Identification of Products: Except for required labels and operating data, do not attach or imprint manufacturer or product names or trademarks on exposed surfaces of products or equipment that will be exposed to view in occupied spaces or on the exterior.
  - 1. Labels: Locate required product labels and stamps on a concealed surface, or, where required for observation following installation, on a visually accessible surface that is not conspicuous.
  - 2. Equipment Nameplates: Provide a permanent nameplate on each item of service- or power-operated equipment. Locate on a visually accessible but inconspicuous surface. Include information essential for operation, including the following:
    - a. Name of product and manufacturer.
    - b. Model and serial number.
    - c. Capacity.

- d. Speed.
- e. Ratings.
- 3. See individual identification Sections in Divisions 21, 22, 23, 26, and 27 for additional equipment identification requirements.

### 1.5 COORDINATION

A. Modify or adjust affected work as necessary to integrate work of approved comparable products and approved substitutions.

## 1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products, using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
  - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
  - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
  - 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
  - 4. Inspect products on delivery to determine compliance with the Contract Documents and that products are undamaged and properly protected.

### C. Storage:

- 1. Provide a secure location and enclosure at Project site for storage of materials and equipment.
- 2. Store products to allow for inspection and measurement of quantity or counting of units.
- 3. Store materials in a manner that will not endanger Project structure.
- 4. Store products that are subject to damage by the elements under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation and with adequate protection from wind.
- 5. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
- 6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
- 7. Protect stored products from damage and liquids from freezing.
- 8. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

### 1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

- 1. Manufacturer's Warranty: Written standard warranty form furnished by individual manufacturer for a particular product and issued in the name of the Owner or endorsed by manufacturer to Owner.
- 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner and issued in the name of the Owner or endorsed by manufacturer to Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
  - 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
  - 2. Specified Form: When specified forms are included in the Project Manual, prepare a written document, using indicated form properly executed.
  - 3. See other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 01 77 00 "Closeout Procedures."

# PART 2 - PRODUCTS

# 2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
  - 1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
  - 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
  - 3. Owner reserves the right to limit selection to products with warranties meeting requirements of the Contract Documents.
  - 4. Where products are accompanied by the term "as selected," Architect will make selection.
  - 5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
  - 6. Or Equal: For products specified by name and accompanied by the term "or equal," "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
    - a. Submit additional documentation required by Architect in order to establish equivalency of proposed products. Unless otherwise indicated, evaluation of "or equal" product status is by the Architect, whose determination is final.
- B. Product Selection Procedures:
  - 1. Sole Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
    - a. Sole product may be indicated by the phrase "Subject to compliance with requirements, provide the following."
  - 2. Sole Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

- a. Sole manufacturer/source may be indicated by the phrase "Subject to compliance with requirements, provide products by the following."
- 3. Limited List of Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
  - a. Limited list of products may be indicated by the phrase "Subject to compliance with requirements, provide one of the following."
- 4. Non-Limited List of Products: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed or an unnamed product that complies with requirements.
  - a. Non-limited list of products is indicated by the phrase "Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following."
  - b. Provision of an unnamed product is not considered a substitution, if the product complies with requirements.
- 5. Limited List of Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
  - a. Limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, provide products by one of the following."
- 6. Non-Limited List of Manufacturers: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed or a product by an unnamed manufacturer that complies with requirements.
  - a. Non-limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, available manufacturers whose products may be incorporated in the Work include, but are not limited to, the following."
  - b. Provision of products of an unnamed manufacturer is not considered a substitution, if the product complies with requirements.
- 7. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications may additionally indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
  - a. For approval of products by unnamed manufacturers, comply with requirements in Section 01 25 00 "Substitution Procedures" for substitutions for convenience.
- C. Visual Matching Specification: Where Specifications require the phrase "match Architect's sample," provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
  - 1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 01 25 00 "Substitution Procedures" for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or a similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.
- E. Sustainable Product Selection: Where Specifications require product to meet sustainable product characteristics, select products complying with indicated requirements. Comply with requirements in Division 01 sustainability requirements Section and individual Specification Sections.
  - 1. Select products for which sustainable design documentation submittals are available from manufacturer.

# 2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration of Comparable Products: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with the following requirements:
  - 1. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work.
  - 2. Detailed comparison of significant qualities of proposed product with those of the named basis-of-design product. Significant product qualities include attributes, such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.
  - 3. Evidence that proposed product provides specified warranty.
  - 4. List of similar installations for completed projects, with project names and addresses and names and addresses of architects and owners, if requested.
  - 5. Samples, if requested.
- B. Architect's Action on Comparable Products Submittal: If necessary, Architect will request additional information or documentation for evaluation, as specified in Section 01 33 00 "Submittal Procedures."
  - 1. Form of Approval of Submittal: As specified in Section 01 33 00 "Submittal Procedures."
  - 2. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.
- C. Submittal Requirements, Two-Step Process: Approval by the Architect of Contractor's request for use of comparable product is not intended to satisfy other submittal requirements. Comply with specified submittal requirements.
- D. Submittal Requirements, Single-Step Process: When acceptable to Architect, incorporate specified submittal requirements of individual Specification Section in combined submittal for comparable products. Approval by the Architect of Contractor's request for use of comparable product and of individual submittal requirements will also satisfy other submittal requirements.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 60 00

SECTION 01 73 00 - EXECUTION

PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work, including, but not limited to, the following:
  - 1. Construction layout.
  - 2. Field engineering and surveying.
  - 3. Installation of the Work.
  - 4. Cutting and patching.
  - 5. Coordination of Owner's portion of the Work.
  - 6. Coordination of Owner-installed products.
  - 7. Progress cleaning.
  - 8. Starting and adjusting.
  - 9. Protection of installed construction.
- B. Related Requirements:
  - 1. Section 00 70 00 "General Conditions".
  - 2. Section 01 10 00 "Summary" for coordination of Owner-furnished products, and limits on use of Project site.
  - 3. Section 01 33 00 "Submittal Procedures" for submitting surveys.
  - 4. Section 01 77 00 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, replacing defective work, and final cleaning.
  - 5. Section 02 41 19 "Selective Demolition" for demolition and removal of selected portions of the building.
  - 6. Section 07 84 13 "Penetration Firestopping" for patching penetrations in fire-rated construction.

#### 1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

#### 1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For land surveyor.

- B. Certified Surveys: Submit electronic signed by land surveyor
- C. Certificates: Submit certificate signed by land surveyor, certifying that location and elevation of improvements comply with requirements.
- D. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:
  - 1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
  - 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
  - 3. Products: List products to be used for patching and firms or entities that will perform patching work.
  - 4. Dates: Indicate when cutting and patching will be performed.
  - 5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
    - a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.
- E. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

### 1.5 CLOSEOUT SUBMITTALS

A. Final Property Survey: Submit electronic copy showing the Work performed and record survey data.

### 1.6 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.
- B. Professional Engineer Qualifications: Refer to Section 01 40 00 "Quality Requirements."
- C. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
  - 1. Structural Elements: When cutting and patching structural elements, or when encountering the need for cutting and patching of elements whose structural function is not known, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
  - 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:
    - a. Primary operational systems and equipment.
    - b. Fire separation assemblies.

- c. Air or smoke barriers.
- d. Fire-suppression systems.
- e. Plumbing piping systems.
- f. Mechanical systems piping and ducts.
- g. Control systems.
- h. Communication systems.
- i. Fire-detection and -alarm systems.
- j. Conveying systems.
- k. Electrical wiring systems.
- I. Operating systems of special construction.
- 3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:
  - a. Water, moisture, or vapor barriers.
  - b. Membranes and flashings.
  - c. Exterior curtain-wall construction.
  - d. Sprayed fire-resistive material.
  - e. Equipment supports.
  - f. Piping, ductwork, vessels, and equipment.
  - g. Noise- and vibration-control elements and systems.
- 4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of specified products and equipment.

# PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Comply with requirements specified in other Sections.
  - 1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with sustainable design requirements.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
  - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of inplace materials. Use materials that are not considered hazardous.
- C. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

# PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical, and other construction affecting the Work.
  - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, gas service piping, and water-service piping; underground electrical services; and other utilities.
  - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
  - 1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
  - 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
  - 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
  - 1. Description of the Work, including Specification Section number and paragraph, and Drawing sheet number and detail, where applicable.
  - 2. List of detrimental conditions, including substrates.
  - 3. List of unacceptable installation tolerances.
  - 4. Recommended corrections.
- D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

# 3.2 PREPARATION

- A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before

fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect in accordance with requirements in Section 01 31 00 "Project Management and Coordination."

# 3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks and existing conditions. If discrepancies are discovered, notify Architect promptly.
- B. Engage a land surveyor experienced in laying out the Work, using the following accepted surveying practices:
  - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
  - 2. Establish limits on use of Project site.
  - 3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
  - 4. Inform installers of lines and levels to which they must comply.
  - 5. Check the location, level and plumb, of every major element as the Work progresses.
  - 6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
  - 7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

### 3.4 FIELD ENGINEERING

- A. Identification: Owner will identify existing benchmarks, control points, and property corners.
- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

- 1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
- 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
  - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
  - 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
  - 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

# 3.5 INSTALLATION

- A. Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
  - 1. Make vertical work plumb, and make horizontal work level.
  - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
  - 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
  - 4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces, unless otherwise indicated on Drawings.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure satisfactory results as judged by Architect. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations, so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy of type expected for Project.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on-site and placement in permanent locations.
- F. Tools and Equipment: Select tools or equipment that minimize production of excessive noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for Work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with

other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions with manufacturer.

- 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
- 2. Allow for building movement, including thermal expansion and contraction.
- 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed Work are not indicated, arrange joints for the best visual effect, as judged by Architect. Fit exposed connections together to form hairline joints.
- J. Repair or remove and replace damaged, defective, or nonconforming Work.
  - 1. Comply with Section 01 77 00 "Closeout Procedures" for repairing or removing and replacing defective Work.

### 3.6 CUTTING AND PATCHING

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
  - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of Work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching in accordance with requirements in Section 01 10 00 "Summary."
- F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.
- G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

- 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
- 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
- 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
- 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
- 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
- 6. Proceed with patching after construction operations requiring cutting are complete.
- H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as practicable, as judged by Architect. Provide materials and comply with installation requirements specified in other Sections, where applicable.
  - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
  - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
    - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    - b. Restore damaged pipe covering to its original condition.
  - 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
    - a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch, corner to corner of wall and edge to edge of ceiling. Provide additional coats until patch blends with adjacent surfaces.
  - 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
  - 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

# 3.7 COORDINATION OF OWNER'S PORTION OF THE WORK

- A. Site Access: Provide access to Project site for Owner's construction personnel.
  - 1. Provide temporary facilities required for Owner-furnished, Contractor-installed products.
  - 2. Refer to Section 01 10 00 "Summary" for other requirements for Owner-furnished, Contractor-installed products.
- B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel and Owner's separate contractors.

- 1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
- 2. Preinstallation Conferences: Include Owner's construction personnel and Owner's separate contractors at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

# 3.8 PROGRESS CLEANING

- A. Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
  - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
  - 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
  - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
    - a. Use containers intended for holding waste materials of type to be stored.
  - 4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where Work is in progress to the level of cleanliness necessary for proper execution of the Work.
  - 1. Remove liquid spills promptly.
  - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 01 74 19 "Construction Waste Management and Disposal."
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

# 3.9 STARTING AND ADJUSTING

- A. Coordinate startup and adjusting of equipment and operating components with requirements in Section 01 91 00 "Commissioning."
- B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Manufacturer's Field Service: Comply with qualification requirements in Section 01 40 00 "Quality Requirements."

# 3.10 PROTECTION AND REPAIR OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Repair Work previously completed and subsequently damaged during construction period. Repair to like-new condition.
- C. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.
- D. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 01 73 00

# SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

#### PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
  - 1. Salvaging nonhazardous demolition and construction waste.
  - 2. Recycling nonhazardous demolition and construction waste.
  - 3. Disposing of nonhazardous demolition and construction waste.
- B. Related Requirements:
  - 1. Section 31 10 00 "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

#### 1.3 DEFINITIONS

- A. Construction Waste: Building, structure, and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building, structure, and site improvement materials resulting from demolition operations.
- C. Disposal: Removal of demolition or construction waste and subsequent salvage, sale, recycling, or deposit in landfill, incinerator acceptable to authorities having jurisdiction, or designated spoil areas on Owner's property.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

#### 1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition and construction waste becomes property of Contractor.

- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
  - 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

# 1.5 INFORMATIONAL SUBMITTALS

- A. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- B. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

### 1.6 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with transportation and disposal regulations of authorities having jurisdiction.

### PART 2 - PRODUCTS

# 2.1 RECYCLING RECEIVERS AND PROCESSORS

- A. Subject to compliance with requirements, available recycling receivers and processors include, but are not limited to, the following:
  - 1. Designated C&D recovery facilities listed on King County's website

## 2.2 PERFORMANCE REQUIREMENTS

- A. General: Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials, including the following:
  - Demolition Waste:
    - a. Asphalt paving.
  - b. Concrete.
  - c. Concrete reinforcing steel.
  - d. Brick.
  - e. Concrete masonry units.
  - f. Wood studs.
  - g. Wood joists.
  - h. Plywood and oriented strand board.
  - i. Wood paneling.
  - j. Wood trim.
  - k. Structural and miscellaneous steel.
  - I. Rough hardware.
  - m. Roofing.

1.

- n. Insulation.
- o. Doors and frames.
- p. Door hardware.
- q. Windows.
- r. Glazing.
- s. Metal studs.
- t. Gypsum board.
- u. Acoustical tile and panels.
- v. Carpet.
- w. Carpet pad.
- x. Demountable partitions.
- y. Equipment.
- z. Cabinets.
- aa. Plumbing fixtures.
- bb. Piping.
- cc. Supports and hangers.
- dd. Valves.
- ee. Sprinklers.
- ff. Mechanical equipment.
- gg. Refrigerants.
- hh. Electrical conduit.
- ii. Copper wiring.
- jj. Lighting fixtures.
- kk. Lamps.
- II. Ballasts.
- mm. Electrical devices.
- nn. Switchgear and panelboards.
- oo. Transformers.
- 2. Construction Waste:
  - a. Masonry and CMU.
  - b. Lumber.
  - c. Wood sheet materials.
  - d. Wood trim.
  - e. Metals.
  - f. Roofing.
  - g. Insulation.
  - h. Carpet and pad.
  - i. Gypsum board.
  - j. Piping.
  - k. Electrical conduit.
  - I. Packaging: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
    - 1) Paper.
    - 2) Cardboard.
    - 3) Boxes.
    - 4) Plastic sheet and film.
    - 5) Polystyrene packaging.
    - 6) Wood crates.
    - 7) Wood pallets.
    - 8) Plastic pails.
  - m. Construction Office Waste: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following construction office waste materials:

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- 1) Paper.
- 2) Aluminum cans.
- 3) Glass containers.

# PART 3 - EXECUTION

## 3.1 SALVAGING DEMOLITION WASTE

- A. Comply with requirements in Section 02 41 19 "Selective Demolition" for salvaging demolition waste.
- B. Salvaged Items for Reuse in the Work: Salvage items for reuse and handle as follows:
  - 1. Clean salvaged items.
  - 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
  - 3. Store items in a secure area until installation.
  - 4. Protect items from damage during transport and storage.
  - 5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.
- C. Salvaged Items for Sale and Donation: Not permitted on Project site.
- D. Salvaged Items for Owner's Use: Salvage items for Owner's use and handle as follows:
  - 1. Clean salvaged items.
  - 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
  - 3. Store items in a secure area until delivery to Owner.
  - 4. Transport items to Owner's storage area designated by Owner.
  - 5. Protect items from damage during transport and storage.
- E. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.
- F. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.
- G. Plumbing Fixtures: Separate by type and size.
- H. Lighting Fixtures: Separate lamps by type and protect from breakage.
- I. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.
- 3.2 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL
  - A. General: Recycle paper and beverage containers used by on-site workers.
    - 1. Remove recyclable waste from Owner's property and transport to recycling receiver or processor as often as required to prevent overfilling bins.

## 3.3 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged or recycled, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
  - 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
  - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn waste materials.

END OF SECTION 01 74 19

# SECTION 01 77 00 - CLOSEOUT PROCEDURES

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for Contract closeout, including, but not limited to, the following:
  - 1. Substantial Completion procedures.
  - 2. Final completion procedures.
  - 3. Warranties.
  - 4. Final cleaning.
- B. Related Requirements:
  - 1. Section 00 70 00 "General Conditions".
  - 2. Section 01 29 00 "Payment Procedures" for requirements for Applications for Payment for Substantial Completion and Final Completion.
  - 3. Section 01 32 33 "Photographic Documentation" for submitting Final Completion construction photographic documentation.
  - 4. Section 01 78 23 "Operation and Maintenance Data" for additional operation and maintenance manual requirements.
  - 5. Section 01 78 39 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
  - 6. Section 01 79 00 "Demonstration and Training" for requirements to train the Owner's maintenance personnel to adjust, operate, and maintain products, equipment, and systems.

#### 1.3 DEFINITIONS

A. List of Incomplete Items: Contractor-prepared list of items to be completed or corrected, prepared for the Architect's use prior to Architect's inspection, to determine if the Work is substantially complete.

### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of cleaning agent.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at Final Completion.

## 1.5 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.
- C. Field Report: For pest-control inspection.

## 1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items required by other Sections.

### 1.7 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's "punch list"), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
  - 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction, permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
  - 2. Submit closeout submittals specified in other Division 01 Sections, including Project Record Documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
  - 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
  - 4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number.
    - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect's signature for receipt of submittals.
  - 5. Submit testing, adjusting, and balancing records.
  - 6. Submit sustainable design submittals not previously submitted.
  - 7. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
  - 1. Advise Owner of pending insurance changeover requirements.
  - 2. Install permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
  - 3. Complete startup and testing of systems and equipment.
  - 4. Perform preventive maintenance on equipment used prior to Substantial Completion.

- 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 01 79 00 "Demonstration and Training."
- 6. Advise Owner of changeover in utility services.
- 7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
- 8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
- 9. Complete final cleaning requirements.
- 10. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion (AIA Document G704) after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
  - 1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
  - 2. Results of completed inspection will form the basis of requirements for Final Completion.

### 1.8 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining Final Completion, complete the following:
  - 1. Submit a final Application for Payment in accordance with Section 01 29 00 "Payment Procedures."
  - 2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
  - 3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
  - 4. Submit pest-control final inspection report.
  - 5. Submit Final Completion photographic documentation.
- B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
  - 1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

# 1.9 LIST OF INCOMPLETE ITEMS

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
  - 1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest, listed by room or space number.
  - 2. Organize items applying to each space by major element, including categories for ceilings, individual walls, floors, equipment, and building systems.
  - 3. Include the following information at the top of each page:
    - a. Project name.
    - b. Date.
    - c. Name of Architect.
    - d. Name of Contractor.
    - e. Page number.
  - 4. Submit list of incomplete items in the following format:
    - a. MS Excel Electronic File: Architect will return annotated file.
    - b. Web-Based Project Software Upload: Utilize software feature for creating and updating list of incomplete items (punch list).

### 1.10 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
- D. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
  - 1. Submit on digital media acceptable to Architect.
- E. Provide additional copies of each warranty to include in operation and maintenance manuals.

### PART 2 - PRODUCTS

### 2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

# PART 3 - EXECUTION

#### 3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
  - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
    - a. Clean Project site of rubbish, waste material, litter, and other foreign substances.
    - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
    - c. Rake grounds that are not planted, mulched, or paved to a smooth, even-textured surface.
    - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
    - e. Remove snow and ice to provide safe access to building.
    - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
    - g. Remove debris and surface dust from limited-access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
    - h. Clean flooring, removing debris, dirt, and staining; clean according to manufacturer's recommendations.
    - i. Vacuum and mop concrete.
    - j. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
    - k. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
    - I. Remove labels that are not permanent.
    - m. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
    - n. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
    - o. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
    - p. Clean ducts, blowers, and coils.
      - 1) Clean HVAC system in compliance with Division 23. Provide written report on completion of cleaning.
    - q. Clean luminaires, lamps, globes, and reflectors to function with full efficiency.
    - r. Clean strainers.
    - s. Leave Project clean and ready for occupancy.

- C. Pest Control: Comply with pest control requirements in Section 01 50 00 "Temporary Facilities and Controls." Prepare written report.
- D. Construction Waste Disposal: Comply with waste-disposal requirements in Section 01 74 19 "Construction Waste Management and Disposal."

# 3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations required by Section 01 73 00 "Execution" before requesting inspection for determination of Substantial Completion.

END OF SECTION 01 77 00

# SECTION 01 78 23 - OPERATION AND MAINTENANCE DATA

#### PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
  - 1. Operation and maintenance documentation directory manuals.
  - 2. Emergency manuals.
  - 3. Systems and equipment operation manuals.
  - 4. Systems and equipment maintenance manuals.
  - 5. Product maintenance manuals.
- B. Related Requirements:
  - 1. Section 00 70 00 "General Conditions".
  - 2. Section 01 33 00 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.

#### 1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

# 1.4 CLOSEOUT SUBMITTALS

- A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
  - 1. Architect will comment on whether content of operation and maintenance submittals is acceptable.
  - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operation and maintenance manuals in the following format:
  - 1. Initial Submittal: Submittal on digital media acceptable to Architect. Enable reviewer comments on draft submittals.
  - 2. Final, Approved Submittal: digital media and 1 paper/ binder copy delivered to Owner.

- C. Initial Manual Submittal: Submit draft digital copy of each manual at least 30 days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.
- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15days before commencing demonstration and training. Architect will return copy with comments.
  - 1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.
- E. Comply with Section 01 77 00 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

# 1.5 FORMAT OF OPERATION AND MAINTENANCE MANUALS

- A. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
  - 1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
  - 2. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.
- B. Manuals, Paper Copy: Submit manuals in the form of hard-copy, bound and labeled volumes.
  - 1. Binders: Heavy-duty, three-ring, vinyl-covered, binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
    - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
    - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple volume sets
  - 2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
  - 3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment. Enclose title pages and directories in clear plastic sleeves.
  - 4. Supplementary Prepared on 8-1/2-by-11-inch white bond paper.
  - 5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
    - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.

b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

## 1.6 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Organization of Manuals: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
  - 1. Title page.
  - 2. Table of contents.
  - 3. Manual contents.
- B. Title Page: Include the following information:
  - 1. Subject matter included in manual.
  - 2. Name and address of Project.
  - 3. Name and address of Owner.
  - 4. Date of submittal.
  - 5. Name and contact information for Contractor.
  - 6. Name and contact information for Construction Manager.
  - 7. Name and contact information for Architect.
  - 8. Name and contact information for Commissioning Authority.
  - 9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
  - 10. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
  - 1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

### 1.7 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY MANUAL

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals. List items and their location to facilitate ready access to desired information. Include the following:

- 1. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- 2. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- 3. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

# 1.8 SYSTEMS AND EQUIPMENT OPERATION MANUALS

- A. Systems and Equipment Operation Manual: Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures.
  - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
  - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- B. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
  - 1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
  - 2. Performance and design criteria if Contractor has delegated design responsibility.
  - 3. Operating standards.
  - 4. Operating procedures.
  - 5. Operating logs.
  - 6. Wiring diagrams.
  - 7. Control diagrams.
  - 8. Piped system diagrams.
  - 9. Precautions against improper use.
  - 10. License requirements including inspection and renewal dates.
- C. Descriptions: Include the following:
  - 1. Product name and model number. Use designations for products indicated on Contract Documents.
  - 2. Manufacturer's name.
  - 3. Equipment identification with serial number of each component.
  - 4. Equipment function.
  - 5. Operating characteristics.
  - 6. Limiting conditions.
  - 7. Performance curves.
  - 8. Engineering data and tests.
  - 9. Complete nomenclature and number of replacement parts.
- D. Operating Procedures: Include the following, as applicable:
  - 1. Startup procedures.
  - 2. Equipment or system break-in procedures.
  - 3. Routine and normal operating instructions.
  - 4. Regulation and control procedures.
  - 5. Instructions on stopping.

- 6. Normal shutdown instructions.
- 7. Seasonal and weekend operating instructions.
- 8. Required sequences for electric or electronic systems.
- 9. Special operating instructions and procedures.
- E. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- F. Piped Systems: Diagram piping as installed, and identify color coding where required for identification.

# 1.9 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Systems and Equipment Maintenance Manuals: Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of a system. Include manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information.
  - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
  - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- B. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranties and bonds as described below.
- C. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- D. Manufacturers' Maintenance Documentation: Include the following information for each component part or piece of equipment:
  - 1. Standard maintenance instructions and bulletins; include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
    - a. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
  - 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
  - 3. Identification and nomenclature of parts and components.
  - 4. List of items recommended to be stocked as spare parts.
- E. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
  - 1. Test and inspection instructions.

- 2. Troubleshooting guide.
- 3. Precautions against improper maintenance.
- 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
- 5. Aligning, adjusting, and checking instructions.
- 6. Demonstration and training video recording, if available.
- F. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
  - 1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
  - 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- G. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- H. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- I. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
  - 1. Include procedures to follow and required notifications for warranty claims.
- J. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
  - 1. Do not use original project record documents as part of maintenance manuals.

### 1.10 PRODUCT MAINTENANCE MANUALS

- A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- B. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- C. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- D. Product Information: Include the following, as applicable:
  - 1. Product name and model number.
  - 2. Manufacturer's name.
  - 3. Color, pattern, and texture.

- 4. Material and chemical composition.
- 5. Reordering information for specially manufactured products.
- E. Maintenance Procedures: Include manufacturer's written recommendations and the following:
  - 1. Inspection procedures.
  - 2. Types of cleaning agents to be used and methods of cleaning.
  - 3. List of cleaning agents and methods of cleaning detrimental to product.
  - 4. Schedule for routine cleaning and maintenance.
  - 5. Repair instructions.
- F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
  - 1. Include procedures to follow and required notifications for warranty claims.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 78 23

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## SECTION 01 78 39 - PROJECT RECORD DOCUMENTS

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for Project Record Documents, including the following:
  - 1. Record Drawings.
- B. Related Requirements:
  - 1. Section 00 70 00 "General Conditions".
  - 2. Section 01 73 00 "Execution" for final property survey.
  - 3. Section 01 77 00 "Closeout Procedures" for general closeout procedures.
  - 4. Section 01 78 23 "Operation and Maintenance Data" for operation and maintenance manual requirements.

### 1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
  - 1. Number of Copies: Submit copies of Record Drawings as follows:
    - a. Submit PDF electronic files of scanned record prints.

#### 1.4 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
  - 1. Preparation: Mark record prints to show the actual installation, where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
    - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    - b. Accurately record information in an acceptable drawing technique.
    - c. Record data as soon as possible after obtaining it.
    - d. Record and check the markup before enclosing concealed installations.
    - e. Cross-reference record prints to corresponding photographic documentation.
  - 2. Content: Types of items requiring marking include, but are not limited to, the following:
    - a. Dimensional changes to Drawings.
    - b. Revisions to details shown on Drawings.

- c. Depths of foundations.
- d. Locations and depths of underground utilities.
- e. Revisions to routing of piping and conduits.
- f. Revisions to electrical circuitry.
- g. Actual equipment locations.
- h. Duct size and routing.
- i. Locations of concealed internal utilities.
- j. Changes made by Change Order or Architectural Supplemental Instruction.
- k. Changes made following Architect's written orders.
- I. Details not on the original Contract Drawings.
- m. Field records for variable and concealed conditions.
- n. Record information on the Work that is shown only schematically.
- 3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
- 4. Mark record prints with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
- 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
- 6. Note Architectural Supplemental Instruction numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
  - 1. Format: Annotated PDF electronic file.
  - 2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
  - 3. Refer instances of uncertainty to Architect for resolution.
  - 4. Architect will review annotated drawing set as a submittal. Upon approval, contractor to provide owner with (1) bound, full-sized printed copy of annotated drawing set.

# 1.5 MAINTENANCE OF RECORD DOCUMENTS

A. Maintenance of Record Documents: Store Record Documents in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 78 39

### SECTION 01 79 00 - DEMONSTRATION AND TRAINING

## PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
  - 1. Instruction in operation and maintenance of systems, subsystems, and equipment.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
- B. Attendance Record: For each training module, submit list of participants and length of instruction time.

#### 1.4 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 01 40 00 "Quality Requirements," experienced in operation and maintenance procedures and training.

#### 1.5 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

SECTION 01 79 00

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data have been reviewed and approved by Architect.

# 1.6 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
  - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
    - a. System, subsystem, and equipment descriptions.
    - b. Performance and design criteria if Contractor is delegated design responsibility.
    - c. Operating standards.
    - d. Regulatory requirements.
    - e. Equipment function.
    - f. Operating characteristics.
    - g. Limiting conditions.
    - h. Performance curves.
  - 2. Documentation: Review the following items in detail:
    - a. Emergency manuals.
    - b. Systems and equipment operation manuals.
    - c. Systems and equipment maintenance manuals.
    - d. Product maintenance manuals.
    - e. Project Record Documents.
    - f. Identification systems.
    - g. Warranties and bonds.
    - h. Maintenance service agreements and similar continuing commitments.
  - 3. Emergencies: Include the following, as applicable:
    - a. Instructions on meaning of warnings, trouble indications, and error messages.
    - b. Instructions on stopping.
    - c. Shutdown instructions for each type of emergency.
    - d. Operating instructions for conditions outside of normal operating limits.
    - e. Sequences for electric or electronic systems.
    - f. Special operating instructions and procedures.
  - 4. Operations: Include the following, as applicable:
    - a. Startup procedures.
    - b. Equipment or system break-in procedures.
    - c. Routine and normal operating instructions.
    - d. Regulation and control procedures.
    - e. Control sequences.
    - f. Safety procedures.
    - g. Instructions on stopping.
    - h. Normal shutdown instructions.
    - i. Operating procedures for emergencies.

- j. Operating procedures for system, subsystem, or equipment failure.
- k. Seasonal and weekend operating instructions.
- I. Required sequences for electric or electronic systems.
- m. Special operating instructions and procedures.
- 5. Adjustments: Include the following:
  - a. Alignments.
  - b. Checking adjustments.
  - c. Noise and vibration adjustments.
  - d. Economy and efficiency adjustments.
- 6. Troubleshooting: Include the following:
  - a. Diagnostic instructions.
  - b. Test and inspection procedures.
- 7. Maintenance: Include the following:
  - a. Inspection procedures.
  - b. Types of cleaning agents to be used and methods of cleaning.
  - c. List of cleaning agents and methods of cleaning detrimental to product.
  - d. Procedures for routine cleaning.
  - e. Procedures for preventive maintenance.
  - f. Procedures for routine maintenance.
  - g. Instruction on use of special tools.
- 8. Repairs: Include the following:
  - a. Diagnosis instructions.
  - b. Repair instructions.
  - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
  - d. Instructions for identifying parts and components.
  - e. Review of spare parts needed for operation and maintenance.

#### 1.7 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 01 78 23 "Operation and Maintenance Data."
- B. Set up instructional equipment at instruction location.

#### 1.8 INSTRUCTION

- A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
- B. Scheduling: Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
  - 1. Schedule training with Owner with at least 7 days' advance notice.

- C. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.
- D. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of demonstration performance-based test.
- E. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION 01 79 00

## SECTION 01 91 00 - COMMISSIONING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
- B. Owner' documentation are included by reference for information only.

#### 1.2 SUMMARY

- A. Section includes general requirements that apply to implementation of commissioning without regard to specific systems, assemblies, or components.
- B. Related Sections:
  - 1. Division 23 for commissioning process activities for HVAC systems, assemblies, equipment, and components.

#### 1.3 DEFINITIONS

- A. BoD: Basis of Design. A document that records concepts, calculations, decisions, and product selections used to meet the OPR and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.
- B. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.
- C. CxA: Commissioning Authority.
- D. OPR: Owner's Project Requirements. A document that details the functional requirements of a project and the expectations of how it will be used and operated. These include Project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.
- E. Systems, Subsystems, Equipment, and Components: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.

#### 1.4 COMMISSIONING TEAM

A. Members Appointed by Contractor(s): Individuals, each having the authority to act on behalf of the entity he or she represents, explicitly organized to implement the commissioning process through coordinated action. The commissioning team shall consist of, but not be limited to, representatives of Contractor, including Project superintendent and subcontractors, installers, suppliers, and specialists deemed appropriate by the CxA.
- 1. Members Appointed by Owner: CxA: The designated person, company, or entity that plans, schedules, and coordinates the commissioning team to implement the commissioning process. Owner will engage the CxA under a separate contract.
- 2. Representatives of the facility user and operation and maintenance personnel.
- 3. Architect and engineering design professionals.

# 1.5 OWNER'S RESPONSIBILITIES

- A. Provide the OPR documentation to the CxA and Contractor for information and use.
- B. Assign operation and maintenance personnel and schedule them to participate in commissioning team activities.
- C. Provide the BoD documentation, prepared by Engineer of Record and approved by Owner, to the CxA and Contractor for use in developing the commissioning plan, systems manual, and operation and maintenance training plan.

# 1.6 CONTRACTOR'S RESPONSIBILITIES

- A. Contractor shall assign representatives with expertise and authority to act on its behalf and shall schedule them to participate in and perform commissioning process activities including, but not limited to, the following:
  - 1. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend corrective action.
  - 2. Cooperate with the CxA for resolution of issues recorded in the Issues Log.
  - 3. Attend commissioning team meetings held on a variable basis, no more than monthly frequency.
  - 4. Integrate and coordinate commissioning process activities with construction schedule.
  - 5. Review and accept construction checklists provided by the CxA.
  - 6. Complete electronic construction checklists as Work is completed and provide to the Commissioning Authority on a weekly basis.
  - 7. Review and accept commissioning process test procedures provided by the Commissioning Authority.
  - 8. Complete commissioning process test procedures.

## 1.7 CxA'S RESPONSIBILITIES

- A. Organize and lead the commissioning team.
- B. Provide commissioning plan.
- C. Convene commissioning team meetings.
- D. Provide Project-specific construction checklists and commissioning process test procedures.

Verify the execution of commissioning process activities using random sampling. The sampling rate may vary from 1 to 100 percent. Verification will include, but is not limited to, equipment submittals, construction checklists, training, operating and maintenance data, tests, and test reports to verify compliance with the OPR. When a random sample does not meet the requirement, the CxA will report the failure in the Issues Log.

- E. Prepare and maintain the Issues Log.
- F. Prepare and maintain completed construction checklist log.
- G. Witness systems, assemblies, equipment, and component startup.
- H. Compile test data, inspection reports, and certificates; include them in the systems manual and commissioning process report.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 91 00

SECTION 02 41 00 – DEMOLITION

## PART 1 - GENERAL

#### 1.1 DESCRIPTION

A. The work includes removing and disposing of or salvaging materials as indicated on the plans or directed by the Engineer. The work also includes the backfilling of trenches, holes or pits that result from such removals.

## 1.2 STANDARD SPECIFICATIONS

- A. All work to be performed and materials to be used shall be in accordance with current City of Kirkland standards and specification and the 2022 Standard Specifications and Standard Plans for Road, Bridge and Municipal Construction, as published by the Washington State Department of Transportation, unless otherwise indicated herein.
- B. The Contractor shall have one copy of the Standard Specifications and Standard Plans at the job site.
- C. The Standard Specifications apply only to performance and materials and how they are to be incorporated into the work. The legal/contractual relationship sections and the measurement and payment sections do not apply to this document.

PART 2 - PRODUCTS

Not applicable.

#### PART 3 - EXECUTION

#### 3.1 GENERAL REQUIREMENTS

A. With certain exceptions, the Contractor shall raze, remove and dispose of all materials that lie wholly or partially within the clearing limits. The exceptions are utility-owned equipment, items indicated to remain on the plans, and any other items the Owner may direct the Contractor to leave intact.

SECTION 02 41 00

DEMOLITION

B. When salvageable material is to remain the Owner's property, the materials identified shall be removed as described herein. Any material not named as the Owner's property will belong to the Contractor. The Contractor shall store or dispose of such material in a safe and legal manner at no expense to the Owner.

END OF SECTION

# SECTION 02 41 19 - SELECTIVE DEMOLITION

# PART 1 - GENERAL

# 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. Section Includes:
  - 1. Demolition and removal of selected portions of building or structure.
  - 2. Demolition and removal of selected site elements.
  - 3. Salvage of existing items to be reused or recycled.
- B. Related Requirements:
  - 1. Section 01 10 00 "Summary" for restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.
  - 2. Section 01 73 00 "Execution" for cutting and patching procedures.
  - 3. Section 01 35 16 "Alteration Project Procedures" for general protection and work procedures for alteration projects.

## 1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.
- B. Remove and Salvage: Dismantle items from existing construction, in a manner to prevent damage, store for Reinstall. All items not reinstalled are to be salvaged and then delivered to Owner unless directed to remove.
- C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.
- E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

## 1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

## 1.5 PREINSTALLATION MEETINGS

- A. Pre-demolition Conference: Conduct conference at Project site
  - 1. Inspect and discuss condition of construction to be selectively demolished.
  - 2. Review structural load limitations of existing structure.
  - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
  - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
  - 5. Review areas where existing construction is to remain and requires protection.

## 1.6 INFORMATIONAL SUBMITTALS

- A. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property for dust control. Indicate proposed locations and construction of barriers.
- B. Schedule of Selective Demolition Activities: Indicate the following:
  - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
  - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
  - 3. Coordination for shutoff, capping, and continuation of utility services.
  - 4. Use of elevator and stairs.
  - 5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- C. Pre-demolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Comply with Section 01 32 33 "Photographic Documentation." Submit before Work begins.

## 1.7 CLOSEOUT SUBMITTALS

A. Inventory: Submit a list of items that have been removed and salvaged.

### 1.8 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: Present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.

- 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
- 3. Owner will provide material safety data sheets for suspected hazardous materials that are known to be present in buildings and structures to be selectively demolished because of building operations or processes performed there.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
  - 1. Maintain fire-protection facilities in service during selective demolition operations.

# 1.9 COORDINATION

A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

# PART 2 - PRODUCTS

# 2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ASSE A10.6 and NFPA 241.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Engage a professional engineer to perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
  - 1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.
- D. Verify that hazardous materials have been remediated before proceeding with building demolition operations.
- E. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or video.

1.Comply with requirements specified in Section 01 32 33 "Photographic Documentation."SECTION 02 41 193SELECTIVE DEMOLITION

- Inventory and record the condition of items to be removed and salvaged. Provide 2. photographs or video of conditions that might be misconstrued as damage caused by salvage operations.
- 3. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

#### 3.2 PREPARATION

Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according Α. to 40 CFR 82 and regulations of authorities having jurisdiction.

#### 3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- Α. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
- Β. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
  - 1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
  - 2. Arrange to shut off utilities with utility companies.
  - 3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
  - Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC 4. systems, equipment, and components indicated on Drawings to be removed.
    - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
    - Equipment to Be Removed: Disconnect and cap services and remove equipment. C.
    - Equipment to Be Removed and Reinstalled: Disconnect and cap services and d. remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
    - Equipment to Be Removed and Salvaged: Disconnect and cap services and remove e. equipment and deliver to Owner.
    - f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
    - Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible g. ductwork material and leave in place.

#### 3.4 PROTECTION

- Α. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
  - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
  - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
- 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are **SECTION 02 41 19** SELECTIVE DEMOLITION 4

exposed during selective demolition operations.

- 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
- 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 01 50 00 "Temporary Facilities and Controls."
- B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
  - 1. Strengthen or add new supports when required during progress of selective demolition.
- C. Remove temporary barricades and protections where hazards no longer exist.

## 3.5 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
  - 1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
  - 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
  - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
  - 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
  - 5. Maintain fire watch during and for at least 1 hour after flame-cutting operations.
  - 6. Maintain adequate ventilation when using cutting torches.
  - 7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
  - 8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
  - 9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
  - 10. Dispose of demolished items and materials promptly. Comply with requirements in Section 01 74 19 "Construction Waste Management and Disposal."
- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- C. Removed and Salvaged Items:
  - 1. Clean salvaged items.
  - 2. Pack or crate items after cleaning. Identify contents of containers.
  - 3. Store items in a secure area until delivery to Owner.
  - 4. Transport items to Owner's storage area designated by Owner.
  - 5. Protect items from damage during transport and storage.

- D. Removed and Reinstalled Items:
  - 1. Clean and repair items to functional condition adequate for intended reuse.
  - 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
  - 3. Protect items from damage during transport and storage.
  - 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and reinstalled in their original locations after selective demolition operations are complete.

## 3.6 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.
- B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.
- C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.
- D. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.
- E. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings."
- F. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight.
  - 1. Remove existing roof membrane, flashings, copings, and roof accessories.
  - 2. Remove existing roofing system down to substrate.

# 3.7 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and recycle or dispose of them according to Section 01 74 19 "Construction Waste Management and Disposal."
  - 1. Do not allow demolished materials to accumulate on-site.
  - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
  - 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
- B. Burning: Do not burn demolished materials.

## 3.8 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective SECTION 02 41 19 6 SELECTIVE DEMOLITION

END OF SECTION 02 41 19

# SECTION 03 10 00 - SITE CONCRETE FORMING AND ACCESSORIES

## PART 1 - GENERAL

- 1.1 SCOPE
  - A. General: Furnish all labor, equipment and materials necessary to provide formwork in accordance with the provisions of this Section for all site cast-in-place concrete shown in the drawings or required by other Sections of these Specifications.
  - B. Related Sections:
    - 1. Section 03 20 00 Site Concrete Reinforcing
    - 2. Section 03 30 00 Site Cast-in-Place Concrete
- 1.2 BUILDING CODE
  - A. International Building Code, latest edition, if more rigid than those herein, shall govern.
- 1.3 STANDARD SPECIFICATIONS
  - A. Unless otherwise shown or specified, design, construct, erect, maintain and remove forms and related structures for cast-in-place concrete work in compliance with the American Concrete Institute Standard ACI 347, "Recommended Practice for Concrete Formwork."
- 1.4 DELIVERY, STORAGE AND HANDLING
  - A. Store above ground on framework or blocking in ventilated, protected area to prevent deterioration from moisture or damage.

# PART 2 - PRODUCTS

- 2.1 CRUSHED SURFACING TOP COURSE (CSTC)
  - A. Crushed Surfacing Top Course (C.S.T.C.) shall conform to requirements for "Crushed Surfacing -Top Course" per Section 9-03.9(3), of the "Standard Specifications".
- 2.2 CRUSHED SURFACING BASE COURSE (CSBC)
  - A. Crushed Surfacing Base Course (C.S.B.C.) shall conform to requirements for "Crushed Surfacing Base Course" per Section 9-03.9(3), of the "Standard Specifications".

## 2.3 PLYWOOD

- A. Concealed Work: Thickness sufficient to support concrete at rate placed, 5/8-inch minimum, B grade minimum.
- B. Exposed Work: DFPA high density overlay plyform Class I/Exterior; 60/60 weight. Conform to PSI-74, all new materials. Thickness sufficient to support concrete at rate place, 3/4-inch minimum.

## 2.4 STEEL FORMS

A. Minimum 16 gauge (1.5 mm) sheet, well matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.

## 2.5 RE-USE OF FORMS

A. Clean and repair surfaces of forms to be re-used in the work. Split, frayed, delaminated or otherwise damaged form-facing material will not be acceptable. Apply new form coating compound material to concrete contact surfaces as specified for new formwork. When forms are reused for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close all joints. Align and secure joints to avoid offsets.

# 2.6 FORM TIES

- A. Free of defects that will leave holes no larger than 1-1/4 inches (32 mm) diameter in concrete surface. Strength consistent with spacing and rate of placing.
- B. Wire ties and wood spacers are not permitted.

### 2.7 FORM COATINGS

- A. Provide commercial formulation form-coating compounds that will not stain, bond with or adversely affect concrete surfaces. Compound shall not impair subsequent treatment of concrete surfaces requiring bond or adhesion, nor impede the wetting of surfaces to be cured with water or curing compounds.
- B. Sealing of Wood Forms (for use on wood forms other than HDO plywood forms): Before usage, coat faces and edges with Sonneborn "Castoff", Nox-Crete "Preform", or approved equal. Apply in strict accordance with manufacturer's directions.
- C. Form Release Agent:
  - 1. Before each pour, coat wood forms (including HDO plywood forms) with "Paragon", Sonneborn "Castoff", Nox-Crete "Form Coating", Layco "Lacton", or approved equal.
  - 2. For metal forms, use North Coast Chemical's "Form Free', Concentrate No. 2, or approved equal.
  - 3. Apply in accordance with manufacturer's directions.

4. For PVC form liner – as recommended by manufacturer of form liner.

## 2.8 FORMWORK ACCESSORIES

- A. Fillets for Chamfered Corners: Wood strips or rigid plastic, size as required, maximum possible lengths.
- B. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of strength and character to maintain formwork in place while pouring concrete.

## PART 3 - EXECUTION

## 3.1 BASE PREPARATION

A. Install crushed surfacing base course to the specified depths; finish grade and compact to 95% maximum dry density.

## 3.2 FORMS

- A. The Contractor shall be responsible for design, engineering and construction of formwork and shoring.
- B. Design in accordance with "Recommended Practice for Concrete Formwork" (ACI 347), and Building Code, which ever is more rigid. Size facing materials, studs, walers, shores, joists, etc., to safely carry loads at rate placed. Size to limit deflection of individual members to L/360.
- C. Carry Vertical and lateral loads to ground by formwork system and in-place construction that has attained adequate strength for that purpose.
- D. Design formwork so that concrete members and structures are of correct size, shape, alignment, elevation, and position.
- E. Design forms and falsework to include assumed values of live load, dead load, weight of moving equipment operated on formwork, concrete mix, height of concrete drop, vibrator frequency, ambient temperature, foundation pressures, stresses, lateral stability, and other factors pertinent to safety of structure during construction.
- F. Provide shores and struts with positive means of adjustment capable of taking up formwork settlement during concrete placing operations, using wedges or jacks or a combination thereof.
- G. Provide trussed supports when adequate foundations for shores and struts cannot be secured.
- H. Support form facing materials by structural members spaced sufficiently close to prevent objectionable deflection.
- I. Fit forms placed in successive units for continuous surfaces to accurate alignment, free from irregularities, and within allowable tolerances.

- J. Provide camber in formwork as required for anticipated deflections due to weight and pressures of fresh concrete and construction loads.
- K. Provide formwork sufficiently tight to prevent leakage of cement past during concrete placement. Solidly butt joints and provide backup material at joints as required to prevent leakage and fins.

# 3.3 FORM CONSTRUCTION

- A. Construct forms complying with ACI 347, to the exact sizes, shapes, lines, and dimensions shown, and as required to obtain accurate alignment, location, grades, level, and plumb work in finish structures.
- B. Provide for opening, offsets, sinkages, keyways, recesses, moldings, reglets, chamfers, blocking, screeds, bulkheads, anchorages and other features required. Use selected materials to obtain required finishes.
- C. Forms for openings, and construction which accommodates installation by other trades whose materials and products must be fabricated before the opportunity exists to verify the measurements of adjacent construction which affects such installations, shall be accurately sized and located as dimensioned on the drawings. In the event that deviation from the drawing dimensions results in problems in the field, the Contractor shall be responsible for resolution of the conditions as approved by the Owner's Representative without additional expense to the Owner.

## 3.4 FABRICATION

- A. Form intersecting planes to provide true, clean-cut corners.
- B. Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before concrete is placed. Retighten forms immediately after concrete placements as required to eliminate mortar leaks.

# 3.5 FORMS FOR EXPOSED CONCRETE

- A. Drill forms to suit ties used and to prevent leakage of concrete mortar around tie holes. Provide form tie holes as indicated on drawings.
- B. Provide sharp, clean corners at intersecting planes, without visible edges or offsets. Maintain true, square intersections.
- C. Prevent bowing of forms between studs and to avoid bowed appearance in concrete.
- D. Assemble forms so they may be readily removed without damage to exposed concrete surfaces.
- E. Unless shown otherwise, ease exposed edges with 1/4 inch radius.

F. Tape between form joints and cover joint with a skim coat of silicone sealer to provide a smooth, continuous concrete surface. Provide joints at exposed concrete as indicated on the drawings.

# 3.6 JOINTS

A. General: Joints not shown on the drawings shall be so made and located as to least impair the strength of the structure and shall be approved by the Owner's Representative prior to forming.

## 3.7 FORM COATINGS

- A. General Application:
  - 1. In accordance with manufacturer's instructions
  - 2. Before placing reinforcing
  - 3. For each re-use of form
  - 4. Use minimum quantity required
  - 5. Do not allow to contact concrete against which fresh concrete will be placed.
- B. Board and Plywood Forms: "Form Film", W.R. Crace Company, or Burke "Form Coating", or approved equal.

# 3.8 REMOVAL

- A. Remove load-supporting forms when concrete has attained 75 percent of required 28-day compressive strength.
- B. Remove formwork progressively so no unbalanced loads are imposed on structure.
- C. Use only wooden wedges for removal of forms from exposed surfaces. Do not pry.
- D. Remove all formwork.

END OF SECTION 03 10 00

## SECTION 03 20 00 - SITE CONCRETE REINFORCING

## PART 1 - GENERAL

- 1.1 SCOPE
  - A. General: Furnish all labor, equipment and materials necessary to provide complete, in place, all steel required for reinforcement of cast-in-place concrete as shown on the drawings.
- 1.2 QUALITY ASSURANCE:
  - A. Comply with the pertinent provisions of following standards as listed:
    - 1. International Building Code, latest edition.
    - 2. CRSI "Manual of Standard Practice."
    - 3. ACI 318. "Building Code Requirements for Reinforcement Concrete."
- 1.3 MILL CERTIFICATES
  - A. Submit steel producer's certificates for mill tests.

## 1.4 DELIVERY

A. Deliver reinforcement to the job site bundled, tagged, and marked. Use metal tags indicating bar size, lengths, and other information corresponding to markings shown on placement diagrams.

## 1.5 STORAGE

A. Store reinforcement at the job site in a manner to prevent damage and accumulation of dirt and rust. Do not store atop existing concrete surface.

# PART 2 - PRODUCTS

- 2.1 MATERIALS
  - A. Reinforcing Bars: Comply with ASTM A 615, Grade 60, deformed.
  - B. Steel Wire: Comply with ASTM A 82.
  - C. Welded Wire Fabric: Comply with ASTM A 185, size as shown on drawings.

D. Anchor Bolts: Anchor bolts shall be ASTM A 36 threaded rod or ASTM A 307 bolts, or as indicated on the drawings. Anchor bolts shall be hot dip galvanized in conformance with ASTM A 123 and ASTM A 153.

# 2.2 ACCESSORY MATERIALS

- A. Supports for Reinforcement: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement in place.
- B. Use wire bar supports complying with CRSI recommendations, unless otherwise indicted. Do not use wood or brick.
- C. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
- D. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with either hot-dip galvanized or plastic protected legs.
- E. Tie Wire: Minimum 16 gage annealed type.

## 2.3 FABRICATION

- A. Fabricate reinforcing bars to conform to required shapes and dimensions, with fabrication tolerances complying with CRSI Manual. In case of fabricating errors, do not re-bend or straighten reinforcement in a manner that will injure or weaken the material. Reinforcement with any of the following defects will not be permitted in the work:
  - 1. Bar lengths, depths, and bends exceeding specified fabrication tolerances.
  - 2. Bends or kinks not indicated on drawings or final shop drawings.
  - 3. Bars with reduced cross-section due to excessive rusting or other cause.

## PART 3 - EXECUTION

## 3.1 INSPECTION

A. Examine the subgrade, formwork, and the conditions under which concrete reinforcement is to be placed, and correct conditions which would prevent proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

## 3.2 INSTALLATION

- A. Comply with the specified standards for details and methods of reinforcement placement and supports, and as herein specified.
- B. Clean reinforcement to remove loose rust and mill scale, earth, and other materials which reduce or destroy bond with concrete.

- C. Position, support, and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolster, spacers and hangers as required. Blocks, for holding reinforcement from contact with the forms, shall be precast mortar blocks having a 28-day compressive strength of not less than 3,750 psi of approved shape and dimensions or approved metal chairs. Metal chairs which are in contact with the exterior surface of the concrete shall be plastic coated or galvanized. Layers of bars shall be separated by plastic chairs, precast mortar blocks having a 28-day compressive strength of not less than 3,750 psi or by other equally suitable devices. The use of pebbles, pieces of broken stone or brick, metal pipe, and wooden blocks will not be permitted. The minimum spacing between bars shall be one-bar diameter or one-inch minimum, but not less than 1-1/3 times the maximum size of coarse aggregate.
- D. Place reinforcement to obtain the minimum coverages for concrete protection according to ACI 318. Arrange, space, and securely tie bars and supports together with 16 gauge wire to hold reinforcement accurately in position during concrete placement operations. Set wire ties so that twisted ends are directed away from exposed concrete surfaces. Bars shall be tied at all intersections, except where spacing is less than 1 foot in each direction when alternate intersections shall be tied.
- E. Install welded fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh.
- F. Provide sufficient numbers of supports and of strength to carry reinforcement. Do not place reinforcing bars more than 2" beyond the last leg of any continuous bar support. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.
- G. Provide standard reinforcement splices by lapping ends the proper length, placing bars in contact, and tightly wire tying.
- H. Reinforcement in any member shall be placed and then inspected by the Owner's Representative before concrete placing begins. Concrete placed in violation of this provision may be rejected and removal required with new reinforcing steel and concrete placed by Contractor at no additional cost to the Owner.
- I. In the event conduits, piping, inserts, sleeves, or any other items interfere with placing reinforcement as indicated in the Drawings or as otherwise required, immediately consult the Owner's Representative, and obtain approval of new procedure before placing concrete.
- J. Splicing:
  - 1. All reinforcement shall be furnished in full lengths wherever possible. Splicing of bars shall conform to ACI SP-66 and ACI 318. Splices shall be staggered as far apart as possible.
  - 2. Unless shown otherwise, lap all reinforcing bars 40 diameters (18 inches minimum).

# 3.3 FIELD WELDING

A. Welding performed by American Welding Society certified welders as per AWS D12.1. Weld reinforcing steel only where indicated on the drawings unless authorized in writing by the

Engineer. ASTM A 706 reinforcing shall be utilized if reinforcing is to be welded. Welding shall be performed in conformance with AWS D1.4.

- 3.4 CONCRETE PROTECTION
  - A. Provide concrete protection as shown on the drawings.
- 3.5 REINFORCING SCHEDULE
  - A. General: Provide reinforcing bar or woven wire mesh in concrete where indicated on drawings:
    - 1. Woven wire mesh shall be used in concrete pavement, accessible (ADA) ramps and driveway ramps unless otherwise noted.
    - 2. Reinforcing bar shall be used in walls, stairs, concrete edging, curbs and footings as noted.

END OF SECTION 03 20 00

## SECTION 03 30 00 - SITE CAST-IN-PLACE CONCRETE

## PART 1 - GENERAL

## 1.1 SCOPE

A. General: Furnish all labor, equipment and materials necessary for all site concrete work, including but not limited to: concrete work in footings, pavement, curbs, walls, and accessible (ADA) curb ramps.

## 1.2 BUILDING CODE

- A. International Building Code, latest edition, if more rigid than those herein, shall govern.
- 1.3 STANDARD SPECIFICATIONS
- A. Conform to Standard "Specifications for Structural Concrete Buildings, ACI 301, published by the American Concrete Institute, except as otherwise shown on the drawings or specified herein.

## 1.4 QUALITY CONTROL

- A. Notify Owner's Representative at least 48 hours in advance of concrete pour.
- B. Quality Control by Contractor: The Contractor shall be responsible for the strength and quality of all the concrete placed.
- C. Quality Control by the Owner: Concrete manufactured and intended for placement in the work shall be tested by a Testing Laboratory employed by the Owner to determine compliance with these Specifications. (This applies to Site Cast-in-Place Concrete only. Contractor is responsible for all code compliance testing of Architectural Concrete). The Owner's Laboratory will sample and test the fresh concrete and cast and test all standard concrete test cylinders. The Owner shall inform the Contractor of the results of all tests performed by the Owner's Laboratory including the test strength of the concrete cylinders. However, the Owner shall be in no way responsible for any portion of the quality control necessary to produce concrete meeting the specified strength and quality requirements. The responsibility for furnishing and placing concrete conforming to the requirements of these Specifications is solely that of the Contractor.
- D. Layout: Contractor is to layout and stake the location of all concrete accessible (ADA) curb ramps, walkways, plaza areas, curbs, footings for site furnishings and sign posts, and walls on the site for approval prior to construction.
- E. Inspection: Notify Owner's Representative at least 48 hours before inspection will be required; inspection will be required immediately prior to any intended pours or placement of concrete.
- F. Tests: Concrete tests per ASTM C143

# 1.5 SUBMITTALS

- A. Submit design mix data under the provisions of Section 01 33 00 Submittal Procedures to Owner's Representative no less than 2 weeks prior to concrete placement. Do not proceed until authorized. Concrete mix designs shall conform to the requirements of IBC 1905.
- B. Submit under the provisions of Section 01 33 00 Submittal Procedures:
  - 1. Product Data: Manufacturer's product data, application and installation instructions for proprietary materials and items. Submit for admixtures, coloring agents, bonding agents, curing compounds and the like.
- C. Submit under the provisions of Section 01 33 00 Submittal Procedures:
  - 1. Certificates: Provide material certificates, instead of materials laboratory test reports, ONLY when permitted by Owner. Both material producer and Contractor are required to sign, certifying that each material item complies with or exceeds specified requirements.
  - 2. Concrete Placement Schedule: Submit proposed concrete placement schedule, including the following information:
    - a. Method of placement.
    - b. Location.
    - c. Quantity of concrete. (Area rather than volume acceptable)
    - d. Concrete mix, including type of cement and admixtures to be used.
- D. Samples:
  - 1. Provide four (4) 6" x 6" samples showing range of sandblast finish. Approved samples to be maintained on site until project completion

# PART 2 - PRODUCTS

## 2.1 CEMENT

A. Portland cement shall conform to the "Standard Specification for Portland Cement" (ASTM C 150 Type 1). Low heat Portland cement shall be used unless high-early-strength cement is authorized by the Owner. Where high-early-strength concrete is used, the specified strength shall be achieved in 7 days rather than the 28 days specified for low heat cement. All cement shall come from the same manufacturing plant and be certified as to quality.

# 2.2 AGGREGATES

- A. Coarse Aggregate: Coarse aggregate for concrete shall conform to ASTM C33, 3/4" maximum size.
- B. Fine Aggregate: Fine aggregate shall be natural sand conforming to ASTM C-33.

## 2.3 WATER

A. Water shall be any potable water, clean and free from injurious amounts of oil, acid, alkali, and organic materials. Water shall conform to ASTM C 94.

## 2.4 ADMIXTURES

- A. General: Where more than one admixture is used in the mix, furnish manufacturer's certification to the Owner's Representative that the admixtures to be used are compatible in combination with the cement and aggregates.
- B. Water reducing admixture shall conform to ASTM C 494, Type A.
- C. Retarder-Densifying Admixture: Conform to ASTM C-494, Type B.
- D. Accelerator: Chemical admixture designed to accelerate set on concrete but not corrode reinforcing steel; ASTM C-494, Type C.
- E. Air entrainment admixture shall conform to ASTM C 260.
- F. Fly Ash: ASTM C 618, Class F.

## 2.5 BONDING AGENTS

A. Grace Construction Materials Daraweld C, Larson Products Weldcare, or approved. Emulsiontype additive of plasticized high polymer resins designated for bonding of concrete.

### 2.6 CURING COMPOUND

A. Concrete curing compound shall be of a nature and composition not deleterious to concrete and shall be of a standard and uniform quality ready for use as shipped by the manufacturer. At the time of use, the curing compound shall be in a thoroughly stirred condition. Curing compounds shall not be diluted by the addition of solvents or thinners, or be altered in any manner without the specific approval of and in a manner prescribed by the manufacturer.

# 2.7 ADHESIVES

- A. Adhesives Engineering Concresive 1180, or approved. Use for grouting embedded dowels and reinforcing bars.
- B. Grout for exposed surfaces shall be non-staining.
- C. Primers and Sealers: As recommended by the adhesive manufacturer.
- 2.8 EXPANSION JOINTS

- A. Premolded Joint: Pre-molded non-extruded resilient material maximum 3/8" thick, with strip off top to allow for joint caulking.
- B. Joint caulking: Self-leveling polyurethane, Sikaflex 1 CSL by Sika, or approved equal, color to match concrete.

## 2.9 CONCRETE

- A. General: Ready mix concrete shall conform to specifications for Ready Mix Concrete (ASTM C 172). Mix in accordance with minimum stated proportions. Select ingredient proportions, producing workable mix and attaining required 28-days strength. Produce durable, abrasion-resistant, watertight concrete, uniform in appearance. Minimum cement content is 550 pounds/cubic yard.
- B. Consistency: The quantity of water required for the proper consistency of the concrete shall be determined by the slump test in accordance with ASTM C 142. Slump allowances shall be 3 inches, plus or minus 1 inch.
- C. Strength: Compressive strength shall be determined in accordance with ASTM C-39. Strength for all concrete pavement, flatwork and curbs retaining 6" or less shall have a 28-day compressive strength of 3,000 psi. Strength for all concrete footings, retaining walls and curbs retaining more than 6" shall have a 28-day compressive strength of 4,000 psi.

# 2.10 CRUSHED SURFACING TOP COURSE (CSTC)

A. Crushed Surfacing Top Course (C.S.T.C.) shall conform to requirements for "Crushed Surfacing -Top Course" per Section 9-03.9(3), of the "Standard Specifications."

## 2.11 NON-SHRINK GROUT

A. Non-shrink grout shall conform to ASTM C 1107 and shall be premixed consisting of nonmetallic aggregate, cement, water-reducing admixture and plasticizing agents capable of developing the 28-day strengths on the drawings.

# 2.12 SACKING MIX

A. General: Dry mix shall consist of one part cement; two parts, by volume, of sand passing a No. 16 screen. Blend cement with white cement, only if necessary, to obtain color match to surrounding concrete surface as required. For mortar add enough water to the dry mix to achieve the correct consistency.

## 2.12 OTHER MATERIALS

A. All other materials not specifically described but required for completion and proper installation of cast-in-place concrete shall be as selected by Contractor and approved by Owner's Representative.

# PART 3 - EXECUTION

## 3.1 CONCRETE PLACEMENT

- A. Place concrete in compliance with practices and recommendations of ACI 304, and as herein specified. Give minimum 48-hour notification prior to placing concrete.
- B. Where new concrete abuts existing, bond shall be obtained by roughening the surface of the concrete to ¼-inch amplitude in an approved manner which will expose the aggregate uniformly and will not leave laitance, loosened particles or aggregate or damaged concrete at the surface. Apply bonding agent.
- C. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which was hardened sufficiently to cause the formation of seams or planes of weakness within the section.
- D. If a section cannot be placed continuously, provide construction joints as herein specified.
- E. Perform concrete placing at such a rate that concrete which is being integrated with fresh concrete is still plastic.
- F. Deposit concrete as nearly as practicable in its final location to avoid segregation due to rehandling and flowing.
- G. Do not subject concrete to any procedure which will cause segregation.
- H. Remove temporary spreaders in forms when concrete placing has reached the elevation of such spreaders.
- I. Screed concrete which is to receive other construction to the proper level to avoid excessive skimming and grouting.
- J. Do not use concrete which becomes nonplastic and unworkable, or does not meet the required quality control limits, or which has been contaminated by foreign materials.
- K. Remove and replace, when directed by Owner's Representative, concrete surfaces which show excessive shrinkage, cracks, or improper drainage.
- L. Remove rejected concrete from the site and dispose of legally.
- M. Excavation:
  - 1. Footing excavations are to be to the depth and widths shown on the drawings. Overexcavations shall be filled with concrete.
  - 2. Grade sidewalk and slab areas to the lines and elevations required. Compact subgrade per above prior to placing base course.
- N. Cold Weather Placement: ACI 306.1. Do not place concrete while the atmospheric temperature is below 40 degrees F., or approaching 40 degrees F. and falling.

O. Hot Weather Placement: ACI 305 R.

## 3.2 REINFORCING AND EMBEDDED ITEMS

A. Accurately position, support and secure reinforcement and embedded items against displacement. Provide reinforcing in concrete where indicated on drawings and specified herein. Stagger laps to avoid discontinuity in either direction.

## 3.3 PLACING CONCRETE SLABS

- A. Deposit and consolidate concrete slabs in a continuous operation, within the limits of construction joints, until the placing of a panel or section is complete.
- B. Consolidate concrete during placement by use of the specified equipment, thoroughly working concrete around the reinforcement and into corners.
- C. Consolidate concrete in remainder of slabs by vibrating bridge screeds, roller pipe screeds, or other methods acceptable to the Owner's Representative.
- D. Limit the time of vibrating consolidation to prevent bringing an excess of fine aggregate to the surface.
- E. Bring slab surfaces to the correct level with a straight edge, and then strike off.
- F. Use bullfloats or darbies to smooth the surface, leaving it free from bumps and hollows. Finish interior slabs with smooth steel trowel.
- G. Do not sprinkle water on the plastic surface; do not disturb the slab surfaces prior to start of finishing operations.

### 3.4 CONSOLIDATION

- A. Consolidate all concrete in accordance with provisions of ACI 309.
- B. Consolidate each layer of concrete immediately after placing, by use of high frequency, rubber tipped, mechanical internal concrete vibrators supplemented by hand-spading, rodding, or tamping.
- C. Do not use vibrators to transport concrete inside the forms.

### 3.5 EQUIPMENT

- A. Provide adequate number of units and power source at all times. Maintain spare units on hand to ensure adequacy.
- 3.6 JOINTS

SECTION 03 30 00

- A. General: Where a construction joint is to be made, the surface of concrete shall be thoroughly cleaned and all laitance removed. Vertical joints shall be thoroughly wetted and slushed with a neat cement grout immediately before placing of new concrete. Joint locations shall be as shown on the plan and details with the following specifics and minimums.
  - 1. Paving: Locate joints as shown on drawings or as approved. Align joints of new pavement with existing pavement where shown on plans. Control joints shall be located at 10' o.c. max and as detailed on the plans. Provide expansion joints at approximate 30' spacing and as detailed on the plans and where:
    - a. Exterior slabs abut vertical or inclined surfaces, including building, stairs, walls, ramps, columns, and curbs.
    - b. New concrete abuts existing concrete
    - c. As detailed in the plans.
  - 2. Curbs: Locate control joints at 10' o.c. max, expansion joints 30' o.c. max. All joints shall align with joint pattern of adjacent paving. Provide expansion joints where curbs abut building.
  - 3. Walls: Locate control joints at 10' o.c. max., expansion joints approximately 30' o.c. max., horizontally and vertically. All joints shall align with joint pattern of adjacent pavement. Provide expansion joints where concrete walls abut building.
- B. Expansion Joints:
  - 1. Pre-molded expansion joints shall be max 3/8" wide and filled to full cross section with caulking.
  - 2. Place expansion joints at right angles to the surface of paving.
- C. Control Joints:
  - 1. Tooled control joints to depth and dimensions as indicated on drawings.
- D. Construction Joints:
  - 1. Form with a keyed joint per drawings.
  - 2. Grade and finish shall match across joint.
- E. Keys: Longitudinal keys at least 1 1/2 inches deep shall be provided in all wall joints.

# 3.7 PROTECTION AND REPAIR OF CONCRETE CONSTRUCTION

- A. All surfaces shall be protected against damage. This may require installation of temporary fencing or provision of security services. During the first 72 hours after placing the concrete, any wheeling, working or walking on the concrete shall not be permitted. All slabs, stairs and other flatwork subject to wear shall be covered with plywood as soon as the concrete has set. This does not alter the requirements for proper curing as specified.
- B. No concrete slabs or top surfaces of walls shall be placed during rain unless acceptable protective shelter is provided, and during such weather, all concrete placed within the preceding 12 hours shall be protected with waterproof canvas or other suitable coverings.

- C. Clean: Clean up all concrete drippings, tools, etc., and remove from site. Fill all voids, gravel pockets, etc., with color matched mortar. Knock protrusions and fins off flush with surface. Leave all surfaces clean.
- D. Replacement: Remove and replace, when directed by Owner's Representative, surfaces which show excessive shrinkage, cracks or improper drainage.

## 3.8 FINISH OF SURFACES

- A. General: Surface to be hard, uniform in color, clean and without pockmarks, honeycomb, projections or embedded materials. Tool all outside edges with a 1/4 inch radius tool unless otherwise noted.
- B. Finishing Tolerances:
  - 1. Finished surfaces shall have no variation greater than 1/4 inch plus or minus from a 10 foot straight-edge, except at grade changes or where shown on the drawings.
- C. Screeds:
  - 1. Set edge forms and intermediate screed strips accurately to produce the designed elevations and contours in the finished surface.
  - 2. Screeds and forms will be sufficiently strong to support vibrating bridge screeds or roller pipe screeds if the nature of the finish specified requires the use of such equipment.
  - 3. Align the concrete surface to the contours of screed strips by the use of strike-off templates or approved compacting type screeds.
- D. Float finish:
  - 1. Apply float finish to all unformed horizontal concrete surfaces.
  - 2. After placing concrete, do not work the surface further until ready for floating.
  - 3. Begin floating when the surface water has disappeared or when the concrete has stiffened sufficiently to permit operation of a power-driven float, or both.
  - 4. Consolidate the surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units.
  - 5. Check and level the surface plane with a ten foot straightedge placed on the surface not less than two different angles.
  - 6. Cut down high spots and fill low spots to produce a surface with the specified finish tolerances.
  - 7. Uniformly slope to drains where required.
  - 8. Immediately after leveling, refloat the surfaces to a smooth, uniform, granular texture.
- E. Light or Medium Broom Finish:
  - 1. Provide a floated finish as described above.
  - 2. Apply a light or medium broom finish, with surface grooves or grains not greater than 1/16" in depth. Provide uniform texture with a fiberbristle broom.
  - 3. Texture in the direction perpendicular to the main traffic route unless shown otherwise on the Drawings.

- F. Trowel Finish:
  - 1. General: Apply trowel finish to monolithic slab surfaces that are to be exposed to view, unless otherwise shown, and to slab surfaces.
  - 2. Provide Float finish as described above.
  - 3. Begin the first trowel finish operation using a power-driven trowel. Begin final troweling when the surface produces a ringing sound as the trowel is moved over the surface.
  - 4. Consolidate the concrete surface by the final hand troweling operation, free from trowel marks, uniform in texture and appearance, and with Class A surface finish throughout.
  - 5. Sack all exposed surfaces of walls and curb at plant bed as required to obtain desired finish and to match finish of exposed concrete exterior walls of new building.
  - 6. Sacking: Perform sacking after completing all necessary patching and correction of major imperfections. Thoroughly wet the concrete surface and immediately commence sack rubbing. Rub the mortar thoroughly over the area with clean burlap or a sponge rubber float so that it fills all pits, rock pockets and imperfections. While the mortar is still plastic, rub the surface with a dry mix of the same material in order to remove all excess plastic material and place enough dry material to stiffen the mortar. The surface of pits and deformities should be flush with the surrounding surface.
- G. Finishing Schedule:
  - 1. Vehicular curbs: Light broom finish
  - 2. ADA Curb Ramps: Medium broom finish and truncated dome texture per drawings.
  - 3. Walls and curb at plant bed: Trowel/ sack finish
  - 4. Plazas, paths and walkways: Light broom finish

# 3.9 CONCRETE CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold weather protection and ACI 305 R for hot weather protection during curing.
- B. Formed Surfaces: Cure formed surfaces. If forms are removed during curing period, continue moist curing as follows for unformed surfaces.
- C. Unformed Surfaces: Cure unformed surfaces continuously moist for not less than 7 days with water, water-fog spray or moisture retaining cover.

END OF SECTION 03 30 00

# SECTION 03 30 01 – BUILDING CAST-IN-PLACE CONCRETE

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.
- B. Related Sections:
  - 1. Division 31 "Earthwork" for drainage fill under slabs-on-grade.

## 1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

## 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
  - 1. Submitted mix designs shall include either the "Field Experience Method Form" or the "Trial Batch Method Form", included in this specification. Fill out the forms in their entirety.
  - 2. Indicate amounts of mixing water to be withheld for later addition at Project site.
- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

# 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer.
- B. Material Certificates: For each of the following, signed by manufacturers:
  - 1. Cementitious materials.

- 2. Admixtures.
- 3. Steel reinforcement and accessories.
- 4. Curing compounds.
- 5. Vapor retarders.
- 6. Joint-filler strips.
- C. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
  - 1. Aggregates.

## 1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
- B. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
  - 1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.
  - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- C. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

## 1.7 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Keep reinforcement off ground by using pallets, dunnage, or other supports.

## PART 2 - PRODUCTS

- 2.1 Materials
  - A. Formwork: Furnish formwork and form accessories according to ACI 301.
  - B. Steel Reinforcement
    - 1. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
    - 2. Plain Steel Wire: ASTM A 82, as drawn.
    - 3. Plain Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.
  - C. Concrete Materials
    - 1. Portland Cement: ASTM C 150, Type I or II or I/II. Supplement with the following:
      - a. Fly Ash: ASTM C618, Class F or C.
      - b. Ground Granulated Blast Furnace Slag: ASTM C989, Grade 100 or 120.
    - 2. Normal Weight Aggregate: ASTM C 33, uniformly graded, with the following maximum nominal size:
      - a. Foundations: 1 1/2-inch

- b. Slabs-on-Grade: 1 inch
- c. Concrete on Metal Deck: 3/4 inch
- 3. Water: Complying with ASTM C 94.
- D. Admixtures
  - 1. Air-Entraining Admixture: ASTM C 260.
  - 2. Water-Reducing Admixture: ASTM C 494, Type A.
  - 3. High Range, Water-Reducing Admixture: ASTM C 494, Type F.
  - 4. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.
  - 5. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
- E. Vapor Retarder: Multi-ply reinforced polyethylene sheet, ASTM E 1745, Class C, not less than 7.8 mils thick; or polyethylene sheet, ASTM D 4397, not less than 10 mils thick.
- F. Joint Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- G. Curing Materials
  - 1. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
  - 2. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf.
  - 3. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap polyethylene sheet.
  - 4. Water: Potable.
  - 5. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
  - 6. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

### 2.2 CONCRETE MIXTURES

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301. Mixture designs shall comply with the requirements of the structural drawings.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than Portland cement in concrete as follows:
  - 1. Fly Ash: 25 percent.
- C. Admixtures: Use admixtures according to manufacturer's written instructions.
  - 1. Use water-reducing or high-range water-reducing admixture in concrete, as required, for placement and workability.
  - 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
  - 3. Use water-reducing admixture in pumped concrete and concrete with a water-cementitious materials ratio below 0.50.

## 2.3 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

- 1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.
- 2. Provide batch ticket for each batch discharged and used in the work, indicating project identification name and number, date, mix type, mix time, quantity, and amount of water in the batch from the plant and the remaining water that may be added at the site, if any. Record approximate location of final deposit in structure.

# 2.4 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

# PART 3 - EXECUTION

- 3.1 Installation, General
  - A. Formwork: Design, erect, shore, brace, and maintain formwork, according to ACI 301.
  - B. Embedded Items: Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
    - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
  - C. Vapor Retarder: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
    - 1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.
  - D. Steel Reinforcement: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
    - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
  - E. Joints: Construct joints true to line with faces perpendicular to surface plane of concrete.
    - 1. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
      - a. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated.
      - b. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
    - 2. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth as indicated and as follows:
      - a. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

- 3. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
- F. Tolerances: Comply with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

# 3.2 CONCRETE PLACEMENT

- A. Comply with ACI 304R for measuring, mixing, transporting, and placing concrete.
- B. Do not add water to concrete during delivery or during placement.
  - 1. Subject to Architect's approval, water may be added at Project site before test sampling and placing concrete, only to the amount listed on the batch ticket, subject to limitations of ACI 301.
- C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints. Deposit concrete to avoid segregation.
  - 1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
  - 2. Do not use vibrators to transport concrete inside forms.
- D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
- E. Cold-Weather Placement: Comply with ACI 306.1.
- F. Hot-Weather Placement: Comply with ACI 301.

# 3.3 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
  - 1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
  - 1. Apply to concrete surfaces exposed to public view, to be covered with a coating or covering material applied directly to concrete.
- C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.
- 3.4 FINISHING Unformed Surfaces

- A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Screed surfaces with a straightedge and strike off. Begin initial floating using bull floats or darbies to form a uniform and open textured surface plane before excess moisture or bleedwater appears on the surface.
  - 1. Do not further disturb surfaces before starting finishing operations.
- C. Scratch Finish: Apply scratch finish to surfaces to receive concrete floor topping or mortar setting beds for ceramic or quarry tile, Portland cement terrazzo, and other bonded cementitious floor finish, unless otherwise indicated.
- D. Float Finish: Apply float finish to surfaces indicated, to surfaces to receive trowel finish, and to floor and slab surfaces to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.
- E. Trowel finish: Apply a hard trowel finish to surfaces indicated and to floor and slab surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin film-finish coating system.
  - 1. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- (3.05-m-) long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4 inch (6 mm).
- F. Trowel and Fine Broom Finish: Apply a partial trowel finish, stopping after second troweling, to surfaces indicated and to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set methods. Immediately after second troweling, and when concrete is still plastic, slightly scarify surface with a fine broom.
- G. Nonslip Broom Finish: Apply a nonslip broom finish to surfaces indicated, and to exterior concrete platforms, steps, and ramps. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber bristle broom perpendicular to main traffic route.

# 3.5 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with inplace construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

## 3.6 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
  - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
  - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
  - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
    - a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.
  - 4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

# 3.7 LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.
  - 1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
  - 2. Do not apply to concrete that is less than seven days old.
  - 3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.
- B. Polished Concrete Floor Treatment: Apply polished concrete finish system to cured and prepared slabs to match accepted mockup.
  - 1. Machine grind floor surfaces to receive polished finishes level and smooth and to depth required to reveal aggregate to match approved mockup.
  - 2. Apply penetrating liquid floor treatment for polished concrete in polishing sequence and according to manufacturer's written instructions, allowing recommended drying time between successive coats.
- 3. Continue polishing with progressively finer grit diamond polishing pads to gloss level to match approved mockup.
- 4. Control and dispose of waste products produced by grinding and polishing operations.
- 5. Neutralize and clean polished floor surfaces.
- C. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instructions.

#### 3.8 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
  - 1. Defer joint filling until concrete has aged at least one month(s). Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

## 3.9 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part Portland cement to two and one-half parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
  - Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension to solid concrete. Limit cut depth to 3/4 inch (19 mm). Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
  - 2. Repair defects on surfaces exposed to view by blending white Portland cement and standard Portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
  - 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
  - 1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or

that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.

- 2. After concrete has cured at least 14 days, correct high areas by grinding.
- 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
- 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
- 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
- 6. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
- 7. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

## 3.10 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Tests and Inspections: As indicated on the structural drawings.
- C. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
- D. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
- E. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
- F. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

G. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

## 3.11 PROTECTION OF LIQUID FLOOR TREATMENTS

A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION 03 30 01

# **CONCRETE MIX DESIGN SUBMITTAL – FIELD EXPERIENCE METHOD**

Project	Mix Design No.
General Contractor	Concrete Class
Ready Mix Supplier	Proposed Use
Plant Supplying Contractor	

# MIX CONSTITUENTS

	Description	Specific	Weight (lb) or	Absolute Volume
		Gravity	Dosage (oz)	(cubic foot)
Cement				
Fly Ash				
Silica Fume				
Coarse Aggre-				
gate				
Fine Aggregate				
Water				
Admixtures				
Water Reducer				
Air Entrainer				
High Range				
Water Reducer				
Other				
Total				

# **MIX CHARACTERISTICS**

Water / Cementitious Ratio Air (%) Density (pcf) Slump (in) Before High Range Water Reducer After High Range Water Reducer

## CONCRETE MIX DESIGN SUBMITTAL – FIELD EXPERIENCE METHOD (CONTINUED)

## **REQUIRED BACK – UP DATA**

NOTE: THE SUBMITTED DATA SHALL COMPLY WITH THE FOLLOWING:

		Yes	No
•	Ten test reports (minimum) provided.		
•	The reports encompass a period of not less than 60 days.		
•	The reports are no more than 24 months old.		
•	The reports are for concrete supplied from the same plant that will be supplying this project.		
•	Submitted test data is supported by reports from an independent testing agency, and the independent agency's reports are available at the Engineer's request.		

## **REQUIRED STATISTICAL ANALYSIS**

METHOD FOR DETERMINING REQUIRED AVERAGE COMPRESSIVE STRENGTH (PICK ONE)

ACI 301 Section 4.2.3.3.a – Standard Deviation
15 tests minimum required

Specified compressive strength (psi)	
Calculated standard deviation of submitted data, $s_s$ (psi)	
Factor from Table 4.2.3.3.a.1, k	
Required average compressive strength from Table 4.2.3.3.a, f'cr (psi)	
Calculated average strength of submitted data (psi)	

ACI 301 Section 4.2.3.3.b – Standard Deviation Not Required

Specified compressive strength (psi) Required Average Strength from Table 4.2.3.3.b, f'<sub>cr</sub> (psi) Calculated average strength of submitted data (psi)

## REQUIRED ATTACHMENTS (Please Check)

Field Test Data
Statistical Analysis
Coarse Aggregate Gradation
Fine Aggregate Gradation

Certification that all ingredients are compatible.

SECTION 03 30 01

# CONCRETE MIX DESIGN SUBMITTAL – TRIAL BATCH METHOD

Project	Mix Design No.
General Contractor	Concrete Class
Ready Mix Supplier	Proposed Use
Plant Supplying Contractor	

# **MIX CONSTITUENTS**

	Description	Specific	Weight (lb) or	Absolute Volume
		Gravity	Dosage (oz)	(CUDIC TOOT)
Cement				
Fly Ash				
Silica Fume				
Coarse Aggre-				
gate				
Fine Aggregate				
Water				
Admixtures				
Water Reducer				
Air Entrainer				
High Range				
Water Reducer				
Other				
Total				

# **MIX CHARACTERISTICS**

Water/Cementitious Ratio Air (%) Density (pcf) Slump (in) Before High Range Water Reducer After High Range Water Reducer

No

## CONCRETE MIX DESIGN SUBMITTAL – TRIAL BATCH METHOD (CONTINUED)

# **DOCUMENTATION OF AVERAGE STRENGTH**

NO	TE: THE SUBMITTED DATA SHALL COMPLY WITH THE FOLLOWING:	
		Yes
•	At least three trial mixtures are included	

٠	At least three trial mixtures are included	
•	At least three different cement contents are included.	
•	At least three different water / cementitious materials ratios are included.	
•	The trial batches are no more than 24 months old.	

## **REQUIRED STATISTICAL ANALYSIS**

METHOD FOR DETERMINING REQUIRED AVERAGE COMPRESSIVE STRENGTH (PICK ONE)

ACI 301 Section 4.2.3.3.a – Standard Deviation
15 tests minimum required from the plant supplying the concrete

Specified compressive strength (psi)	
Calculated standard deviation of submitted data, $s_s$ (psi)	
Factor from Table 4.2.3.3.a.1, k	
Required average compressive strength from Table 4.2.3.3.a, f cr (psi)	
Average strength of proposed mix, obtained from plot of submitted trial batch date (psi)	
ACI 301 Section 4.2.3.3.b – Standard Deviation Not Required	
Specified compressive strength (psi)	
Required Average Strength from Table 4.2.3.3.b, f' <sub>cr</sub> (psi)	
Average strength of proposed mix, obtained from plot of submitted trial batch date (psi)	

## REQUIRED ATTACHMENTS (Please Check)

**Statistical Analysis** 

	Plot of compressive strength versus water / cementitious materials ratio	Certification that all ingredients are compatible.
If stand	lard deviation is calculated: Field test data	Coarse aggregate gradation Fine aggregate gradation

SECTION 03 30 01

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## SECTION 03 35 43 – POLISHED CONCRETE FINISHING

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes grinding and polished concrete finishing and scoring.
- B. Related Requirements:
  - 1. Section 033001 "Building Cast-in-Place Concrete." for concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, initial finishing, and curing.

## 1.3 DEFINITIONS

- A. Design Reference Sample: Sample designated by Architect in the Contract Documents that reflects acceptable surface quality and appearance of polished concrete.
- B. Grinding standards as identified by ConcreteNetwork.com
- 1.4 ACTION SUBMITTALS
  - A. Samples for Verification: Mockup for each type of exposed finish.

## 1.5 QUALITY ASSURANCE

- A. Mockups: Before casting concrete, build mockups to verify selections made under Sample submittals and to demonstrate typical joints, surface finish, tolerances, and standard of workmanship. Build mockups to comply with the following requirements, using materials indicated for the completed Work:
  - 1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
  - 2. Demonstrate curing, finishing, and protecting of concrete.

#### 1.6 FIELD CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

## 2.1 GRINDING AND POLISHING

- A. Gloss level
  - 1. Level 2 (satin)
  - 2. 400-grit resin bond medium sheen
- B. Aggregate Exposure1. Class B (salt and pepper)

#### 2.2 LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatments for Polished Concrete Finish: Clear, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; that penetrates, hardens, and is suitable for polished concrete surfaces.
  - 1. <u>Products</u>: Subject to compliance with requirements and as approved by Architect, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Prosoco, Inc: Consolideck PolishGuard 1-800-255-4255 www.prosoco.com

Penetrating Liquid Floor Treatment for Polished Concrete Finishes: Clear, chemically reactive, water borne solution of silicate material and proprietary components, odorless, that penetrates, hardens and is suitable for Polished Concrete surfaces leaving no surface film.

- 2. Unreacted Silicate Rinse: Liquid rinse solution, increases stain resistance.
  - a. Acceptable Material: Vexcon Chemicals, Certi-Shine Fixative.
- 3. Stain Repellent (non-film forming): Ready to use, food (oil and acid), hydraulic fluid and motor oil stain and water repellent, Silane and Silane polymer blend.
  - a. Acceptable Material: Vexcon Chemicals, Certi-Shine Finish Coat Ultra.
- 4. Silicate floor repair material: Liquid silicate material which fills and repairs concrete surface imperfections.
  - a. Acceptable Material: Vexcon Chemical, Certi-Shine Fusion.
- 5. Cleaning Solution: Eco-friendly degreaser and cleaner, concentrate pH must be slightly alkaline.
  - a. Acceptable Material: Vexcon Chemicals, StarSeal EF Degreaser and Cleaner.
- 6. Finishing Gloss Level Standard:
  - a. Medium shine Gold, equivalent to 60° film gloss of 60 when viewed at an angle

B. Locations of Polished Concrete Finish: As indicated on Drawings.

#### PART 3 - EXECUTION

#### 3.01 EXAMINATION

- A. Site Verification of Concrete Conditions
  - 1. Installer and manufacturer's representative will examine surfaces receiving concrete finish and polishing system.
    - a. Verify that surfaces conform to product manufacturer's requirements for substrate conditions.
    - b.Verify floor is free of curing membrane, bond-breaker, concrete laitance, and will absorb water per water absorbency test.
- B. Concrete slab performance requirements
  - 2. Verify that all the concrete complies with finishing requirements as specified in Cast In Place Section 03 30 01.

#### 3.02 CONCRETE PREPARATION

- A. Complete surface preparation per manufacturers written instructions.
- B. Power sweep floor area, blow out corners and column footings.
- C. Initial grind should clean the concrete surface, removing all coatings, dirt, oil and latiance.
- D. If grinding does not remove oil spots, treat oil spots with emulsifier and oil absorber materials. Detail scrub with high pH detergent.
  - 1. Acceptable Material: Vexcon Chemicals, StarSeal EF Stripper
- E. Double scrub floor with automatic scrubber capable minimum of 80 to 120 pounds of head pressure, equipped with black stripping pads. Use proper dilution of high pH detergent. Scrub floor once without squeegee or vacuum. On second pass, remove water solution.
- F. Power rinse surface removing all traces of soap residue.
- G. Inspect the concrete surface.
- H. Complete surface preparation per manufacturers written instructions.
- I. Perform water absorbency test.
  - 1. Repeat any steps as necessary to prepare for polishing.
- 3.03 CONCRETE FINISH APPLICATION AND POLISHING
  - A. Immediately following cleaning operation, install concrete polishing material(s) per manufacturer's instructions.

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- B. Perform polishing operation to the specified polish level.
  - 1. Polishing Levels for Certi-Shine products
    - a. Clear, Medium Shine Equivalent to 60° film gloss of 60 when viewed on an angle.

## 3.04 JOINT FILLER

- A. Prime and fill with manufacturer's approved epoxy joint sealant those joints that require the application of joint sealant after the application of the finishing system or as directed by the manufacturer.
  - 1. Powercoat Primer
  - 2. Powercoat Flexible Epoxy Joint Sealant

## 3.05 PROTECTION

- A. Protect finished surfaces from damage and soiling and other construction activities.
- B. Without damaging completed work, provide protective cover.

END OF SECTION 03 35 43

## SECTION 051200 - STRUCTURAL STEEL

#### FRAMING PART 1 – GENERAL

- 1.1 SUMMARY
  - A. Section Includes:
    - 1. Structural steel not part of Division 13.

#### 1.2 DEFINITIONS

A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in ANSI/AISC 303.

## 1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

#### 1.4 ACTION SUBMITTALS

- A. Product Data:1. High-strength, bolt-nut-washer assemblies.
- B. Shop Drawings: Show fabrication of structural-steel components.

#### 1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU or is accredited by the IAS Fabricator Inspection Program for Structural Steel (Acceptance Criteria 172).
- B. Installer Qualifications: A qualified Installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector.

#### PART 2 – PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Comply with applicable provisions of the following specifications and documents:
  - 1. RCSC's "Specification for Structural Joints Using High-Strength Bolts."
- B. Construction: Braced frame.
- 2.2 STRUCTURAL-STEEL MATERIALS
  - A. W-Shapes: ASTM A992/A992M.

- B. Channels, Angles: ASTM A36/A36M.
- C. Cold-Formed Hollow Structural Sections: ASTM A500/A500M, Grade C structural tubing.
- D. Steel Pipe: ASTM A53/A53M, Type E or Type S, Grade B.

#### 2.3 BOLTS AND CONNECTORS

- A. High-Strength A325 Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers; all with plain finish.
  - 1. Direct-Tension Indicators: ASTM F959/F959M, Type 325-1, compressible-washer type with plain finish.
- B. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F3125/F3125M, Grade F1852, Type 1, round head assemblies, consisting of steel structural bolts with splined ends; ASTM A563, Grade DH (ASTM A563M, Class 10S), heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers.

#### 2.4 RODS

- A. Unheaded Anchor Rods: ASTM F1554, Grade per drawings.
  - 1. Configuration: Straight.
  - 2. Finish: Plain.
- B. Headed Anchor Rods: ASTM F1554, Grade per drawings, straight.
  - 1. Finish: Plain.
- C. Threaded Rods: ASTM A36/A36M.
  - 1. Finish: Plain.
- 2.8 SHOP CONNECTIONS
  - A. High-Strength Bolts: Shop install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.
    - 1. Joint Type: Pretensioned.

#### 2.10 SHOP PRIMING & FINISHING

- A. Shop prime steel surfaces, except the following:
  - 1. Surfaces of high-strength bolted, slip-critical connections.
  - 2. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
- B. Paint all exposed structural steel components; see Division 09.

#### 2.11 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.
  - 2. Bolted Connections: Inspect shop-bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."

#### PART 3 – EXECUTION

#### 3.1 EXAMINATION

- A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.3 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt and joint type specified.
  - 1. Joint Type: Pretensioned.

#### 3.4 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector to perform the following special inspections:
  - 1. Verify connection materials and inspect high-strength bolted connections.
- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
  - 1. Bolted Connections: Inspect and test bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."

END OF SECTION 05 12 00

## SECTION 05 50 00 - METAL FABRICATIONS

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Prefinished Aluminum Fencing and Gates
  - 2. Metal downspout adapter.
  - 3. Loose bearing and leveling plates for applications where they are not specified in other Sections.
- B. Products furnished, but not installed, under this Section include the following:
  - 1. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete.
  - 2. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.
- C. Related Requirements:
  - 1. Section 05 12 00 "Structural Steel Framing" for steel framing, supports, divider beams, door frames, and other steel items attached to the structural-steel framing.

#### 1.3 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
  - 1. Metal downspout boots.

- B. Shop Drawings: Show fabrication and installation details. Provide Shop Drawings for the following:
  - 1. Steel framing and supports for applications where framing and supports are not specified in other Sections.
- C. Samples for Verification: For each type and finish of extruded nosing.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For professional engineer's experience with providing delegated-design engineering services of the kind indicated, including documentation that engineer is licensed in the jurisdiction in which Project is located.
- B. Mill Certificates: Signed by stainless steel manufacturers, certifying that products furnished comply with requirements.
- C. Welding certificates.
- D. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- E. Research Reports: For post-installed anchors.

#### 1.6 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel in accordance with the following:
  - 1. AWS D1.1/D1.1M, "Structural Welding Code Steel."
  - 2. AWS D1.2/D1.2M, "Structural Welding Code Aluminum."
  - 3. AWS D1.6/D1.6M, "Structural Welding Code Stainless Steel."

#### 1.7 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls, floor slabs, decks, and other construction contiguous with metal fabrications by field measurements before fabrication.

#### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
  - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

### 2.2 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- C. Stainless Steel Sheet, Strip, and Plate: ASTM A240/A240M or ASTM A666, Type 304.
- D. Stainless Steel Bars and Shapes: ASTM A276/A276M, Type 304.
- E. Steel Tubing: ASTM A500/A500M, cold-formed steel tubing.
- F. Steel Pipe: ASTM A53/A53M, Standard Weight (Schedule 40) unless otherwise indicated.
- G. Aluminum Plate and Sheet: ASTM B209, Alloy 6061-T6.
- H. Aluminum Extrusions: ASTM B221, Alloy 6063-T6.
- I. Aluminum Castings: ASTM B26/B26M, Alloy 443.0-F.
- J. Bronze Extrusions: ASTM B455, Alloy UNS No. C38500 (extruded architectural bronze).
- K. Bronze Castings: ASTM B584, Alloy UNS No. C83600 (leaded red brass) or UNS No. C84400 (leaded semired brass).
- L. Nickel Silver Extrusions: ASTM B151/B151M, Alloy UNS No. C74500.
- M. Nickel Silver Castings: ASTM B584, Alloy UNS No. C97600 (20 percent leaded nickel bronze).

#### 2.3 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
  - 1. Provide stainless steel fasteners for fastening aluminum, stainless steel, or nickel silver.
  - 2. Provide bronze fasteners for fastening bronze.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.
- C. High-Strength Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 3, heavy-hex steel structural bolts; ASTM A563, Grade DH3, heavy-hex carbon-steel nuts; and where indicated, flat washers.
- D. Stainless Steel Bolts and Nuts: Regular hexagon-head annealed stainless steel bolts, ASTM F593; with hex nuts, ASTM F594; and, where indicated, flat washers; Alloy Group 1.
- E. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563; and, where indicated, flat washers.

- 1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
- F. Anchors, General: Capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing in accordance with ASTM E488/E488M, conducted by a qualified independent testing agency.
- G. Cast-in-Place Anchors in Concrete: Either threaded or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A47/A47M malleable iron or ASTM A27/A27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F2329/F2329M.
- H. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
  - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.
  - 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless steel bolts, ASTM F593, and nuts, ASTM F594.

## 2.4 MISCELLANEOUS MATERIALS

- A. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
  - 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- B. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.
- C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.
- E. Shrinkage-Resistant Grout: Factory-packaged, nonmetallic, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- F. Concrete: Comply with requirements in Section 03 30 00 "Cast-in-Place Concrete" for normalweight, air-entrained concrete with a minimum 28-day compressive strength of 3000 psi.

#### 2.5 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
- J. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

#### 2.6 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
  - 1. Fabricate units from slotted channel framing where indicated.
  - 2. Furnish inserts for units installed after concrete is placed.
- C. Galvanize miscellaneous framing and supports where indicated.
- D. Prime miscellaneous framing and supports with primer specified in Section 09 96 00 "High-Performance Coatings" where indicated.

#### 2.7 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
  - 1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
- C. Prime miscellaneous steel trim with primer specified in Section 09 96 00 "High-Performance Coatings."
- 2.8 ALUMINUM FENCING AND GATES

A. Provide Saturn Design Aluminum Fence with Swing Gate and manufacturer's standard hardware as required for complete functional operation inclusive, Velvet Black polyester powder coating, with 0.09" ridged, ½"x4" tubular aluminum sections spaced vertically in two alternating rows such that there is 100 percent direct visual screening, height as indicated on drawings, as manufactured by Ametco Manufacturing Corporation, 1-800-321-7042, www.ametco.com or approved equal.

### 2.9 METAL DOWNSPOUT ADAPTER

- a. Stainless Steel Downspout Adapter
  - 1) <u>Manufacturers</u>: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a) Piedmont Pipe, 7907 Commerce Drive, Denver, NC 28037, 1-877-489-0911
  - 2) Product: Piedmont Pipe Downspout Model A1
    - a) Inlet Size: per downspout diameter (on drawings)
    - b) Outlet Size: per Civil
    - c) Finish: Stainless Steel

#### 2.10 LOOSE BEARING AND LEVELING PLATES

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.
- B. Galvanize bearing and leveling plates.
- C. Prime plates with primer specified in Section 09 96 00 "High-Performance Coatings."

#### 2.11 STEEL WELD PLATES AND ANGLES

A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

## 2.12 GENERAL FINISH REQUIREMENTS

- A. Finish metal fabrications after assembly.
- B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

#### 2.13 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.
  - 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
- B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean galvanized surfaces of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.
- C. Shop prime iron and steel items unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
  - 1. Shop prime with primers specified in Section 09 96 00 "High-Performance Coatings."
- D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
  - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

#### 2.14 ALUMINUM FINISHES

- A. As-Fabricated Finish: AA-M12.
- B. Clear Anodic Finish: AAMA 611, Class I, AA-M12C22A41.
- 2.15 STEEL PLATE FOR EXTERIOR WALL HEAD/JAMB TRIM
  - 1. ASTM A36 Steel, 3/16" Hot Rolled Steel Plate; finished: field painted per 099113 Exterior Painting

#### PART 3 - EXECUTION

#### 3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
  - 1. Cast Aluminum: Heavy coat of bituminous paint.
  - 2. Extruded Aluminum: Two coats of clear lacquer.

## 3.2 INSTALLATION OF MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Anchor supports for overhead doors and overhead grilles securely to, and rigidly brace from, building structure.

#### 3.3 INSTALLATION OF NOSINGS

- A. Center nosings on tread widths unless otherwise indicated.
- B. For nosings embedded in concrete steps or curbs, align nosings flush with riser faces and level with tread surfaces.

#### 3.4 INSTALLATION OF BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with shrinkage-resistant grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

#### 3.5 REPAIRS

- A. Touchup Painting:
  - 1. Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
    - a. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
  - Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 09 91 13 "Exterior Painting and Section 09 91 23 "Interior Painting."
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 05 50 00

SECTION 05 52 13 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Steel pipe and tube railings.

## 1.3 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
  - 1. Temperature Change: 120 deg F , ambient; 180 deg F , material surfaces.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
  - 1. Manufacturer's product lines of mechanically connected railings.
  - 2. Grout, anchoring cement, and paint products.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- C. Samples for Verification: For each type of exposed finish required.
  - 1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
  - 2. Fittings and brackets.
  - 3. Assembled Sample of railing system, made from full-size components, including top rail, post, handrail, and infill. Sample need not be full height.
    - a. Show method of connecting members at intersections.

#### 1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of railing from single source from single manufacturer.

- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code Steel."
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1/D1.1M, "Structural Welding Code Steel."
  - 2. AWS D1.6, "Structural Welding Code Stainless Steel."

#### 1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

#### 1.7 COORDINATION AND SCHEDULING

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- C. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

## PART 2 - PRODUCTS

#### 2.1 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.
  - 1. Handrail Brackets at stainless steel rails: Vancouver Glazing Hardware, Glass to Round Tube Handrail Bracket, brushed stainless steel, or equal.
- 2.2 STAINLESS STEEL
  - A. Tubing: ASTM A 554, Grade MT 316.
  - B. Pipe: ASTM A 312/A 312M, Grade TP 316.
- 2.3 FASTENERS
  - A. General: Provide the following:1. Stainless-Steel Railings: Type 316 stainless-steel fasteners.

- B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated.
- C. Fasteners for Interconnecting Railing Components:
  - 1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.
  - 2. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for railings indicated.
  - 3. Provide square or hex socket flat-head machine screws for exposed fasteners unless otherwise indicated.
- D. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
  - 1. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 2 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

#### 2.4 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
  - 1. For stainless-steel railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

#### 2.5 FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage.
- B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Form work true to line and level with accurate angles and surfaces.
- E. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- G. Connections: Fabricate railings with either welded or nonwelded connections unless otherwise indicated.

- H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
- I. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
  - 1. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.
- J. Form changes in direction as follows:
  - 1. As detailed.
  - 2. By bending.
- K. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- L. Close exposed ends of railing members with prefabricated end fittings.
- M. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.
- N. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
  - 1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crushresistant fillers, or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.
- O. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.
- P. For removable railing posts, fabricate slip-fit sockets from stainless-steel tube or pipe whose ID is sized for a close fit with posts; limit movement of post without lateral load, measured at top, to not more than one-fortieth of post height. Provide socket covers designed and fabricated to resist being dislodged.
  - 1. Provide chain with eye, snap hook, and staple across gaps formed by removable railing sections at locations indicated. Fabricate from same metal as railings.
- Q. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.

#### 2.6 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in

the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

#### 2.7 STAINLESS-STEEL FINISHES

- A. Remove tool and die marks and stretch lines, or blend into finish.
- B. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
- C. 320-Grit Polished Finish: Oil-ground, uniform, fine, directionally textured finish.
- D. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

## PART 3 - EXECUTION

#### 3.1 EXAMINATION

A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

#### 3.2 INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
  - 1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
  - 2. Set posts plumb within a tolerance of 1/16 inch in 3 feet .
  - 3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet .
- C. Corrosion Protection: Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- D. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

#### 3.3 RAILING CONNECTIONS

- A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.
- B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.
- C. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches of post.

## 3.4 ANCHORING POSTS

- A. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:
  - 1. For stainless-steel pipe railings, weld flanges to post and bolt to supporting surfaces.
  - 2. For steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.
- B. Install removable railing sections, where indicated, in slip-fit metal sockets cast in concrete.

#### 3.5 ATTACHING RAILINGS

- A. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces and welded to railing ends.
- B. Secure wall brackets and railing end flanges to building construction as follows:
  - 1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
  - 2. For steel-framed partitions, use toggle bolts installed through flanges of steel framing or through concealed steel reinforcements.

## 3.6 ADJUSTING AND CLEANING

A. Clean stainless steel by washing thoroughly with clean water and soap and rinsing with clean water.

#### 3.7 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

## END OF SECTION 05 52 13

## SECTION 06 10 00 - ROUGH CARPENTRY

#### PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Framing with dimensional lumber
  - 2. Wood blocking, cants, and nailers.
  - 3. Wood furring and grounds.
  - 4. Wood sleepers.
- B. Related Requirements:
  - 1. Section 06 16 00 "Sheathing" for sheathing, and underlayment.

#### 1.3 DEFINITIONS

- A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.
- B. Dimension Lumber: Lumber of 2 inches nominal size or greater but less than 5 inches nominal size in least dimension.
- C. Exposed Framing: Framing not concealed by other construction.
- D. OSB: Oriented strand board.
- E. Timber: Lumber of 5 inches nominal size or greater in least dimension.
- F. Lumber grading agencies:
  - 1. NLGA: National Lumber Grades Authority.
  - 2. WCLIB: West Coast Lumber Inspection Bureau.
  - 3. WWPA: Western Wood Products Association.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
  - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate

type of preservative used and net amount of preservative retained.

- 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
- 3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5664.
- 4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
- B. Fastener Patterns: Full-size templates for fasteners in exposed framing.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
- B. Evaluation Reports: For the following, from ICC-ES:
  - 1. Wood-preservative-treated wood.
  - 2. Power-driven fasteners.
  - 3. Post-installed anchors.
  - 4. Metal framing anchors.

## 1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fireretardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

A. Stack wood products flat with spacers beneath and between each bundle to provide air circulation. Protect wood products from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

#### PART 2 - PRODUCTS

- 2.1 WOOD PRODUCTS, GENERAL
  - A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
    - 1. Factory mark each piece of lumber with grade stamp of grading agency.
    - 2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp

on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.

- B. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
  - 1. Allowable design stresses, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

#### 2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
  - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
  - 2. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
  - 1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.
- D. Application: Treat items indicated on Drawings, and the following:
  - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
  - 2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
  - 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
  - 4. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.
  - 5. Wood floor plates that are installed over concrete slabs-on-grade.

## 2.3 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
  - 1. Blocking.
  - 2. Nailers.
  - 3. Cants.

- 4. Furring.
- 5. Grounds.
- B. Dimension Lumber Items: Construction or No. 2 grade lumber of any species.
- C. Concealed Boards: 19 percent maximum moisture content and any of the following species and grades:
  - 1. Hem-fir or hem-fir (north); Construction or No. 2 Common grad; NLGA, WCLIB, or WWPA.
- D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

## 2.4 FASTENERS

- A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture.
  - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.
- B. Nails, Brads, and Staples: ASTM F1667.
- C. Power-Driven Fasteners: NEW NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).
- F. Bolts: Steel bolds complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM a 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.
- G. Expansion Anchors: As indicated.
- H. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01, ICC-ES AC58, ICC-ES AC193, or, ICC-ES AC308 as appropriate for the substrate.
  - 1. Material: Carbon-steel components, zin plated to comply with ASTM B633, Class Fe/Zn 5.
  - 2. Material: Stainless steel with bolts and nuts complying with ASTM F593 and ASTM F594, Alloy Group 1 or 2.
- 2.5 METAL FRAMING ANCHORS

- A. Allowable design loads, as published by manufacturer, shall meet or exceed those of products of manufacturers listed. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.
- B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653/A653M, G60 coating designation.
  - 1. Use for interior locations unless otherwise indicated.
- C. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A653/A653M; structural steel (SS), highstrength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.
  - 1. Use for wood-preservative-treated lumber and where indicated.

## 2.6 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1-inch nominal thickness, compressible to 1/32 inch; selected from manufacturer's standard widths to suit width of sill members indicated.
- B. Adhesives for Gluing [Furring] [and] [Sleepers] to Concrete or Masonry: Formulation complying with ASTM D3498 that is approved for use indicated by adhesive manufacturer.

#### PART 3 - EXECUTION

## 3.1 INSTALLATION, GENERAL

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- C. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.
- E. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- F. Install sill sealer gasket to form continuous seal between sill plates and foundation walls.
- G. Do not splice structural members between supports unless otherwise indicated.
- H. Provide blocking and framing as indicated and as required to support facing materials, fixtures,

specialty items, and trim.

- 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.
- I. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
  - 1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
  - 2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal thickness.
  - 3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. and to solidly fill space below partitions.
  - 4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet o.c.
- J. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- K. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
  - 1. Use inorganic boron for items that are continuously protected from liquid water.
  - 2. Use copper naphthenate for items not continuously protected from liquid water.
- L. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- M. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
  - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).
  - Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
  - 3. ICC-ES evaluation report for fastener.
- N. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.
- O. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.
  - 1. Comply with indicated fastener patterns where applicable. Before fastening, mark fastener locations, using a template made of sheet metal, plastic, or cardboard.

- 2. Use finishing nails unless otherwise indicated. Countersink nail heads and fill holes with wood filler.
- 3. Use common nails unless otherwise indicated. Drive nails snug but do not countersink nail heads.

## 3.2 INSTALLATION OF WOOD BLOCKING AND NAILERS

- A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.
- C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

## 3.3 INSTALLATION OF WOOD FURRING

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
- B. Furring to Receive Plywood or Hardboard Paneling: Install 1-by-3-inch nominal- size furring horizontally and vertically at 24 inches o.c.
- C. Furring to Receive Gypsum Board: Install 1-by-2-inch nominal- size furring vertically at 16 inches o.c.

#### 3.4 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet enough that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06 10 00
SECTION 06 16 00 - SHEATHING

#### PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

# 1.2 SUMMARY

- A. Section Includes:
  - 1. Wall sheathing.
  - 2. Roof sheathing (roof cricket), Preservative-Treated
  - 3. Sheathing joint and penetration treatment.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
  - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
  - 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
  - 3. For fire-retardant treatments, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5516.
  - 4. For products receiving waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
  - 5. For air-barrier and water-resistant glass-mat gypsum sheathing, include manufacturer's technical data and tested physical and performance properties of products.

## 1.4 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Owner will engage a qualified testing agency to perform preconstruction testing on field mockups.

## 1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

# PART 2 - PRODUCTS

# 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance Ratings: As tested according to ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

#### 2.2 WOOD PANEL PRODUCTS

- A. Emissions: Products shall meet the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
- C. Factory mark panels to indicate compliance with applicable standard.

## 2.3 PRESERVATIVE-TREATED PLYWOOD

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
  - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
- C. Application: Treat items indicated on Drawings and plywood in contact with masonry or concrete or used with roofing, flashing, vapor barriers, and waterproofing.

#### 2.4 FIRE-RETARDANT-TREATED PLYWOOD

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
  - 1. Use treatment that does not promote corrosion of metal fasteners.

- 2. Exterior Type: Treated materials shall comply with requirements specified above for fireretardant-treated plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.
- 3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D3201/D3201M at 92 percent relative humidity. Use where exterior type is not indicated.
- 4. Design Value Adjustment Factors: Treated lumber plywood shall be tested according to ASTM D5516 and design value adjustment factors shall be calculated according to ASTM D6305. Span ratings after treatment shall be not less than span ratings specified. For roof sheathing and where high-temperature fire-retardant treatment is indicated, span ratings for temperatures up to 170 deg F shall be not less than span ratings specified.
- C. Kiln-dry material after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- D. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.

# 2.5 WALL SHEATHING

- A. Plywood Sheathing: As indicated.
  - 1. Span Rating: Not less than 32/16.
  - 2. Nominal Thickness: Not less than 3/4 inch.
- B. Paper-Surfaced Gypsum Sheathing: ASTM C1396/C1396M, gypsum sheathing; with water-resistant-treated core and with water-repellent paper bonded to core's face, back, and long edges.
  - 1. Type and Thickness: Regular, 1/2 inch, Type X, 5/8 inch thick.
- C. Fiberboard Sheathing: ASTM C208, Type IV.

## 2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
  - 1. For roof and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.
  - 2. For sheathing, provide fasteners with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B117.
- B. Nails, Brads, and Staples: ASTM F1667.
- C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- D. Screws for Fastening Sheathing to Wood Framing: ASTM C1002.
- E. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

- F. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached.
  - 1. For steel framing less than 0.0329 inch thick, use screws that comply with ASTM C1002.
  - 2. For steel framing from 0.033 to 0.112 inch thick, use screws that comply with ASTM C954.
- G. Screws for Fastening Composite Nail Base Insulated Roof Sheathing to Metal Roof Deck: Steel drill screws, in type and length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B117. Provide washers or plates if recommended by sheathing manufacturer.

## 2.7 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

- A. Sealant for Paper-Surfaced Gypsum Sheathing: Elastomeric, medium-modulus, neutral-curing silicone joint sealant compatible with joint substrates formed by gypsum sheathing and other materials, recommended by sheathing manufacturer for application indicated and complying with requirements for elastomeric sealants specified in Section 07 92 00 "Joint Sealants."
- B. Sealant for Glass-Mat Gypsum Sheathing: Silicone emulsion sealant complying with ASTM C834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.
  - 1. Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches wide, 10 by 10 or 10 by 20 threads/inch, of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing and with a history of successful in-service use.

## 2.8 MISCELLANEOUS MATERIALS

A. Adhesives for Field Gluing Panels to Wood Framing: Formulation complying with ASTM D3498 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.

## PART 3 - EXECUTION

## 3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
  - 1. Table 2304.9.1, "Fastening Schedule," in the ICC's International Building Code.
  - Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in the ICC's International Residential Code for One- and Two-Family Dwellings.

- 3. ICC-ES evaluation report for fastener.
- D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.
- E. Coordinate sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

## 3.2 WOOD PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below:
  - 1. Wall and Roof Sheathing:
    - a. Nail to wood framing.
    - b. Screw to cold-formed metal framing.
    - c. Space panels 1/8 inch apart at edges and ends.

### 3.3 GYPSUM SHEATHING INSTALLATION

- A. Comply with GA-253 and with manufacturer's written instructions.
  - 1. Fasten gypsum sheathing to wood framing with screws.
  - 2. Fasten gypsum sheathing to cold-formed metal framing with screws.
  - 3. Install panels with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
  - 4. Install panels with a 1/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.
- B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.
- C. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent panels without forcing. Abut ends over centers of studs, and stagger end joints of adjacent panels not less than one stud spacing. Attach at perimeter and within field of panel to each stud.
  - 1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of panels.
  - 2. For sheathing under stucco cladding, panels may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.

- D. Vertical Installation: Install vertical edges centered over studs. Abut ends and edges with those of adjacent panels. Attach at perimeter and within field of panel to each stud.
  - 1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of panels.
  - 2. For sheathing under stucco cladding, panels may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.
- E. Seal sheathing joints according to sheathing manufacturer's written instructions.
  - 1. Apply elastomeric sealant to joints and fasteners and trowel flat. Apply sufficient amount of sealant to completely cover joints and fasteners after troweling. Seal other penetrations and openings.
  - 2. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing joints and apply and trowel sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.
- F. Air-Barrier and Water-Resistant Glass-Mat Gypsum Sheathing:
  - 1. Install accessory materials according to sheathing manufacturer's written instructions and details to form a seal with adjacent construction, to seal fasteners, and ensure continuity of air and water barrier.
    - a. Coordinate the installation of sheathing with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
    - b. Install transition strip on roofing membrane or base flashing, so that a minimum of 3 inches of coverage is achieved over each substrate.
  - 2. Connect and seal sheathing material continuously to air barriers specified under other Sections as well as to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.
  - 3. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
  - 4. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply transition strip so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of full contact over firm bearing to perimeter frames, with not less than 1 inch of full contact.
    - a. Transition Strip: Roll firmly to enhance adhesion.
    - b. Preformed Silicone Extrusion: Set in full bed of silicone sealant applied to walls, frame, and air-barrier material.
  - 5. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, doors, and miscellaneous penetrations of sheathing material with foam sealant.
  - 6. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.
  - 7. Seal top of through-wall flashings to sheathing with an additional 6-inch- wide, transition strip.
  - 8. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.
  - 9. Repair punctures, voids, and deficient lapped seams in strips and transition strips extending 6 inches beyond repaired areas in strip direction.

# 3.4 CEMENTITIOUS BACKER UNIT INSTALLATION

A. Install panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated.

# 3.5 FIBERBOARD SHEATHING INSTALLATION

- A. Comply with ASTM C846 and with manufacturer's written instructions.
- B. Fasten fiberboard sheathing panels to intermediate supports and then at edges and ends. Use galvanized roofing nails; comply with manufacturer's recommended spacing and referenced fastening schedule. Drive fasteners flush with surface of sheathing and locate perimeter fasteners at least 3/8 inch from edges and ends.
- C. Install sheathing vertically with long edges parallel to, and centered over, studs. Install solid wood blocking where end joints do not occur over framing. Allow 1/8-inch open space between edges and ends of adjacent units. Stagger horizontal joints if any.
- D. Cover sheathing as soon as practical after installation to prevent deterioration from wetting.

# 3.6 FIELD QUALITY CONTROL

- A. ABAA Quality Assurance Program: Perform examinations, preparation, installation, testing, and inspections under ABAA's Quality Assurance Program.
- B. Testing and Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- C. Inspections: Air-barrier and water-resistant glass-mat gypsum sheathing, accessories, and installation are subject to inspection for compliance with requirements. Inspections may include the following:
  - 1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
  - 2. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
  - 3. Termination mastic has been applied on cut edges.
  - 4. Strips and transition strips have been firmly adhered to substrate.
  - 5. Compatible materials have been used.
  - 6. Transitions at changes in direction and structural support at gaps have been provided.
  - 7. Connections between assemblies (sheathing and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
  - 8. All penetrations have been sealed.
- D. Tests: As determined by testing agency from among the following tests:
  - 1. Air-Leakage-Location Testing: Air-barrier sheathing assemblies will be tested for evidence of air leakage according to ASTM E1186, chamber pressurization or depressurization with smoke tracers or ASTM E1186, chamber depressurization using detection liquids.
  - 2. Air-Leakage-Volume Testing: Air-barrier assemblies will be tested for air-leakage rate according to ASTM E783 or ASTM E2357.

- E. Air barriers will be considered defective if they do not pass tests and inspections.
- F. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.
- G. Prepare test and inspection reports.

END OF SECTION 06 16 00

# SECTION 06 20 23 - INTERIOR FINISH CARPENTRY

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Interior wood trim.
  - 2. Interior wood veneer-faced plywood paneling.
- B. Related Requirements:
  - 1. Section 06 10 00 "Rough Carpentry" for furring, blocking, and other carpentry work not exposed to view.
  - 2. Section 06 41 16 "Plastic-Laminate-Faced Architectural Cabinets" for cabinetry.
  - 3. Section 06 61 16 "Solid Surfacing" for countertops.
  - 4. Section 09 11 30 "Interior Painting" for priming and back priming for interior finish carpentry field painting of factory finish metal support brackets.
  - 5. Section 09 93 00 "Staining and Transparent Finishing" for wood finishing.
  - 6. Section 09 54 26 " Linear Wood Ceilings" for wood wall paneling.

### 1.3 DEFINITIONS

A. MDO: Plywood and medium-density overlay on the face.

### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.
  - 1. Include data for wood-preservative treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained. Include chemical-treatment manufacturer's written instructions for finishing treated material.
  - 2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced before shipment to Project site to levels specified.
- B. Samples: For each exposed product and for each color and texture specified.

### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation.
  - 1. Protect materials from weather by covering with waterproof sheeting, securely anchored.
  - 2. Provide for air circulation around stacks and under coverings.
- B. Deliver interior finish carpentry materials only when environmental conditions comply with requirements specified for installation areas. If interior finish carpentry materials must be stored in other than installation areas, store only where environmental conditions comply with requirements specified for installation areas.

# 1.6 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install interior finish carpentry materials until building is enclosed and weatherproof, wet-work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.
  - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

#### PART 2 - PRODUCTS

#### 2.1 MATERIALS GENERAL

- A. Lumber: DOC PS 20 and the following grading rules:
  - 1. NeLMA: Northeastern Lumber Manufacturers' Association, "Standard Grading Rules for Northeastern Lumber."
  - 2. NHLA: National Hardwood Lumber Association, "Rules for the Measurement and Inspection of Hardwood & Cypress."
  - 3. NLGA: National Lumber Grades Authority, "Standard Grading Rules for Canadian Lumber."
  - 4. SPIB: The Southern Pine Inspection Bureau, "Standard Grading Rules for Southern Pine Lumber."
  - 5. WCLIB: West Coast Lumber Inspection Bureau, Standard No. 17, "Grading Rules for West Coast Lumber."
  - 6. WWPA: Western Wood Products Association, "Western Lumber Grading Rules."
- B. Factory mark each piece of lumber with grade stamp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.
  - 1. For exposed lumber, mark grade stamp on end or back of each piece, or omit grade stamp and provide certificates of grade compliance issued by inspection agency.

### 2.3 INTERIOR WOOD TRIM

- A. Species: Clear vertical grain Douglas fir (CV)
- B. Size(s): Per drawings
- C. Finish: Per Section 099300 "Staining and Transparent Finish

#### 2.5 PANELING

- A. Hardwood Veneer Plywood Paneling: Manufacturer's stock hardwood plywood panels complying with HPVA HP-1.
  - 1. Face Veneer Species and Cut: Paperbacked quarter (rift) cut clear vertical grain Douglas fir (CV)
  - 2. Veneer Matching: Selected for similar color and grain.
  - 3. Panel Edges: match face veneer species and cut
  - 4. Construction: Veneer core.
  - 5. Panel Size: Per drawings, varies.
  - 6. Glue Bond: Type II (interior).
  - 7. Finish: Per Section 099300 "Staining and Transparent Finish

#### 2.6 MISCELLANEOUS MATERIALS

- A. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.
- B. Low-Emitting Materials: Adhesives shall comply with testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- C. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.

# 2.7 PLYWOOD STUDS FOR CASEWORK BUILT IN FIELD

A. 1" plywood studs for casework infill, slotted for cable routing where required

# 2.8 FABRICATION

- A. Back out or kerf backs of the following members, except those with ends exposed in finished work:
  - 1. Interior standing and running trim.
  - 2. Wood-board paneling.
- B. Ease edges of lumber less than 1 inch in nominal thickness to 1/16-inch radius and edges of lumber 1 inch or more in nominal thickness to 1/8-inch radius.

# PART 3 - EXECUTION

# 3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.
- B. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours.

#### 3.3 INSTALLATION, GENERAL

- A. Do not use materials that are unsound; warped; improperly treated or finished; inadequately seasoned; too small to fabricate with proper jointing arrangements; or with defective surfaces, sizes, or patterns.
- B. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials.
  - 1. Use concealed shims where necessary for alignment.
  - 2. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
  - 3. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.
  - 4. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
  - 5. Coordinate interior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.

# 3.4 STANDING AND RUNNING TRIM INSTALLATION

- A. Install trim with minimum number of joints as is practical, using full-length pieces from maximum lengths of lumber available.
  - 1. Do not use pieces less than 24 inches long, except where necessary.
  - 2. Stagger joints in adjacent and related standing and running trim.
  - 3. Miter at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint.
  - 4. Use scarf joints for end-to-end joints.
  - 5. Plane backs of casings to provide uniform thickness across joints where necessary for alignment.

- 6. Match color and grain pattern of trim for transparent finish (stain or clear finish) across joints.
- 7. Install trim after gypsum-board joint finishing operations are completed.
- 8. Install without splitting; drill pilot holes before fastening where necessary to prevent splitting.
- 9. Fasten to prevent movement or warping.
- 10. Countersink fastener heads on exposed carpentry work and fill holes.

#### 3.5 PANELING INSTALLATION

- A. Plywood Paneling: Select and arrange panels on each wall to minimize noticeable variations in grain character and color between adjacent panels.
  - 1. Attach panels to supports with manufacturer's recommended panel adhesive and fasteners per drawings. Space fasteners and adhesive as recommended by panel manufacturer.
  - 2. Conceal fasteners to greatest practical extent.
  - 3. Arrange panels with grooves and joints over supports. Fasten to supports with nails of type and at spacing recommended by panel manufacturer. Use fasteners with prefinished heads matching groove color.
  - 4. Provide veneer-faced reveals on substrate at panel joints per drawings.

#### 3.6 ADJUSTING

- A. Replace interior finish carpentry that is damaged or does not comply with requirements.
  - 1. Interior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.
- B. Adjust joinery for uniform appearance.

### 3.7 CLEANING

- A. Clean interior finish carpentry on exposed and semi-exposed surfaces.
- B. Restore damaged or soiled areas and touch up factory-applied finishes if any.

# 3.8 PROTECTION

- A. Protect installed products from damage from weather and other causes during construction.
- B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.
  - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 06 20 23

# SECTION 06 41 16 - PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

### PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Plastic-laminate-clad architectural casework.
  - 2. Cabinets and hardware for wood-veneer-faced paneled cabinetry.
  - 2. Cabinet hardware and accessories.
  - 3. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-clad architectural casework that is not concealed within other construction.
- B. Related Requirements:
  - 1. Section 06 10 00 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets that are concealed within other construction before cabinet installation.
  - 2. Section 06 61 16 "Solid Surfacing Countertops".
  - 3. Section 062023 "Interior Finish Carpentry" for wood-veneer faced paneling for architectural cabinets.

# 1.3 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to support loads imposed by installed and fully loaded cabinets.

# 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
- B. Shop Drawings: For plastic-laminate-faced architectural cabinets.
  - 1. Include plans, elevations, sections, and attachment details.
  - 2. Show large-scale details.
  - 3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.

- 4. Show locations and sizes of cutouts and holes for items installed in plastic-laminate architectural cabinets.
- 5. Apply AWI Quality Certification Program label to Shop Drawings.
- C. Samples: For each exposed product and for each color and texture specified, in manufacturer's or manufacturer's standard size.
- D. Samples for Initial Selection: For each type of exposed finish.

# 1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful inservice performance.
  - 1. Shop Certification: AWI's Quality Certification Program accredited participant.
- B. Installer Qualifications: Fabricator of products.

# 1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver cabinets until painting and similar finish operations that might damage architectural cabinets have been completed in installation areas. Store cabinets in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

## 1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.
- B. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
  - 1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed/concealed by construction, and indicate measurements on Shop Drawings.
- C. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

# PART 2 - PRODUCTS

# 2.1 PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS & COUNTERTOPS

- A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of cabinets indicated for construction, finishes, installation, and other requirements.
  - 1. Provide inspections of fabrication and installation together with labels and certificates from AWI certification program indicating that woodwork complies with requirements of grades specified.
  - 2. The Contract Documents contain requirements that are more stringent than the referenced quality standard. Comply with requirements of Contract Documents in addition to those of the referenced quality standard.
- B. Grade: Premium

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- C. Drawer & Cabinet Construction
  - 1. Type of Construction: Frameless.
  - 2. Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners.
  - 3. Door and Drawer-Front Style: Flush overlay.
    - a. Reveal Dimension:  $\frac{1}{2}$  inch.
    - b. Door/Panel edging: High-Pressure Decorative Laminate to match laminate face.
  - 4. Laminate Cladding for Exposed Surfaces:
    - a. Horizontal Surfaces: Grade HGS.
    - b. Vertical Surfaces: Grade VGS.
    - c. Edges: Grade HGS, Grade VGS
  - 5. Materials for Semi-exposed Surfaces:
    - Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, NEMA LD 3, Grade VGS
      - 1) Edges of Thermoset Decorative Panel Shelves: PVC or polyester edge banding.
      - For semi-exposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, NEMA LD 3, Grade VGS
    - b. Drawer Sides and Backs: Thermoset decorative panels with PVC or polyester edge banding.
    - c. Drawer Bottoms: Thermoset decorative panels.
  - 6. Dust Panels: 1/4-inch plywood or tempered hardboard above compartments and drawers unless located directly under tops.
  - 7. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.
- D. High-Pressure Decorative Laminate Countertops & Splashes
  - 1. Grade: NEMA LD 3, grades as indicated or if not indicated, as required by quality standard.
  - 2. Substrate: Particleboard: ANSI A208.1, 45-pound density, <sup>3</sup>/<sub>4</sub>" thickness. Marine Plywood at wet locations.
  - 3. Adhesives: Water-based polyvinyl acetate (PVA).

- E. Acceptable Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Formica Corporation
  - 2. Lamin-Art, Inc.
  - 3. Nevamar; a Panlom Industries International, Inc. brand.
  - 4. Wilsonart
- F. Colors, Patterns, and Finish: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
  - 1. As indicated by manufacturer's designations.

# 2.2 LAMINATE SCHEDULE

A. Cabinets, Lobby 202 (PL-1)
1. Formica Laminate: ColorCore2, White, Gloss Finish, #949-90

# 2.3 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
  - 1. Wood Moisture Content: 5 to 10 percent.
- B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
  - 1. Medium-Density Fiberboard (MDF): ANSI A208.2, Grade 130.
  - 2. Particleboard: ANSI A208.1, Grade M-2.
  - 3. Thermoset Decorative Panels: Particleboard or MDF finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for Test Methods 3.3, 3.4, 3.6, 3.8, and 3.10.

## 2.4 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets except for items specified in Section 08 71 00 "Door Hardware."
- B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 100 degrees of opening, self-closing.
- C. Cabinet Pulls: Back mounted, solid metal, 4 inches (100 mm) long, 5/16 inch (8 mm) in diameter.
- D. Catches: Magnetic catches, BHMA A156.9, B03141
- E. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081

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- F. Shelf Rests: BHMA A156.9, B04013; metal.
- G. Drawer Slides: BHMA A156.9.
  - 1. Grade 1 and Grade 2: Side mounted
    - a. Type: Full extension.
    - b. Material: Zinc-plated steel with polymer rollers.
  - 2. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-extension type; zinc-plated-steel ball-bearing slides.
  - 3. For drawers not more than 3 inches high and not more than 24 inches wide, provide Grade 2.
  - 4. For drawers more than 3 inches high, but not more than 6 inches high and not more than 24 inches wide, provide Grade 1.
  - 5. For drawers more than 6 inches high or more than 24 inches wide, provide Grade 1HD-100
- H. Door Locks: BHMA A156.11, E07121.
- I. Drawer Locks: BHMA A156.11, E07041.
- J. Door and Drawer Silencers: BHMA A156.16, L03011.
- K. Grommets for Cable Passage: 2-inch OD, molded-plastic grommets and matching plastic caps with slot for wire passage.
  - 1. Product: Subject to compliance with requirements, provide "SG series" by Doug Mockett & Company, Inc. or as approved by Architect.
  - 2. Color: White.
- L. Exposed Hardware Finishes: For exposed hardware, unless indicated elsewhere, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
  - 1. Satin Stainless Steel: BHMA 630.
- M. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

## 2.5 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber kiln-dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrousmetal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
- C. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement
  - 1. Adhesive for Bonding Edges: Hot-melt adhesive

## 2.6 FABRICATION

A. Fabricate architectural cabinets to dimensions, profiles, and details indicated.

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- B. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
  - 1. Notify Architect seven days in advance of the dates and times architectural cabinet fabrication will be complete.
  - 2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.
- C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs. Seal edges of openings in countertops with a coat of varnish.

# PART 3 - EXECUTION

## 3.1 PREPARATION

A. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.

# 3.2 INSTALLATION

- A. Grade: Install cabinets to comply with quality standard grade of item to be installed.
- B. Assemble cabinets and complete fabrication at Project site to extent that it was not completed in the shop.
- C. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with wafer-head cabinet installation screws.
- D. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches using concealed shims.
  - 1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
  - 2. Install cabinets without distortion so doors and drawers fit openings and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
  - 3. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips

# 3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects. Where not possible to repair, replace architectural cabinets. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean cabinets on exposed and semiexposed surfaces.

END OF SECTION 06 41 16

# SECTION 06 61 16 - SOLID SURFACING

# PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Solid surface material countertops and integral splashes.
  - 2. Solid surface material backsplashes.
  - 3. Factory Finish Knee Braces for support.
- B. Related Requirements:
  - 1. Section 06 10 00 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets and concealed within other construction before cabinet installation.
  - 2. Section 06 41 16 "Plastic Laminate-Faced Architectural Cabinets" for mounting surfaces.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For countertop materials.
- B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.
  - 1. Show locations and details of joints.
  - 2. Show direction of directional pattern, if any.
- C. Samples for Verification: For the following products:
  - 1. Countertop material, 6 inches square.

# 1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

#### 1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For solid surface material countertops to include in maintenance manuals. Include Product Data for care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

### 1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-service performance.
- B. Installer Qualifications: Fabricator of countertops.

#### 1.7 FIELD CONDITIONS

A. Field Measurements: Verify dimensions of countertops by field measurements before countertop fabrication is complete.

#### 1.8 COORDINATION

A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

# PART 2 - PRODUCTS

# 2.1 SOLID SURFACE COUNTERTOP MATERIALS

- A. Quartz Surfacing: Material must be homogenous in nature containing approximately 93% crushed quartz combined with high quality polymer resin and pigments to form slabs using Bretonstone technology.
  - 1. SS-1 (WORKSTATION & CUSTOM CASEWORK)
    - 1) Acceptable Manufacturer: Vicostone distributed by Pental Granite and Marble Inc. (PentalQuartz.)
    - 2) Color: BQ400P Seashell.
    - 3) Finish: Polished
    - 4) Location: per drawings
- B. Solid Surface Material: Homogeneous-filled plastic resin complying with ICPA SS-1.
  - 1. SS-2 (LOBBY COUNTER AT SINK)
    - 1) Acceptable Manufacturer: Dupont Corian
    - 2) Color: Ash Concrete.
    - 3) Location: per drawings
- B. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.

C. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

# 2.2 COUNTERTOP FABRICATION

- A. Fabricate countertops according to solid surface material manufacturer's written instructions and to the AWI/AWMAC/WI's "Architectural Woodwork Standards."
  - 1. Grade: Premium
- B. Configuration:
  - 1. Front: Straight, slightly eased at top
  - 2. Backsplash: Straight, slightly eased at corner
  - 3. End Splash: Matching backsplash
- C. Counter Perimeter Frame: Ensure ½" thick, moisture resistant cores for counter tops in wet areas having sinks or lavatories are 3/4" thick exterior grade plywood with waterproof adhesive, Fir or Poplar plywood, veneer core only.
- D. Adhesive: Product recommended by solid surface material manufacturer.
- E. Sealant for Countertops: Comply with applicable requirements in Section 07 92 00 "Joint Sealants."

# 2.3 FACTORY FINISH KNEE BRACE (KNEE BRACKET)

- 1. Basis-of-Design Manufacturer:
  - a. The Original Granite Bracket
  - b. <or as approved by Architect.>
- 2. Product:
  - a. Free Hanging Shelf Bracket.
    - 1) Size: 26" x 11" unless noted otherwise
    - 2) Finish: Black
    - 3) Locations: Per Drawings.

# PART 3 - EXECUTION

- 3.1 EXAMINATION
  - A. Examine substrates to receive solid surface material countertops and conditions under which countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.
  - B. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 INSTALLATION

- A. Install countertops level to a tolerance of 1/8 inch in 8 feet, 1/4 inch maximum. Do not exceed 1/64-inch difference between planes of adjacent units.
- B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Predrill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
- C. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.
- D. Secure countertops to subtops with adhesive according to solid surface material manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
- E. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.
  - 1. Install metal splines in kerfs in countertop edges at joints. Fill kerfs with adhesive before inserting splines and remove excess immediately after adjoining units are drawn into position.
  - 2. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.
- F. Install backsplashes and end splashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.
- G. Install aprons to backing and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears. Fasten by screwing through backing. Predrill holes for screws as recommended by manufacturer.
- H. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.
  - 1. Seal edges of cutouts in particleboard subtops by saturating with varnish.
- I. Apply sealant to gaps at walls; comply with Section 07 92 00 "Joint Sealants."

END OF SECTION 06 61 16

SECTION 07 21 00 - THERMAL INSULATION

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. Section Includes:
  - 1. Extruded polystyrene foam-plastic board.
  - 2. Polyisocyanurate foam-plastic board.
  - 3. Glass-fiber blanket.
  - 4. Mineral-wool blanket (Acoustic Insulation).
  - 5. Spray-applied cellulosic insulation.
- B. Related Requirements:
  - 1. Section 13 14 19 "Metal Building Systems" for insulation products associated preengineered metal building.

## 1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

## 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Protect foam-plastic board insulation as follows:
  - 1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
  - 2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site until just before installation time.
  - 3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

# PART 2 - PRODUCTS

# 2.1 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD (XPS, RIGID INSULATION)

- A. Extruded Polystyrene Board: ASTM C578, Type X, 15-psi minimum compressive strength; unfaced; maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, per ASTM E84.
  - 1. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

#### 2.2 POLYISOCYANURATE FOAM-PLASTIC BOARD (RIGID INSULATION)

- A. Polyisocyanurate Board, Foil Faced: ASTM C1289, foil faced, Type I, Class 1 or 2.
  - 1. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

### 2.3 GLASS-FIBER BLANKET (BATT INSULATION)

- A. Glass-Fiber Blanket, Unfaced: ASTM C665, Type I; with maximum flame-spread and smokedeveloped indexes of 25 and 50, respectively, per ASTM E84; passing ASTM E136 for combustion characteristics.
- B. Glass-Fiber Blanket, Kraft Faced: ASTM C665, Type II (nonreflective faced), Class C (faced surface not rated for flame propagation); Category 1 (membrane is a vapor barrier).

## 2.4 MINERAL-WOOL BLANKETS (ACOUSTIC INSULATION)

- A. Mineral-Wool Blanket, Unfaced: ASTM C665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E84; passing ASTM E136 for combustion characteristics.
  - 1. Basis-of-Design Products:
    - a. Rockwool Comfortbatt
  - 2. Locations: where indicated on partition schedule as 'acoustic' wall assembly and/or batt, mineral wool.

# 2.5 SPRAY-APPLIED CELLULOSIC INSULATION

Self-Supported, Spray-Applied Cellulosic Insulation: ASTM C1149, Type I (materials applied with liquid adhesive; suitable for either exposed or enclosed applications), chemically treated for flame-resistance, processing, and handling characteristics.

#### 2.6 INSULATION FASTENERS

A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position with self-locking washer in place.

- 1. Plate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
- 2. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation.
- B. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick galvanizedsteel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches square or in diameter.
  - 1. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in the following locations:
    - a. Attic spaces.
- C. Insulation Standoff: Spacer fabricated from galvanized mild-steel sheet for fitting over spindle of insulation anchor to maintain air space between face of insulation and substrate to which anchor is attached.
- D. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates without damaging insulation, fasteners, or substrates.

# 2.7 ACCESSORIES

- A. Insulation for Miscellaneous Voids:
  - 1. Glass-Fiber Insulation: ASTM C764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E84.
  - 2. Spray Polyurethane Foam Insulation: ASTM C1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E84.
- B. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

# PART 3 - EXECUTION

# 3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.

# 3.2 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Install insulation that is undamaged, dry, and unsolled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

# 3.3 INSTALLATION OF SLAB INSULATION

- A. On vertical slab edge and foundation surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.
  - 1. If not otherwise indicated, extend insulation a minimum of 24 inches below exterior grade line.
- B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.
  - 1. If not otherwise indicated, extend insulation a minimum of 24 inches in from exterior walls.

# 3.4 INSTALLATION OF CAVITY-WALL INSULATION

- A. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches o.c. both ways on inside face and as recommended by manufacturer.
  - 1. Fit courses of insulation between obstructions, with edges butted tightly in both directions, and with faces flush.
  - 2. Press units firmly against inside substrates.
  - 3. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in Section 04 20 00 "Unit Masonry."
- B. Cellular-Glass Board Insulation: Install with closely fitting joints using attachment method according to manufacturer's written instructions.
- C. Mineral-Wool Board Insulation: Install insulation fasteners 4 inches from each corner of board insulation, at center of board, and as recommended by manufacturer.
  - 1. Fit courses of insulation between obstructions, with edges butted tightly in both directions, and with faces flush.
  - 2. Press units firmly against inside substrates.

## 3.5 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

- A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
  - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
  - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
  - 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.

- B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
  - 1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft.
  - 2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.
- C. Loose-Fill Insulation: Apply according to ASTM C1015 and manufacturer's written instructions. Level horizontal applications to uniform thickness as indicated, lightly settle to uniform density, but do not compact excessively.
  - 1. For cellulosic-fiber loose-fill insulation, comply with CIMA's Bulletin #2, "Standard Practice for Installing Cellulose Insulation."
- D. Spray-Applied Cellulosic Insulation: Apply spray-applied insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked. After insulation is applied, make flush with face of studs by using method recommended by insulation manufacturer.

# 3.6 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 07 21 00

# SECTION 07 21 16 - BLANKET INSULATION FOR METAL BUILDINGS

# PART 1 - GENERAL

- 1.1 SECTION INCLUDES
  - A. Thermal insulation and moisture control system for metal buildings for the following applications:
    - 1. Roofing, with OSHA compliant, leading edge fall protection.
  - B. Related Work: The following items are not included in this Section and are specified under the designated Sections:
    - 1. Section 13 34 19 Metal Building Systems.
    - 2. Division 21 Fire Suppression.
    - 3. Division 22 Plumbing; Rough-in utilities.
    - 4. Division 23 HVAC; Rough-in utilities.
    - 5. Division 26 Electrical; Rough-in utilities.

# 1.2 REFERENCES

- A. ASTM International (ASTM):
  - 1. ASTM C991 Standard Specification for Flexible Fibrous Glass Insulation for Metal Buildings.
  - 2. ASTM C1136 Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.
  - 3. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.
  - 4. ASTM E 96 Standard Test Method for Water Vapor Transmission of Materials in Sheet Form (Procedure A).
- B. North American Insulation Manufacturers Association (NAIMA):
  - 1. NAIMA 202-96(R) (Rev. 2000) STANDARD For Flexible Fiberglass Insulation to be Laminated for Use in Metal Buildings.
- C. National Fire Protection Association (NFPA):
  - 1. NFPA 255 Standard Method of Test of Surface Burning Characteristics of Building Materials.
- D. Underwriters Laboratories (UL):
  - 1. UL 723 Test for Surface Burning Characteristics of Building Materials.

# 1.3 SYSTEM DESCRIPTION

- A. Design Requirements:
  - 1. Insulation R-Value of R-25 + R-11 LS + R-11 LS(U = .026) for installed roof system.
  - 2. The installed roof systems shall provide a continuous vapor barrier.

## 1.4 SUBMITTALS

A. Product Data: Provide manufacturer's data for each of the following including:

- 1. Roof installation instructions.
- 2. Product data sheet.
- 3. Design considerations guide.

- 4. Recycle content certification for fiberglass insulation products minimum 50% recycled content for all fiberglass insulation materials.
- B. Shop Drawings: Provide shop drawings that indicate the following:
  - 1. Liner fabric layout.
  - 2. Insulation Layout and cut list.
  - 3. Customer and project information.

## 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Companies shall be familiar with the installation practices associated with banded liner systems.
- B. Therm-All shall approve all materials used in the ProLiner<sup>™</sup> Banded Liner System. Contact Therm-All for specific materials approved for use within the ProLiner<sup>™</sup> Banded Liner System.
   1. Substitution of any original components will nullify compliance with OSHA standards.

## 1.6 SAFETY PRECAUTIONS

- A. Installation contractor must have a site-specific safety plan and comply with all OSHA applicable local rules and regulations when installing this system.
- B. Workers must use OSHA required fall protection when installing banding and fabric system at heights (see OSHA regulations at 29 CFR 1926, Subpart M).
  - 1. ProLiner<sup>™</sup> Bi-Directional installation: Leading-edge fall protection offered.
  - 2. ProLiner<sup>™</sup> Single Direction installation: No fall protection.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products indoors or in a dry, covered area. Do not open products until ready to use.
- B. Protect products from potential construction site damage. Use care when opening products as pallets may shift during shipment.
- C. Banding has sharp edges. Wear cut proof gloves when handling. Wear safety glasses when unpacking materials.

# 1.8 PROJECT CONDITIONS

A. For best results, do not install this system outside of the temperature, humidity, ventilation and environmental limits recommended by the manufacturer. Products should be kept covered and dry at temperatures less than 100 degrees F prior to installation.

# PART 2 - PRODUCTS

# 2.1 MATERIALS

- A. Basis of Design: ProLiner<sup>™</sup> Banded Liner System as supplied by Therm-All, 31387 Industrial Parkway, North Olmsted, OH 44070; Toll Free Tel: 800-886-9494; Fax: 440-734-1001; Email: WBeals@therm-all.com; www.therm-all.com.
  - 1. Components:
    - a. Polyethylene vapor retarder liner fabric in white color.
    - b. Galvanized metal support straps (bands).
    - c. EcoTouch Certified R metal building insulation in two layers.

- 2. Metal Building Insulation:
  - a. Complies with ASTM C991 Type 1.
  - b. Complies with NAIMA 202-96-REV 2000.
  - c. Surface Burning Characteristics: Flame Spread Index less than 25 and Smoke Developed Index less than 50 when tested in accordance with ASTM E84, NFPA 255 and UL 723.
  - d. Certified by SCS Global Services to contain a minimum of 65 percent recycled glass content, 18 percent pre-consumer and 47 percent post-consumer.
  - e. Thermal Resistance, R-Value: 25.
  - f. Unfaced.
  - g. GREENGUARD Indoor Air Quality Certified.
  - h. GREENGUARD Gold Certified.
- B. Fabric liner facing/vapor barrier composed of woven high-density polyethylene coated on both sides with polyethylene. Complies with the following:
  - 1. Color: White
  - 2. ASTM C1136, Types I through Type VI. Type I-IV exception for dimensional stability (value is less than 2.0 percent).
  - 3. Perm Rating: Maximum 0.02 when tested in accordance with ASTM E 96 Procedure A.
  - 4. Surface Burning Characteristics: Flame Spread Index of 0 and Smoke Developed Index less than 50 when tested in accordance with ASTM E 84.
  - 5. Vapor Barrier Adhesive: Application temperature of 0 to 110 degrees F.
  - 6. Double Sided Vapor Barrier Tape: Width 0.75 to 1.5 inches, rubber or acrylic base.
  - 7. Patch Tape: Adhesive added to one side; installation temperature of 10 to 110 degrees F, width: 3 inches.
  - 8. Metal Banding/ Straps: Coated steel, width 1.0 inch, structural steel Grade 50 per ASTM C 653, exposed color to match vapor barrier, gray backing color.
  - 10. Thermal Breaks:
    - a. Thermal spacer blocks:
      - 1) Extruded or expanded polystyrene.
      - 2) Thickness: 1.0 inches.
      - 3) Minimum width: 3.0 inches.
  - 11. Light Gage Steel Fasteners:
    - a. Material: Zinc plated, cold forged steel.
    - b. Head color to match vapor barrier.
    - c. Contain rubber sealing washer.
  - 12. Heavy Gage Steel Fasteners:
    - a. Material: Zinc plated, cold forged steel.
    - b. Head color to match vapor barrier.
  - 13. Insulation Hangers: Insul-hold insulation hangers.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine the areas and conditions under which work of this section will be installed. Verify that adjacent materials are dry and ready to receive insulation. Verify structure, bracing, and concealed building systems have been tested and inspected.
- B. Provide written report listing conditions detrimental to performance of work in this section. Do not proceed with installation until unsatisfactory conditions have been corrected.

# 3.2 INSTALLATION

- A. Install liner system in accordance with manufacturer's installation instructions and approved Shop Drawings.
- B. Purlin and girt attachment surfaces should be clean and dry prior to attaching two-faced tape or sealing adhesive.
- C. Installed fiberglass insulation should fit snugly against purlin and girt walls in the cavity space. Avoid gaps, voids and any excess compression.

# 3.3 CLEANING

A. Clean dirt from vapor barrier fabric using a soft cloth with soap and water or non-abrasive household cleaner. Solvent-based cleaners and abrasive pads should be avoided.

END OF SECTION 07 21 16

# SECTION 07 25 00 - WEATHER BARRIERS

### PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Unless noted otherwise, this Section Includes:
  - 1. Weather Resistant Barrier (WRB)
  - 2. Self-Adhering Membrane (SAM)
  - 3. Self-Adhering Sill Plate Barrier
  - 4. Liquid-Applied Flashing (LAF)
  - 5. Window Sill Pan
  - 6. Aluminum back dam angle
  - 7. Flashing Panels
- B. Related Requirements:
  - 1. Division 06 Section "Rough Carpentry"
  - 2. Division 07 Section "Sheet Metal Flashing and Trim"
  - 3. Division 08 Section "Hanger Bi-Fold Doors"
  - 4. Division 08 Section "Aluminum-Framed Entrances and Storefronts"
  - 5. Division 13 Section "Metal Building Systems"
- C. System Description:
  - 1. Supply labor, materials and equipment for a mechanically attached water-resistive weather barrier membrane system.
  - 2. Complete Work as shown on the Drawings and specified herein to bridge gaps and seal the water-resistive vapor permeable air barrier membrane against air leakage and water intrusion, including:
    - Connections of the walls to the roof membrane Connections of the walls to the foundations Seismic and expansion joints Openings and penetrations of window and door frames, store front, curtain wall Piping, conduit, duct and similar penetrations Masonry ties, screws, bolts and similar penetrations All other air leakage pathways in the building envelope
  - 3. Install primary water-resistive vapor permeable air barrier, flashing, and accessories.

## 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Submit manufacturers' current details and installation instructions for the water-resistive

vapor permeable air barrier membrane components and accessories.

- C. Submit samples of the following:
  - 1. Manufacturer's sample warranty
- 1.4 WARRANTY

A. Provide manufacturer's standard material warranty in which manufacturer agrees to provide replacement material for the mechanically attached water-resistive vapor permeable air barrier sheets installed in accordance with manufacturer's instructions that fail due to material defects within 20 years of the date of Purchase.

#### PART 2 - PRODUCTS

#### 2.1 MANUFACTURER

- A. Manufacturer: The manufacturer listed below is the basis-of-design product, equivalent products by other manufacturers, provided they comply with requirements of the contract documents, will be considered (if applicable).
- 2.2 WEATHER RESISTANT BARRIER (WRB)
  - A. At Walls: Vapro-Shield Wrapshield IT (integrated tape), or equal
- 2.3 FLASHING ASSEMBLY (SELF ADHERING MEMBRANE (SAM) AND LIQUID-APPLIED FLASHING (LAF)):
  - A. Self-Adhered Membrane (SAM): VaproFlashing SA<sup>™</sup> Self-Adhered Orange
  - B. Liquid-Applied Flashing (LAF): Prosoco Fast Flash, a liquid-applied vapor permeable air barrier flashing material with vapor permeance and resistance to air leakage properties compatible with the primary air barrier membrane.
- 2.4 WINDOW SILL PANS (Aluminum angle installed inboard of window at sill, coated with liquid flashing)
  - A. Back Angle: 1.5"x1.5"x0.050 Aluminum. Cut to fit full width of opening and installed behind window frame at sill. Set in sealant and make watertight with VaproLiqui-Flash.

# 2.5 SEALANT

A. VaproBond, Dow 758, or VaproLiqui-Flash. For use at vertical joints in Wrapshield IT, penetrations, base of wall to adhere Wrapshield to foundation, and where shown in drawings and details.

# 2.6 SELF ADHESIVE SILL PLATE BARRIER

- A. Protecto Premium Energy Sill Sealer by Protecto-Wrap, or equal 5-1/2" wide x 3/8" thick
  - 1. Closed Cell Polyethylene Foam with Self Adhering Waterproof Membrane

# 2.7 FLASHING PANELS

- A. Flashing Panels: Quickflash Weatherproofing Products INC.
- B. Mechanical / Plumbing Flashing Panels:
  - 1. Materials:
    - a. Panel: Combination of high-density polyethylene (HDPE) and low-density polyethylene (LDPE).
      - 1) HDPE, Specific Gravity, ASTM D 1505: 0.953 g/cm<sup>3</sup>.
      - 2) HDPE, Tensile Strength at Yield, ASTM D 638: 3,100 psi.
      - 3) LDPE, Specific Gravity, ASTM D 792: 0.917 g/cm<sup>3</sup>.
      - 4) LDPE, Tensile Strength at Yield, ASTM D 638: 1,300 psi.
    - b. Weatherproof Seal: Thermoplastic elastomer.
      - 1) Hardness, ASTM D 2240, Shore A, 10 Seconds: 46.
      - 2) Specific Gravity, ASTM D 792: 1.05 g/cm<sup>3</sup>.
      - 3) Tensile Strength, ASTM D 412: 490 psi.
- C. Electrical Flashing Panels:
  - 1. Material: Thermoplastic elastomer.
    - a. Hardness, ASTM D 2240, Shore A, 10 Seconds: 93.
    - b. Specific Gravity, ASTM D 792: 1.05 g/cm<sup>3</sup>.
    - c. Tensile Strength, ASTM D 412: 1,300 psi.
- D. Flashing Panel Model Numbers: As required for all Mechanical, Plumbing and Electrical penetrations identified in the drawings at exterior wall locations.

## 2.8 MISCELLANEOUS MATERIALS

- A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spun-bonded polyolefin to produce an overall thickness of not less than 0.025 inch (0.6 mm) 0.030 inch (0.8 mm) 0.040 inch (1.0 mm).
  - a. Products: Provide product compatible to the Weather Barrier products.
- B. Primer for Flexible Flashing: Product recommended by manufacturer of flexible flashing for substrate.
- C. Nails and Fasteners: ASTM F 1667.
  - 1. Mechanical fasteners used to secure sheathing surfaces or penetrate sheathing surfaces shall be set flush with sheathing, fastened into solid backing and covered with the upper overlapping membrane. If exposed fasteners are present on the surface of the membrane, cover and seal with Vapro-LiquiFlash or VaproBond<sup>™</sup>.
  - 2. If exposed fasteners are required, use Vaproshield VaproCaps to insure water/air tight seal.
- D. Bi-Cellular Backer Rods: Provide cylindrical, flexible sealant backings composed bi-cellular material per Type B, ASTM C 1330 and ASTM C 717 for use as gasket or sealing material, for use with cold-applied sealants.

PART 3 - EXECUTION
#### 3.1 WEATHER RESISTANT BARRIER INSTALLATION

- A. Refer to detail drawings
- B. Install in strict accordance with manufacturer's instructions for wrap, self-adhered flashing, liquid flashing and integrated tape.
  - 1. Seal seams, edges, fasteners, and penetrations with integrated tape or sealant.

#### 3.2 WINDOW FLASHING INSTALLATION

- A. Apply self-adhered flashing where indicated to comply with manufacturer's written instructions.
  - 1. Clean and or Prime substrates as recommended by flashing manufacturer.
  - 2. Lap seams and junctures with other materials at least 4 inches (100 mm) except that at flashing flanges of other construction, laps need not exceed flange width.
  - 3. Lap flashing over water-resistive barrier at bottom of openings.
  - 4. Lap water-resistive barrier over flashing at heads and jambs of openings.
  - 5. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrates.
- B. Apply sill angle at back of opening, set in sealant. Seal over angle with liquid flashing and seal ends of angle to jambs to form a sill pan. Position so ~1/4" inboard of window frame to allow installation of interior sealant between angle and window frame.
- C. Apply liquid flashing at all sides of opening over the self-adhered membrane. Extend to back of opening, inboard of window frame by a minimum of 1". Return liquid flashing up back angle to form a sill pan. Return out onto face of wall a minimum of 1" on all sides of opening.

## 3.3 SELF ADHESIVE SILL BARRIER INSTALLATION

- A. Apply sill barrier along the foundation perimeter to comply with manufacturer's written instructions.
  - 1. Prime the top of the foundation with Protecto #100 Primer and allow primer to tack up.

## 3.4 FLASHING PANELS

A. Install flashing panels in accordance with manufacturer's instructions.

END OF SECTION 07 25 00

# SECTION 07 42 13 – METAL WALL PANELS

## PART 1 - GENERAL

# 1.1 SECTION INCLUDES

- A. Steel faced, polyurethane (polyisocyanurate) metal wall panels.
- B. Accessories including fasteners and perimeter trim.

## 1.2 REFERENCES

- A. American Architectural Manufacturers Association (AAMA)
  - 1. AAMA 501.1: Standard Test Method for Metal Curtain Walls for water penetration using Dynamic Pressure.
  - 2. AAMA 501.2: Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls and Sloped Glazing Systems.
- B. American Society of Civil Engineers (ASCE)
  - 1. ASCE 7: Minimum Design Loads for Buildings and Other Structures.
- C. ASTM International
  - 1. ASTM A480: Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.
  - 2. ASTM A653: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
  - 3. ASTM A755: Standard Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products
  - 4. ASTM A792: Standard Specification for Steel Sheet, 55% Aluminum-Zinc AlloyCoated by the Hot–Dip Process
  - 5. ASTM A924: Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
  - 6. ASTM B117: Standard Practice for Operating Salt Spray (Fog) Apparatus
  - 7. ASTM B209: Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
  - 8. ASTM C209: Standard Test Methods for Cellulosic Fiber Insulating Board
  - 9. ASTM C273: Standard Test Method for Shear Properties of Sandwich Core Materials.
  - 10. ASTM C518: Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
  - 11. ASTM C920: Standard Specification for Elastomeric Joint Sealants
  - 12. ASTM D224; Standard Specification for Smooth-Surfaced Asphalt Roll

- 13. ASTM D522: Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings
- 14. ASTM D523: Standard Test Method for Specular Gloss
- 15. ASTM D714: Standard Test Method for Evaluating Degree of Blistering of Paints
- 16. ASTM D968: Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
- 17. ASTM D1308: Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes
- 18. ASTM D1621: Standard Test Method for Compressive Properties of Rigid Cellular Plastics
- 19. ASTM D1622: Standard Test Method for Apparent Density of Rigid Cellular Plastics
- 20. ASTM D1623: Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics
- 21. ASTM D1654: Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.
- 22. ASTM D1929: Standard Test Method for Determining Ignition Temperature of Plastics
- 23. ASTM D2126: Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
- 24. ASTM D2244: Standard practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates
- 25. ASTM D2247: Standard Practice for Testing Water Resistance of Coatings in 100 percent Relative Humidity
- 26. ASTM D2794: Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
- 27. ASTM D3273: Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
- 28. ASTM D3359: Standard Test Methods for Measuring Adhesion by Tape Test
- 29. ASTM D3363: Standard Test Method for Film Hardness by Pencil Test
- 30. ASTM D4145: Standard Test Method for Coating Flexibility of Prepainted Sheet
- 31. ASTM D4214: Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films
- 32. ASTM D5894: Standard Practice for Cyclic Salt Fog/UV Exposure of Painted Metal, (Alternating Exposures in a Fog/Dry Cabinet and a UV Condensation Cabinet)
- ASTM D6226: Standard Test Method for Open Cell Content of Rigid Cellular Plastics.
- 34. ASTM E72: Standard Test Methods of Conducting Strength Tests of Panels for Building Construction
- 35. ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials
- 36. ASTM E90: Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
- ASTM E283: Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
- 38. ASTM E330: Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference

- 39. ASTM E331: Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
- 40. ASTM G153: Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials
- 41. ASTM G154: Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials
- D. FM Global (FM)
  - 1. Approval Standard 4880; Class 1 Fire Rating of Insulated Wall or Wall and Roof/Ceiling Panels, Interior Finish Materials or Coatings, and Exterior Wall Systems.
  - 2. Approval Standard 4881; Class 1 Exterior Wall Systems.
- E. International Building Code (IBC): current edition
- F. National Fire Protection Agency (NFPA)
  - 1. NFPA 259: Standard Test Method for Potential Heat of Building Materials.
  - 2. NFPA 268: Standard Test Method for Determining Ignitibility of Exterior Wall Assemblies Using a Radiant Heat Energy Source.
  - NFPA 285: Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components. G. UL Canada (ULC)Approvals:
  - 1. CAN/ULC-S101: Standard Methods of Fire Endurance Tests of Building Construction and Materials
  - 2. CAN/ULC-S102: Standard Method of Test for Surface Building Characteristics of Building Materials and Assemblies
  - 3. CAN/ULC-S127: Standard Corner Wall Method of Test for Flammability Characteristics of Non-Melting Building Materials
  - 4. CAN/ULC-S134: Fire Test of Exterior Wall Assemblies
- H. International Organization for Standardization (ISO)
  - 1. ISO 14025: Environmental Labels and Declarations

# 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-installation meeting: Conduct a pre-installation meeting at the job site attended by Owner, Architect, Manufacturer's Technical Representative, Panel Installer, and Contractors of related trades. Coordinate structural support requirements in relation to insulated wall panel system, installation of any separate air/water barriers, treatment of fenestration, and other requirements specific to the project.
- 1.4 SUBMITTALS

- A. Refer to Section 01 33 00 Submittal Procedures.
- B. Product Data: Submit manufacturer current technical literature for each type of product.
- C. Shop Drawings: Submit detailed drawings and panel analysis showing:
  - 1. Profile
  - 2. Gauge of both exterior and interior sheet
  - 3. Location, layout and dimensions of panels
  - 4. Location and type of fasteners
  - 5. Shape and method of attachment of all trim
  - 6. Locations and type of sealants
  - 7. Installation sequence
  - 8. Coordination Drawings: Provide elevation drawings and building sections which show panels in relationship to required locations for structural support. Include panel details and details showing attachment to structural support.
  - 9. Other details as may be required for a weathertight installation
- D. Panel Analysis: Provide panel calculations to verify panels will withstand the design wind loads indicated without detrimental effects or deflection exceeding L/180. Include effects of thermal differential between the exterior and interior panel facings and resistance to fastener pullout.
- E. Samples: Provide nominal 3 x 5 inch of each color indicated. Provide panel width by 8 inches long minimum-
- H. Quality Assurance Submittals
  - 1. Design Data, Test Reports: Provide manufacturer test reports indicating product compliance with requirements.
  - 2. Manufacturer Erection Instructions: Provide manufacturer's written installation instructions including proper material storage, material handling, installation sequence, panel location(s), and attachment methods, details and required trim and accessories.

## 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
  - 1. Manufacturer shall have a minimum of five (5) years experience in the production of insulated wall panels. Manufacturer shall demonstrate past experience with examples of projects of similar type and exposure.
  - 2. Manufacturer to be registered with a Program Operator with a Certified, Environmental Product Declaration, in conformance with ISO 14025, for Insulated Metal Panels.
- B. Installer Qualifications: Authorized by the manufacturer and the work shall be supervised by a person having a minimum of five (5) years experience installing insulated wall panels on similar type and size projects.

## 1.6 DELIVERY, STORAGE AND HANDLING

- A. Refer to Section 01 60 00 Product Requirements.
- B. Deliver panel materials and components in manufacturer's original, unopened, undamaged packaging with identification labels intact.
- C. Store wall panel materials on dry, level, firm, and clean surface. Stack no more than two bundles high. Elevate one end of bundle to allow moisture run-off, cover and ventilate to allow air to circulate and moisture to escape.

#### 1.7 WARRANTY

- A. Limited Warranty: Standard form in which manufacturer agrees to repair or replace items that fail in materials or workmanship within specified warranty period. The items covered by the warranty include structural performance including bond integrity, deflection and buckling.
  - 1. Warranty Period: Two (2) years from date of Substantial Completion, or 2 years and 6 months from the date of shipment from manufacturer's plant, whichever occurs first.
- B. Finish Warranty: Standard form in which manufacturer agrees to repair or replace metal panels that evidence deterioration of fluoropolymer finish, including flaking or peeling from approved primed metal substrate, chalk in excess of 8 when tested in accordance

with ASTM D4214, Method A, and /or color fading in excess of 5  $\Delta$ E Hunter units on panels when tested in accordance with ASTM D2244.

1. Warranty Period: Twenty (20) years from date of Substantial Completion, or 20 years and 3 months from the date of shipment from manufacturer's plant, whichever occurs first.

## PART 2 - PRODUCTS

#### 2.1 MANUFACTURER

- A. Kingspan Insulated Panels Ltd. 12557 Coleraine Drive, Caledon, ON L7E 3B5 (866-442-3594); 5202-272nd Street, Langley, B.C. V4W 1S3 (866-442-3594) (www.kingspanpanels.ca);
- Kingspan Insulated Panels, Inc., 726 Summerhill Drive, Deland, FL 32724 (888-882-5862); 2000 Morgan Road, Modesto, CA 95358 (800-377-5110) (www.kingspanpanels.us)
- C. Basis of Design: Kingspan KS Series.
- D. Substitution Limitations:
  - 1. Submit written request for approval of substitutions to the Architect in accordance with Section 01 25 00 Substitution Procedures. Include the following information:

- a. Name of the materials and description of the proposed substitute.
- b. Drawings, cut sheets, performance and test data.
- c. List of projects similar scope and photographs of existing installations.
- d. Test reports indicating compliance with the performance criteria.
- e. Other information necessary for evaluation.
- 2. After evaluation by Architect, approval will be issued via addendum. No verbal approval will be given.
- 3. Substitutions following award of contract are not allowed except as stipulated in Division 01 – General Requirements.

# 2.2 EXTERIOR WALL PANELS A.

Performance Criteria:

- Structural Test: Structural performance shall be verifiable by witnessed structural testing for simulated wind loads in accordance with ASTM E72 and E330. Deflection criteria shall be L/180.
- 2. Fatigue Test: There shall be no evidence of metal/insulation interface delamination when the panel is tested by simulated wind loads (positive and negative loads), when applied for two million alternate cycles of L/180 deflection.
- Freeze / Heat Cycling Test: Panels shall exhibit no delamination, surface blisters, permanent bowing or deformation when subjected to cyclic temperature extremes of minus 36 deg. F to plus 180 deg. F temperatures for twenty one, eight-hour cycles.
- 4. Water Penetration: There shall be no uncontrolled water penetration through the panel joints at a pressure differential of 20 psf, when tested in accordance with ASTM E331.
- 5. Dynamic Water Penetration: There shall be no uncontrolled water penetration through the panel assembly at a pressure difference of 12 psf, when tested in accordance with AAMA 501.1.
- 6. Air Infiltration: Air infiltration through the panel shall not exceed 0.006 cfm/sf at 20 psf air pressure differential when tested in accordance with ASTM E283.
- 7. Humidity Test: Panels shall exhibit no delamination or metal interface corrosion when subjected to plus 140 deg. F temperature and 100 percent relative humidity for a total of 1500 hours (62 days).
- 8. Autoclave Test: Panels shall exhibit no delamination or shrinkage/melting of the foam core from the metal skins after being subjected in an autoclave to a pressure of 2psig (13.8kPa) at a temperature of plus 218 deg. F (plus 103 deg. C) for a period of 2 1/2 hours.
- 9. Seismic Performance: Comply with ASCE 7, Section 13, "Seismic Design Requirements for Non-Structural Components". Panels shall be hard-fastened to structure along one edge only such that lateral slippage between panels can occur in the event of seismic activity.
- 10. Panel Fire Tests:
  - a. Fire Endurance Test 10 minutes: Panels remained in place without joint stitch fastening per CAN/ULC-S101.
  - b. Fire Endurance Test 15 minutes: Panels remained in place with joint stitch fastening per CAN/ULC-S101.

- 11. Flame Spread and Smoke Developed Tests on exposed Insulating Core:
  - a. Flame Spread: 25 or less.
  - b. Smoke Developed: 250 or less.
  - c. Tests performed in accordance with CAN/ULC-S102 and ASTM E84.
- 12. Fire Test Response Characteristics: Steel-faced panels with polyisocyanurate (ISO) core shall fully comply with Chapter 26 of International Building Code regarding the use of Foam Plastic.
  - a. FM 4880: Class I rated per FM Global, panels are approved for use without a thermal barrier and do not create a requirement for automatic sprinkler protection.
  - b. NFPA 259 Potential Heat Content; established for foam core.
  - c. NFPA 268 Ignitability of Exterior Wall Assemblies Using a Radiant Heat Source; successfully passed acceptance criteria.
  - d. NFPA 285 Intermediate Scale Multi-story Fire Evaluation; successfully passed acceptance criteria.
  - e. UL 263 Fire Resistive Rating; classified as a component of a fire-rated wall assembly for 1-hour and 2-hour rating Design No. U053 (rated assemblies include appropriate layers of fire-rated Type X Gypsum board).
  - f. ASTM D1929 Minimum Flash and Self Ignition; established for foam core.
  - g. S101, S102, S127, S134 UL Canada fire test standards; successfully passed.
- 13. Windborne Debris rating for Wall Panel:
  - a. Meet requirements for high velocity hurricane zone with large missile impact when tested in accordance with FM Standard 4881.
- 14. Insulating Core: Polyisocyanurate (ISO) core, ASTM C591 Type IV, CFC and HCFC free, compliant with Montreal Protocol and Clean Air Act, with the following minimum physical properties:
  - a. Core is 95 percent closed cell when tested in accordance with ASTM D6226
  - b. Panel shall provide a nominal R-value of 7.2 [hr·ft2·°F/Btu] per inch thickness when tested in accordance with ASTM C 518 at 75°F mean temperature and 8.0 [hr·ft2·°F/Btu] per inch thickness when tested in accordance with ASTM C 518 at 35°F mean temperature.
  - c. Foam has a density of 2.2 to 2.8 pounds per cubic foot when tested in accordance with ASTM D1622
  - d. Compressive Stress: Panels shall have a compressive stress of 19 psi. when tested according to ASTM D1621
  - e. Shear Stress: 25 psi when tested in accordance with ASTM C273
  - f. Tensile Stress: 23 psi when tested in accordance with ASTM D1623
  - g. Oven Aging at 212 degrees F:
    - 1) 1 day: plus 1 percent volume change

- 2) 7 days: plus 3 percent volume change 3) Tested according to ASTM D2126
- h. Low Temperature Aging at minus 40 degrees F:
  - 1) 1 day: 0 percent volume change
  - 2) 7 days: 0 percent volume change
  - 3) Tested according to ASTM D2126
- B. Paint Finish Characteristics:
  - 1. Gloss: 15 ± 5 measured at 60 degree angle tested in accordance with ASTM D523.
  - 2. Pencil Hardness: HB-H minimum tested in accordance with ASTM D3363.
  - 3. Flexibility, T-Bend: 1-2T bend with no adhesion loss when tested in accordance with ASTM D4145.
  - 4. Flexibility, Mandrel: No cracking when bent 180° around a 1/8 mandrel as tested in accordance with ASTM D522.
  - 5. Adhesion: No adhesion loss tested in accordance with ASTM D3359.
  - 6. Reverse Impact: No cracking or adhesion loss when impacted 3000 by inches of metal thickness (Ib-in), tested in accordance with ASTM D2794.
  - 7. Abrasion Resistance: Nominal 65 liters of falling sand to expose 5/32 inch diameter of metal substrate when tested in accordance with ASTM D968.
  - 8. Graffiti Resistance: Minimal effect.
  - 9. Acid Pollutant Resistance: No effect when subjected to 30 percent sulfuric acid for 18 hours, or 10 percent muriatic acid for 15 minutes when tested in accordance with ASTM D1308.
  - 10. Salt Fog Resistance: Passes 1000 hours, when tested in accordance with ASTM B117 (5 percent salt fog at 95 deg. F).
  - 11. Cyclic Salt Fog and UV Exposure: Passes 2016 hours when tested in accordance with ASTM D5894.
  - 12. Humidity Resistance: Passes 1500 hours at 100 percent relative humidity and 95 deg. F, with a test rating of 10 when tested in accordance with ASTM D2247, and D714.
  - 13. Color Retention: Passes 5000 hours when tested in accordance with ASTM G153 and G154.
  - 14. Chalk Resistance: Maximum chalk is a rating of 8 when tested in accordance with ASTM D4214, Method A.
    - 15. Color Tolerances: Maximum of  $5\Delta E$  Hunter units on panels when tested in
- C. Panel Assembly:
  - 1. Panel thickness: 3 inches thick.
  - 2. Panel width: 42 inches.
  - 3. Panel Lengths: As indicated on Drawings].
  - 4. Panel Attachment: Shall consist of fasteners and stainless steel attachment clip completely concealed within the panel side joint.
  - 5. Vertical Panel Joint Reveals: 1/8 inch.
  - 6. Exterior Face of Panel:

a. Material:

1) Steel coil material shall be in accordance with ASTM A755: AZ50 Galvalume®/ Zincalume® (55 percent aluminum, 45 percent zinc) in accordance with ASTM A792.

- b. Profile: Azteco®,-Mini-Wave called out on the drawings.
- c. Texture: Smooth
- d. Exterior Paint Finish Color:

1) Selected from current Kingspan Insulated Panels color chart

2) Finish System:

a) 1.0 mil. Fluropolymer (PVDF) Two Coat system: 0.2 mil primer with 0.8 mil Kynar 500 (70 percent) SOLID color coat.

Interior Face of Panel:

- a. Material:
  - 1) Steel coil material shall be in accordance with ASTM A755: AZ50 Galvalume®/ Zincalume® (55 percent aluminum, 45 percent zinc) in accordance with ASTM A792
- b. Profile: Shadowline.
  - 1) Profile description: Linear striations nominal 0.0625 inch deep by 3/4 inches wide at 3 inches on center.
- c. Texture: Non-directional stucco embossed.
- d. Gauge: 26 gauge.
- e. Interior Finish: modified polyester, dry film thickness of 1.0 mil including primer.
  - 1) Color: USDA Imperial White

## 2.3 ACCESSORIES

Fasteners:

- 1. Self drilling fasteners shall be corrosion resistant plated steel with neoprene washer, as recommended by manufacturer.
- 2. Material: Hex-head type with steel and neoprene washer and 12 gauge stainless steel clip supplied by the manufacturer.
- 3. Size: As recommended by manufacturer. B. Perimeter Trim:
- 1. Fabricated perimeter trim and metal flashing: Shall be same gauge, material and coating color as exterior face of insulated metal wall panel.

- Extruded perimeter trim: Shall be extruded aluminum 6063-T5 alloy with spray applied PVF coating in same color as exterior face of insulated metal wall panel. C. Sealants: Butyl, non-skinning/curing type as recommended by manufacturer.
- D. Butyl Tape: As recommended by manufacturer.

# PART 3 - EXECUTION

# 3.1 EXAMINATION

- A. Provide field measurements to manufacturer as required to achieve proper fit of the preformed wall panel envelope. Measurements shall be provided in a timely manner so that there is no impact to construction or manufacturing schedule.
- B. Supporting Steel: All structural supports required for installation of panels shall be by others. Support members shall be installed within the following tolerances:
  - 1. Plus or minus 1/8 inch in 5 feet in any direction along plane of framing.
  - 2. Plus or minus 1/4 inch cumulative in 20 feet in any direction along plane of framing.
  - 3. Plus or minus 1/2 inch from framing plane on any elevation.
  - 4. Plumb or level within 1/8 inch at all changes of transverse for pre-formed corner panel applications.
  - 5. Verify that bearing support has been provided behind vertical joints of horizontal panel systems and horizontal joints of vertical panel systems. Width of support shall be as recommended by manufacturer.
- C. Examine individual panels upon removing from the bundle; notify manufacturer of panel defects. Do not install defective panels.
- 3.2 PANEL INSTALLATION

Installation shall be in accordance with manufacturer's installation guidelines and recommendations.

- B. Install panels plumb, level, and true-to-line to dimensions and layout indicated on approved shop drawings.
- C. Cut panels prior to installing, where indicated on shop drawings, using a power circular saw with fine tooth carbide tip blade per manufacturer's instructions. Personnel should wear respiratory and eye protection devices. D. Butyl Weather Barrier Sealant:
  - 1. Apply non-skinning butyl sealant as shown on shop drawings and manufacturer's installation instructions as necessary to establish the vapor barrier for the panels.
  - 2. Use non-skinning butyl tube sealant only for tight metal-to-metal contact.
  - 3. Do not use non-skinning butyl tube sealant to bridge gaps.

E. Place panel fasteners through pre-punched holes in attachment clips, concealed within the joint of the panel. Secure units to the structural supports. Space clips as recommended by manufacturer or otherwise indicated on the approved shop drawings.

# 3.3 TRIM INSTALLATION

- A. Place trim and trim fasteners only as indicated per details on the approved shop drawings.
- B. Field drill weep holes where appropriate in horizontal trim; minimum 1/4 inch diameter at 24 inches on center.
- C. Place a continuous strip of butyl tube sealant between the inside back face of closure trims and interior panel faces for proper vapor seal.

# 3.4 SEALANT INSTALLATION FOR EXPOSED JOINTS

- A. Clean and prime surfaces to receive exterior exposed sealants in accordance with sealant manufacturer's recommendations.
- B. Follow sealant manufacturer's recommendations for joint width-to-depth ratio, application temperature range, size and type of backer rod, and compatibility of materials for adhesion.
- C. Direct contact between butyl and silicone sealants shall not be permitted.

## 3.5 TRIM INSTALLATION

Place trim and trim fasteners only as indicated per details on the approved shop drawings.

- B. Field drill weep holes where appropriate in horizontal trim where indicated on shop drawings.
- C. Place a continuous strip of butyl tape or butyl sealant on closure trims for the length of the panel to be covered as indicated on shop drawings.

## 3.6 FIELD QUALITY CONTROL

- A. Testing Agency: General Contractor shall engage an independent testing and inspection agency acceptable to the architect to perform field tests and inspections and to prepare reports of findings.
- B. Field Water Test: After completing portion of metal wall panel assembly including accessories and trim, test a 2-bay area selected by the architect for water penetration in accordance with AAMA 501.2.

# 3.7 CLEANING AND PROTECTION

A. Remove protective film immediately after installation.

B. Touch-up, repair or replace metal panels and trim that have been damaged.

1 After metal wall panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

END OF SECTION 07 42 13

# SECTION 07 52 00 – BITUMINOUS MEMBRANE ROOFING AND EXPANSION JOINTS

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Three ply modified bitumen roof membrane with mineral surface.
- B. This Section also includes the following roofing related work:
  - 1. Roofing demolition at areas identified.
  - 2. Vapor retarder at areas identified.
  - 3. Coverboard.
  - 4. Wood blocking, curbs, nailers, etc.
  - 5. Exterior building expansion joint cover assemblies.
  - 6. Waterproof expansion joints.
- C. Related Sections: The following Sections contain requirements that relate to this Sections:
  - 1. Section 07 62 00: "Sheet Metal Flashing and Trim".

## 1.3 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D 1079 for definitions of terms related to roofing work not otherwise defined in this Section.
- B. Thermal Resistance: Where thermal resistance properties of insulating materials are designated by "R-values," they represent the reciprocal of thermal conductance (C-value). Thermal conductance is the rate of heat flow through a material of thickness indicated. Thermal resistances (R-values) are expressed by the temperature difference in degrees F between the two exposed faces required to cause one (1) BTU to flow through one square foot per hour at mean temperatures indicated.
- C. SEI/ASCE (Structural Engineering Institute/ American Society of Civil Engineers): SEI/ASCE 7: Minimum Design Loads for Buildings and Other Structures.
- D. The term "Contractor" herein shall in all cases mean the Roofing Contractor, unless otherwise stated.

## 1.4 SUBMITTALS

A. Product Data, including manufacturer's technical product data, installation instructions, and recommendations for each type of roofing product (including roofing, insulation, coverboard,

fasteners and equipment) required. Include data substantiating that materials comply with requirements.

- B. Roofing Assembly: Provide diagrams identifying all proposed layers for each roof assembly on the project. Identify each layer and how it is attached. Provide fastening patterns that comply with the specification for mechanically fastened or ribbon-adhered layers.
- C. Installer Certification: Written certification from manufacturer of roofing system certifying that Installer is trained and approved by manufacturer for installation of specified roofing system. Provide two (2) copies of certification to Architect prior to award of roofing work.
- D. Letter of Compatibility: Written statement from the manufacturer of the roofing membrane stating that all proposed materials used are compatible with the specified product and do not invalidate or in any way lessen the required warranties. The letter shall also state that all Contract Drawing details and specifications meet the manufacturer's requirements for the required warranties. Provide two (2) copies of letter to Architect prior to award of roofing work.
- E. Manufacturer's certification indicating that bulk bituminous materials (if any) delivered to Project comply with required standards. Include quantity and statistical and descriptive data for each product. Submit certificate with each load before it is used.

# 1.5 QUALITY ASSURANCE

- A. Single Installer Responsibility: A single installer (contractor) shall perform the work, including sheet metal work, as required by this specification; and shall be a firm specializing in roofing system work who has been in business under the same name and ownership for at least 5 years, capable of showing successful installations similar to the work required for this project.
- B. Installer Qualifications: Engage an experienced Installer ("Roofer") to perform roofing work who has specialized in the installation of roofing systems similar to that required for this project. The roofing contractor shall be certified as an approved applicator by the manufacturer of the roofing system. EVIDENCE OF SAID CERTIFICATION SHALL BE WRITTEN TO THE OWNER AND SIGNED BY THE MANUFACTURER AND FORWARDED TO THE OWNER ALONG WITH THE BID.
- C. Contractor's Field Supervision: Require Contractor to maintain a full-time supervisor/foreman who is on the jobsite during times that roofing work is in progress and who is experienced in installation of roofing systems similar to type and scope required for this Project.
- D. Manufacturer Qualifications: Obtain primary products, including each type of roofing sheet (felt), bitumen, flashings, and vapor retarder, from a single manufacturer. Provide secondary products as recommended by manufacturer of primary products for use with roofing system specified.
- E. Insurance Certification: Assist Owner in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance on roofing and associated work.
- F. UL Listing: Provide roofing system and component materials that have been tested for application and slopes indicated and are listed by UL in "Building Materials Directory", or by other nationally recognized testing laboratory, for Class A external fire exposure.
  - 1. Provide roof-covering materials bearing UL Classification Marking (or corresponding marking from other nationally recognized testing laboratory) on bundle, package, or container indicating that materials have been produced under UL's Classification and Follow-up Service, or corresponding system.

- G. Wind Uplift: Provide manufacturer designed roofing system which will resist wind up-lift loads indicated on the Structural Drawings. When not indicated meet the requirements of SEI/ASCE 7.
- H. Fire Performance Characteristics: Provide insulation materials that are identical to materials whose fire performance characteristics, per requirements listed in Part 2 of this Section, have been determined by testing by UL or other nationally recognized testing and inspecting agency acceptable to authorities having jurisdiction, when tested for the assemblies of which the insulation materials are a part and in accordance with approved test methods.
- I. Pre-Construction Conference: Contractor will meet at project site with installer of each component of associated work, installers of deck or substrate construction to receive roofing work, installers of mechanical work and other work in and around roofing that must precede or follow roofing work (including rooftop units if any), Architect, Owner, roofing system manufacturer's representative, and other representatives directly concerned with performance of the work, including (where applicable) Owner's insurers, test agencies, and governing authorities.
  - 1. Review foreseeable methods and procedures related to roofing work, including but not necessarily limited to the following:
    - a. Tour representative areas of roofing substrates (decks), inspect and discuss condition of substrate, roof drains, curbs, penetrations, and other preparatory work performed by other trades.
    - b. Review structural loading limitations of steel deck and inspect deck for loss of flatness and for required mechanical fastening.
    - c. Review roofing system requirements (drawings, specifications, and other contract documents).
    - d. Review required submittals, both completed and yet to be completed.
    - e. Review and finalize construction schedule related to roofing work and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
    - f. Review required inspection, testing, certifying, and material usage accounting procedures.
    - g. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including possibility of temporary roofing.
    - h. Architect will record discussions of conference and furnish copy of record to each party attending.

# 1.6 PROJECT CONDITIONS

- A. The Contractor is responsible for maintaining the building in a watertight condition. Coordinate all work to ensure, on a daily basis, that the building, its finishes and furnishings, and all new work is protected from damage or moisture and that the roof system remains watertight.
  - 1. Do not remove existing roofing from an area larger than can be made watertight by the end of the working day.
  - 2. Do not assume weighted or nailed visqueen sheets to be watertight.
  - 3. Do not assume that an exposed concrete roof surface will be watertight.
- B. Dust inside the building created by construction operations including vibration, drilling and concrete coring can be detrimental to the Owner's electrical and electronic equipment. The Contractor is responsible for maintaining the building interior in a dust and dirt-free condition. Survey the building interior prior to commencement of demolition work and make all necessary protections to prevent dust and debris from entering the building.

- 1. During the construction period, filters approved by the Owner must be placed over all outside air intakes.
- C. Weather Condition Limitations: Proceed with roofing work only when existing and forecasted weather conditions will permit work to be performed in accordance with manufacturers' recommendations and warranty requirements.
- D. In the event weather conditions force the rapid closure of exposed roof deck or roof insulation, the following temporary closures shall be made:
  - 1. Exposed Roof Deck: As this project is a reroof, do not expose any roof deck that cannot be made weathertight prior to the end of the work day or inclement weather.
  - 2. Exposed Roof Insulation/Coverboard: The insulation/coverboard shall be covered with the specified base sheet and mid ply by the end of the work day to prevent water from coming in contact with the insulation.
  - 3. Should the Work be required to be shut down for extended periods of time, adequate closures shall be provided for all installations in place. Provide closures listed above with cut offs to cover exposed edges of felts and insulation with joints and edges sealed with roofing cement. Remove cut offs immediately before resuming work.

# 1.7 DEMOLITION

- A. Owner will occupy the building during the work. Coordinate demolition and other work that generates noise with Owner.
- B. Do not throw any debris or material from above grade areas to grade. Construct chutes or use other methods to conduct debris safely to on-grade disposal collection areas or containers. Provide containers for debris. DO NOT USE OWNER'S DUMPSTERS OR RECYCLING BINS.
- C. Regulatory Requirements: Comply with governing EPA and PSAPCA notification regulations before starting demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- D. Maintain existing utilities in service and protect them against damage during demolition operations.
  - 1. Do not interrupt existing utilities, including the Fire Alarm system, serving occupied or operating facilities, except when authorized in writing by Owner and authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and to governing authorities.
  - 2. Provide not less than seventy-two (72) hours' notice to Owner if shutdown of service is required during the reroofing work. Refer to Section 01010: Summary of Work.
- E. Promptly patch and repair holes and damaged surfaces caused to adjacent construction by selective demolition operations

## 1.8 DELIVERY, STORAGE, AND HANDLING

A. Store and handle roofing materials in a manner that will ensure that there is no possibility of significant moisture pickup. Store in a dry, well ventilated, weather-tight place. Unless protected from weather or other moisture sources, do not leave unused roofing materials on the roof overnight or when roofing work is not in progress. Store rolls of felt and other sheet materials on end on pallets or other raised surface. Handle and store materials or equipment in a manner to avoid significant or permanent deflection of deck.

- 1. All materials shall be delivered directly to the job site from the manufacturer's warehouse facilities. All materials shall be delivered in the manufacturer's labeled containers.
- 2. Store materials on site in the location designated by the Owner.
- 3. Do not store materials on the roof in a manner that will damage the roof structure or the roof membrane.
- 4. Use canvas rather than polyethylene for the protection of roofing materials.

## 1.9 WARRANTIES

- A. Special Project Warranty: Submit two (2) executed copies of a two (2) year watertight and weatherproof guarantee on the "Standard Roofing Guarantee" form included at end of this section, covering work of this section including roofing membrane, flashing, roof insulation, vapor retarder, and roofing accessories, signed by roofing Contractor.
- B. Manufacturer's Warranty: Submit executed roofing membrane manufacturer's "System Warranty" agreement, signed by an authorized representative of the manufacturer. The warranty shall protect the Owner against the costs of repairing leakage resulting from defects in all components of the system supplied by the roofing membrane manufacturer, to include membrane, flashing, fasteners, and insulation, as well as from their installation. Provide form that was published with product literature as of date of Contract Documents, for the following period of time:
  - 1. Twenty (10) years after date of Substantial Completion.

# PART 2 - PRODUCTS

## 2.1 LUMBER & PLYWOOD

- A. General: Provide lumber for support or attachment of other construction including rooftop equipment curbs and support bases, cant strips, bucks, nailers, blocking, furring, grounds, stripping, and similar members. Fabricate miscellaneous lumber from dimension lumber of sizes indicated and into shapes shown.
- B. For curbs, blocking, top plates, cants, etc., (2" through 4" thick and less than 6" wide), provide the following grade and species:
  - 1. Species: Douglas Fir, Fb = 1450 p.s.i..
  - 2. Grade: No. 2.
  - 3. Moisture Content: 19 percent maximum for lumber items not specified to receive wood preservative treatment.
- C. All wood curbs, blocking, top plates, cants, etc., shall be pressure treated with wood preservatives and bear the AWPB LP-2 stamp with preservative retention of 0.25 #/c.f. Any cuts shall be coated with a brush application of preservative.
- D. Plywood: Provide APA Performance-Rated Panels complying with the following requirements:
  - 1. Thickness: <sup>3</sup>/<sub>4</sub>"
  - 2. Exposure Durability Classification: EXPOSURE 1.
  - 3. Span Rating: 24/16
  - 4. Finish: C-D

#### 2.2 WOOD RELATED FASTENERS

- Α. General: Metal plates, caps, battens, accessory components, fastening devices and adhesives to suit substrate and as recommended by membrane manufacturer unless specifically mentioned below.
- Β. Sealing Washers: Rawlplug Company, Inc., "Rawl EPDM Sealing Washer," 5/8" diameter.
- C. Wood Curbs to Wood Decking: Rawlplug Company, Inc., "Rawl Deck Screw #2618," or approved equal.
- Wood Curbs & Nailers to Concrete: Rawlplug Company, Inc., "Rawl-Drive," or approved equal. D. Length as required. Use with 1 inch diameter washer.

#### 2.3 ROOFING ASSEMBLY

- Option #1: Derbigum Option #2: Siplast Option #3: Soprema Vapor Retarder - For Sopravap'R - self ad-Sopravap'R - self adhered Sopravap'R - self admembrane composed of use at areas where exhered membrane comhered membrane comisting wet insulation is posed of SBS modified SBS modified bitumen and posed of SBS modified removed and the deck is bitumen and woven polwoven polyethylene top bitumen and woven polyethylene top surface for yethylene top surface exposed, at locations surface for use direct to use direct to metal metal decks. Lap existing for use direct to metal shown in the drawings. decks. Lap any existing vapor retarder. decks. Lap any existvapor retarder. ing vapor retarder. Georgia-Pacific "Dens-Georgia-Pacific "Dens-Coverboard Georgia-Pacific "Dens-Deck Prime", 1/4 inch Deck Prime", 1/4 inch Deck Prime", 1/4 inch thick,. Mechanically atthick. Mechanically atthick, Mechanically attached. tached. tached. PRS SA Base Sheet. Siplast Paradiene 20 SA, Sopralene Flam Stick, Base Sheet (over cover-SBS modified, self ad-SBS modified, self-ad-SBS modified, self-adboard) hered fiberglass base hered fiberglass base hered polyester reinforced base sheet. sheet. sheet. Interply Derbibase Ultra, APP plv Paradiene 20 TG. torch Sopralene Flam 180. sheet, glass reinforced, adhered fiberglass rein-SBS ply sheet torch aptorch adhered. forced plysheet. plied to the base sheet. Surface Sheet Derbicolor GP FR, APP Paradiene 30 FR TG, SBS Sopralene Flam 180 FR modified capsheet with granulated capsheet, glass GR, SBS asphalt sheet granule surfacing. Torch reinforced, torch adhered. with mineral surfacing. adhered. Color white or torch applied, color Color white or gray. white or gray. gray. PRS SA Base Sheet. Flashing Ply Sheet Paradiene 20 SA, SBS ply Sopralene Flam Stick, SBS modified basesheet, glass reinforced, polyester reinforced sheet, self-adhered to a self-adhered to primed base sheet, self-adprimed substrate. substrates. hered to primed substrates. Derbicolor GP FR, APP Flashing Surface Sheet Parafor 30 TG, SBS gran-Sopralene Flam 250 FR ulated capsheet with polymodified capsheet with GR, polyester reinaranule surfacing. Torch ester reinforcing, torch-apforced granulatd capadhered. Color white or sheet, torch-applied to plied. flashing ply. gray.
- Α. Manufacturers: Subject to compliance with requirements, provide products by one of the following.

## 2.4 COVERBOARD

A. Georgia-Pacific "Dens-Deck Prime", 1/4 inch thick, fiberglass-faced siliconized gypsum board. Mechanically attached.

#### 2.5 TAPERED EDGE STRIPS

A. Johns-Manville, "Tapered Fesco Board", "US Intec Inc., "Tapered Permalite", or approved equal. Slope as required.

#### 2.6 CANT MATERIAL

A. Johns-Manville, "FesCant Plus", "US Intec Inc., "Permalite Cant Strip", or approved equal, cant strip, 1 1/2" x 48" with 4" face (3" high) and corner cut-outs.

## 2.7 COVERBOARD FASTENERS

A. Corrosion resistant screws and 3" disks as approved by insulation materials manufacturer, Buildex Roof Grip #14 size, or comparable.

#### 2.8 PRIMERS

- A. Asphalt Primer:
  - 1. Siplast, "PA-917 LS Primer ", or equivalent.
- B. Primer for Self-adhered sheets:
  - 1. Siplast, "TA-119 Primer", or equivalent.

#### 2.9 PLASTIC CEMENT

- A. Approved products:
  - 1. Siplast, "PA-1021 Plastic Cement", or equivalent.

## 2.10 SEALANT

- A. Moisture curing elastomeric sealant designed for roofing applications:
  - 1. Siplast, "PS-209", or equivalent.

## 2.11 CERMAIC GRANULES

- A. No. 11 grade specification ceramic granules of color scheme matching the granule surfacing of the finish ply.
  - 1. Siplast, "PA-1021 Plastic Cement", or equivalent.

# 2.12 FLUID APPLIED POLYESTER REINFORCED FLASHING MEMBRANE

- A. Catalyzed Acrylic Resin Flashing System: A specialty flashing system consisting of a liquidapplied, fully reinforced, multi-component acrylic membrane installed over a prepared or primed substrate. The flashing system consists of a catalyzed acrylic resin primer, basecoat and topcoat, combined with a non-woven polyester fleece. The resin and catalyst are pre-mixed immediately prior to installation. The use of the specialty flashing system shall be specifically approved in advance by the membrane manufacturer for each application.
  - 1. Parapro 123 Flashing System by Siplast; Irving, TX, or equivalent. Equivalent products must be guaranteed by the roofing manufacturer.

## 2.13 EXPANSION JOINT COVER ASSEMBLIES (BELLOWS)

- A. Subject to compliance with requirements, provide products from the following manufacturer, or approved equal by Architect:
  - 1. Nystrom 9300 73rd Avenue North Minneapolis, MN 55428 PH: (800) 547-2635 www.Nystrom.com
- B. Flexible expanded rubber membrane and closed cell foam bellow with two 4 inch (102 mm) metal flanges, surface mount, waterproof; accommodating seismic movement with lateral shear.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Nystrom, Inc.; Model EJ-EEJ
  - 2. Design Criteria:
    - a. Nominal Joint Width: 3"
    - b. Minimum Joint Width: 1.5"
    - c. Maximum Joint Width: 4.5"
    - d. Material:
      - 1) Flange: Stainless steel 0.018 inch (0.46 mm)
      - 2) Bellow:
        - a) Flexible Membrane Cover: 60 mil (1.5 mm) EPDM sheet.
        - b) Color: Black.
    - e. Attachment Method: Mechanical fasteners.
    - f. Fire-Resistance Rating: Provide expansion control system and fire-barrier assembly with a rating not less than 1Hr
    - g. Moisture Barrier: Manufacturer's standard.

## 2.14 WATERPROOF EXPANSION JOINT ASSEMBLY

- A. Basis-of-Design Product: Situra Inc.
- B. Product: RedLINE® 06 Waterproof Expansion Joint, reference detail RL-TPL-06.
- C. Accessories: Manufacturer's recommended M1 structural adhesive, sealants, water block, flat termination bar, compressible insulation, reinforced flashing; see drawings for more information.

## 2.15 MISCELLANEOUS ACCESSORIES

- A. Provide 3#/sf lead flashing and caps for soil stacks and conduit penetrations. Pre-prime with asphalt primer and set in cold adhesive as detailed in manufacturer's instructions. Where soil stacks exceed height of lead flashing, provide Uncured EPDM boot.
- B. Provide 4# lead for drain sumps, 30 inch square. Pre-prime with asphalt primer and set in cold adhesive as detailed in manufacturer's instructions.
- C. Provide new cast iron clamping rings, clamp brackets, fasteners, and cast iron dome strainers where existing are damaged, missing, or broken.

## PART 3 - EXECUTION

#### 3.1 INSPECTION OF SUBSTRATES

- A. Examine substrate surfaces to receive roofing system and associated work and conditions under which roofing will be installed. Do not proceed with roofing until unsatisfactory conditions have been corrected in a manner acceptable to Installer.
  - 1. Verify that deck is secure with no projecting surfaces in excess of 1/8" out of plane.

#### 3.2 GENERAL INSTALLATION REQUIREMENTS

- A. Review the drawings and other sections of the specifications for items of demolition which shall occur prior to installation of new roof membrane.
  - 1. Remove all demolition items from roof, prepare roof drains, and broom clean all surfaces before commencing installation.
  - 2. Protect other work from spillage of roofing materials, and prevent liquid materials from entering or clogging drains and conductors. Replace/restore other work damaged by installation of roofing system work.
- B. Coordinate the installation of insulation, roofing, flashings, coatings, and surfacings so that insulation and felts are not exposed to precipitation or exposed overnight. Provide cut offs as described in Paragraph 1.8 at end of each day's work, to cover exposed felts and insulation. Remove cut offs immediately before resuming work.
- C. Substrate Joint Penetrations: Do not allow bitumen to penetrate substrate joints and enter building or damage insulation, vapor barriers (retarders), or other construction.

## 3.3 DEMOLITION OF ROOF MEMBRANE

A. Remove existing built-up roofing baseflashing and cants at all vertical transitions. Remove areas of moisture infiltrated built-up roofing and insulation down to the existing deck substrate. Remove existing lead flashing, sheet metal flashing/counterflashing, and walkpads. Remove any loose or unadhered roof membrane.

## 3.4 DEMOLITION AND PREPARATION

- A. Clean and prime all roof drains. Wire brush all rust and asphalt from the drain bowl and flange. Check all drains for cracks and damage. Remove all broken fasteners. Prime the entire surface of the drain bowl and flange.
- B. Lift all existing sheet metal counterflashing from around mechanical equipment curbs. Clean and straighten integral metal equipment flashing before reinstalling.
- C. Loosen, remove and dispose of all existing sheet metal flashings, counterflashings and copings from curbs, parapets, equipment and sidewall conditions.
- D. If necessary, extend existing vent pipes to 8" above the finished roof membrane using oversized PVC pipe set in adhesive around the existing vent pipe.
- E. Broom clean all substrates of dust, debris, and other substances detrimental to new roofing following preparation work on all roof surfaces.
- F. Clean and prime coat all concrete decks and parapets and all metal flanges to receive new vapor retarder, base sheet and/or base flashing. Apply as specified by manufacturer. Allow to dry before application of base flashings.
- G. Verify all surfaces are dry prior to application of the coverboard.

# 3.5 WOOD CURBS, NAILERS AND BLOCKING

- A. Coordinate the replacement and/or installation of the following items:
  - 1. Install new treated wood nailers and blocking at roof parapets, curbs and all other projections and penetrations shown, specified on project documents or required by manufacturer. Thickness of nailers shall match substrate or insulation height.
  - 2. Nailers shall be anchored to the roof deck to resist a minimum force of 175 pounds per lineal foot in any direction. Fastener spacing shall be a maximum of three (3) feet on center. Fasteners shall be installed within six (6) inches of each end. Spacing and fastener embedment shall conform to FM Loss Prevention Data Sheet 1-49.
  - 3. Any existing woodwork to be reused shall be firmly anchored (shall resist a minimum force of 175 pounds per lineal foot in any direction) and free from rot. Only woodwork designated in drawings to be reused shall remain, and all other woodwork removed.

## 3.6 VAPOR RETARDERS

- A. Install the specified vapor retarder as indicated at locations where existing roof assembly is removed and the deck is exposed.
  - 1. Install the specified vapor retarder membrane to the metal deck. The membrane shall be laid free of wrinkles, creases, or fishmouths and shall be laid at right angles to the slope of the deck. Prime metal deck as necessary.
  - 2. Flash-in at all obstructions and penetrations through vapor retarder.
  - 3. Seal vapor retarder to perimeter walls and curbs so that it extends above the thickness of the insulation, coverboard, and cant strip and will be in contact with the roofing membrane

## 3.7 COVERBOARD INSTALLATION

A. Install Dens Deck Prime over the existing roofing membrane (and new "infill" insulation at areas where existing wet roofing/insulation has been removed) with screws and 3" plates using 1 fastener for every 2 square feet, or to meet SEI/ASCE 7.

## 3.8 CANT INSTALLATION

A. Install cants and tapered edge strips in adhesive around equipment curbs, roof sidewalls, insulation perimeter and all other locations shown on drawings.

# 3.9 ROOF MEMBRANE INSTALLATION

- A. General: The following information shows the basic installation sequence. The Installer shall resolve any discrepancies between this information and the manufacturer's specification prior to the commencement of the Work.
- B. Base Sheet & Midply: Fully adhere to cover board so the flow of water is perpendicular to the laps. Lap each sheet 3 inches on sides and ends. Extend over the top of curb at perimeter and at all equipment curbs. Self-adhered the base sheet to primed substrate, as recommended by the manufacturer. Heat weld seams as necessary. Torch adhere the ply sheet to the underlying surface.
- C. Install reinforcing strips. Torch apply to base sheet with 3 inch end laps onto itself, and extend 4 inches onto the horizontal base ply surface and to the top of the curb or vertical surface as shown in the details. Exert sufficient pressure to ensure full bonding to the base sheet with no air pockets.
- D. Install lead flashing on all vent pipe and conduit penetrations through roof, unless otherwise noted on plans. Prime flange and set in roofing cement. Install reinforcing target in hot asphalt. Trim top of lead flashing to top of vent pipe and install lead cap. Install stainless steel clamp around lead flashing on all pipes and conduits. Apply sealant around base.
- E. Roof Drains: Prime both sides of a 30" square, 4 lb. lead flashing sheet. Allow to dry, and set in a bed of roofing cement. Install reinforcing target ply over lead (option to install reinforcing ply under lead and field plysheet over lead). Extend capsheet into drain opening and clamp completed assembly including lead sheet with the drain ring.
- F. Cap Sheet: The cap sheet shall be bonded to the mid-ply sheet by torch application. Apply with 3" side laps and 6" end laps. The laps shall be applied so the flow of water is perpendicular to the laps. Adjoining end laps should be offset 3' apart. Stagger side laps between plies. The sheets shall be cut into 12 foot lengths and allowed to flatten before application. Extend to top of cant at perimeter and at all equipment curbs. Apply each sheet directly behind the torch applicator, exerting sufficient pressure on the cap sheet to ensure full bonding to the base sheet with no air pockets. Probe laps using a clean, heated roofing trowel and heat fuse any dry laps to ensure a complete seal. Dress all bleed lines of asphalt with granules or reflective emulsion.
- G. Base Flashing: Install at all roof drains, parapets, sidewalls and equipment curbs as shown on drawings (and at all penetrations and conditions requiring flashing not shown on drawings). Base flashings shall be installed with a minimum 3" end lap to itself and shall extend a minimum of 6" onto the roofing membrane surface beyond the cant and a minimum of 8" up the curb, parapet or sidewall, or to the extent shown in the details. All flashing sheets shall be cut off the end of the roll and be applied vertically, always lapping the selvage edge. Self-adhered baseflashing plysheet to primed substrates, using heat as necessary to promote adhesion. Fully torch adhere baseflashing capsheet, taking special precautions to provide continuous seal at exposed edges of flashing.

Exert sufficient pressure to ensure full bonding to the cap sheet with no air pockets. Probe laps using a clean, heated roofing trowel and heat fuse any dry laps to ensure a complete seal. Dress all bleed lines of asphalt with granules to match.

- H. Install walkpad material. Cut material from roll into 3'x5' pads and allow to flatten before installation. Prime mineral surface cap sheet below walkpad at the rate of 15 lbs. per square and allow to thoroughly dry. Apply in plastic cement or torch apply per manufacturer's requirements.
- I. Install new sheet metal copings, reglets, curb covers and counterflashings as noted on drawings and as specified in Section 07600: "Flashing and Sheet Metal".
- J. Clean, prime and install clamping rings on roof drains while membrane is still warm. Clean and install strainers.
- K. Following clamping ring installation, all roof drain lines and leaders shall be cleaned to the storm drain line by a professional drain cleaning service. All obstructions shall be removed and all roof drain lines and leaders shall be free flowing. Any broken or cracked roof drains or drain leaders shall be reported to the Owner.

# 3.10 FLUID APPLIED POLYESTER REINFORCED MEMBRANE

- A. Install the fluid applied flashing membrane per manufacturer's recommendations adhering to the granulated capsheet surface of the roofing membrane and steel substrate, or as shown in the details and drawings.
- 3.11 CLEAN-UP
  - A. Remove all equipment, unused materials, and debris from the roof and job site. Broom clean the roof surface.

## 3.12 PROTECTION OF ROOFING

- A. Upon completion of roofing and associated work, institute appropriate procedures for protection of roofing during clean-up period. At end of clean-up period, inspect roofing and prepare a written report, with copies to Architect and Owner, describing nature and extent of any damage found.
- B. Repair or replace (as required) defective work found at time of above inspection to a condition free of damage at time of Substantial Completion and in accordance with requirements of specified warranty.

END OF SECTION 07 52 00

# SECTION 076200 - SHEET METAL FLASHING AND TRIM

## PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Formed vertical and horizontal exterior sheet metal fabrications.
- B. Related Requirements:
  - 1. Division 06 Section "Rough Carpentry"
  - 2. Division 08 Section "Hanger Bi-Fold Doors"
  - 3. Division 08 Section "Aluminum Framed Entrances and Storefronts"
  - 4. Division 13 Section "Metal Building Systems"

#### 1.3 COORDINATION

- A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leak-proof, secure, and noncorrosive installation.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.
- B. Shop Drawings: For sheet metal flashing and trim.
  - 1. Include plans, elevations, sections, and attachment details.
  - 2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.
  - 3. Include identification of material, thickness, weight, and finish for each item and location in Project.
  - 4. Include details for forming, including profiles, shapes, seams, and dimensions.
  - 5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.

- 6. Include details of termination points and assemblies.
- 7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
- 8. Include details of roof-penetration flashing.
- 9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
- 10. Include details of special conditions.
- 11. Include details of connections to adjoining work.
- C. Samples for Verification: For each type of exposed finish.
  - 1. Sheet Metal Flashing: 12 inches (300 mm) long by actual width of unit, including finished seam and in required profile.
  - 2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches (300 mm) long required finishes.

## 1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

#### 1.7 WARRANTY

- A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
    - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
    - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
    - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
  - 2. Finish Warranty Period: 20 years from date of Substantial Completion.

#### PART 2 - PRODUCTS

## 2.1 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

#### 2.2 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
  - 1. Exposed Coil-Coated Finish:
    - a. Three-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
  - 2. Color: Match selected metal roof / wall panel / hanger bi-fold door and storefront window frame finishes.
  - 3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil (0.013 mm).

## 2.3 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal.
  - 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
    - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
    - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.

- C. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- D. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- E. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- F. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.
- G. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

# 2.4 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
  - 1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
  - 2. Obtain field measurements for accurate fit before shop fabrication.
  - 3. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
  - 4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.
- C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
  - 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.
- D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.
- E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- F. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.
- G. Do not use graphite pencils to mark metal surfaces.

## 2.5 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Roof Edge Flashing (Gravel Stop) and Fascia Cap: Fabricate in minimum 96-inch-(2400-mm-)long, but not exceeding 12-foot-(3.6-m-)long sections. Furnish with 6-inch-(150-mm-) wide, joint cover plates. Shop-fabricate interior and exterior corners.
  - a. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch (0.71 mm) thick.
- B. Copings: Fabricate in minimum 96-inch-(2400-mm-)long, but not exceeding 12-foot-(3.6-m-) long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and drill elongated holes for fasteners on interior leg. Miter corners, fasten and seal watertight. Shop-fabricate interior and exterior corners.
  - 1. Coping Profile: Per Drawings.
  - 2. Joint Style: Lapped Seam
  - 3. Fabricate from the Following Materials:
    - a. Aluminum-Zinc Alloy-Coated Steel: 0.040 inch (1.02 mm) thick.
- C. Roof Expansion-Joint Cover: Fabricate from the following materials: Shop fabricate interior and exterior corners.
  - 1. Aluminum-Zinc Alloy-Coated Steel: 0.034 inch (0.86 mm) thick.
- D. Base Flashing: Fabricate from the following materials:
  1. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch (0.71 mm) thick.
- E. Counterflashing: Fabricate from the following materials:1. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch (0.56 mm) thick.
- F. Roof-Penetration Flashing: Fabricate from the following materials:
  1. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch (0.71 mm) thick.
- G. Roof-Drain Flashing: Fabricate from the following materials:
  1. Stainless Steel: 0.016 inch (0.40 mm) thick.

## 2.6 MISCELLANEOUS SHEET METAL FABRICATIONS

A. Equipment Support Flashing: Fabricate from the following materials:
 1. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch (0.71 mm) thick.

## PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
  - 1. Verify compliance with requirements for installation tolerances of substrates.
  - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
  - 1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
  - 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
  - 3. Space cleats not more than 12 inches (300 mm) apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
  - 4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
  - 5. Torch cutting of sheet metal flashing and trim is not permitted.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
  - 1. Coat concealed side of uncoated-aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet (3 m) with no joints within 24 inches (600 mm) of corner or intersection.
  - 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.
- D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws.
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction.
  - Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).

## 3.3 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to

line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

- B. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches (100 mm) over base flashing. Install stainless-steel draw band and tighten.
- C. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches (100 mm) over base flashing. Lap counterflashing joints minimum of 4 inches (100 mm). Secure in waterproof manner by means of interlocking folded seam or blind rivets and sealant unless otherwise indicated.
- D. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with butyl sealant and clamp flashing to pipes that penetrate roof.

# 3.4 MISCELLANEOUS FLASHING INSTALLATION

A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.

# 3.5 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

END OF SECTION 07 62 00

# SECTION 07 76 00 – PEDISTAL PAVERS

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes Architectural Pavers and Adjustable Pedestals deck support system.
- B. Related Sections:
  - 1. Division 3 "Building Cast In Place Concrete" for slabs-on-grade.

## 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples:
  - 1. Architectural Pavers: Submit samples for type, color and texture required.
  - 2. Pedestals: Submit sample of each pedestal component.
- C. Shop Drawings: Submitted by contractor showing all components required for the paver & pedestal requirements. Shop drawings shall include plan drawings showing layout of all paver areas and detail drawings showing how the various components of the system fit together. Include manufacturer's literature completely describing all components of the paver pedestal systems and giving detailed installation recommendations and instructions. Also included detailed installation drawings for all precast pavers.

## 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: All products covered under this Section shall be produced by a single manufacturer unless otherwise specified.
- B. Installer Qualifications: Utilize an installer having successfully completed a minimum of 3 Paver installations similar in design, material, scope and extent indicated on this project.

## 1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect Concrete Pavers and Pedestal System during shipment, storage and construction against damage. Store a minimum of 4 inches off the ground in a dry location and cover with polyethylene to protect from contact with materials which would cause staining or discoloration.

## **1.7 PROJECT CONDITIONS**

- A. Pedestal System specified are to be used with pedestrian traffic only & all four (4) sides of a deck system must restrain and contain the decking panels with perimeter blocking or walls. Pavers panels must not be allowed to move laterally.
- B. All surfaces to receive pedestals must be broom clean, frost free, and free of dirt, oil or any rough foreign matter, which may impair the waterproofing / roofing manufacturers guarantee or protection requirements.
- C. The substrate that is to receive pedestals must have slope and provide positive and adequate drainage in accordance with good building practice and applicable building codes.
- F. Installation or anticipated installation of additional items on top of the pavers such as industrial equipment must be supported directly by additional pedestals that are <u>in addition</u> to the main paver/tile pedestal system. Failure to adequately support the additional weight of any such features or items may cause significant damage to the pavers.

# PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. The Paver Pedestal Systems specified herein are based upon products manufactured by: Abbotsford Concrete Products Phone: 800-665-4091 Website: <u>www.pavingstones.com</u>
- B. Paver Pedestal Systems equal in appearance and function and meeting these specifications, will be acceptable when the specified submittals are approved in writing by the Architect.

## 2.2 MATERIALS

- C. CONCRETE PAVERS:
  - 1. Type: Abbotsford Texada Hydra Pressed Slabs
    - 2. Color: Natural
    - 3. Size: 24"x24"x2" nominal
    - 5. Weight: 11 to 22 lbs per square foot depending on paver size & thickness.

## **B.PEDESTALS:**

1. BlackJack ScrewJack Pedestals and accessories.

# PART 3 – EXECUTION

## 3.1 EXAMINATION

SECTION 07 76 00

- A. Prior to starting work inspect the substrate to ensure that it has been properly prepared to accept the Pedestal System. The substrate and or surface shall be clean and free of any projections and debris which may impair the performance of the pedestal and or the paver system. Verify all elevations, required pedestal heights and deck dimensions. Commencement of work shall imply acceptance of surfaces & deck conditions.
- B. If preparation is the responsibility of another installer, notify Architect in writing of deviations from manufacturer's recommended installation tolerances and conditions.

# 3.2 PREPARATION

A. The substrate surface that will receive the Pedestal System must be well structurally capable of carrying the dead and live loads anticipated.

# 3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions. Installation requirements vary for each individual project site. Paver used, pattern, grid layout, starting point, and finished elevation should be shown on plan view shop drawings, which have been prepared and approved by the designer, installing contractor and/or owner.

# B.GRID LAYOUT AND ELEVATIONS:

- 1. Once the starting point and the finished elevation of the deck surface have been determined, the "Top of Pedestal Elevation" (finished elevation less decking paver or tile thickness) is established and marked around the perimeter using a transit water level or laser leveling device.
- 2. Precise measurements should be taken and paver area should be accurately defined. Mark off and 'square up' all outside edges with control lines using "snapped" chalk lines. Mark two (2) lines that are perpendicular to each other across the deck area. Continue to mark a grid of lines in both directions marking the location of each pedestal. Use the control lines as references to periodically check and assure a square layout during installation.
- 3. Next, a pedestal must be placed where each measured grid line meets the perimeter. Remove two (2) spacer tabs in line with one another atop each pedestal system placed around the perimeter. Remove all four (4) spacer tabs at corners.
- 4. Adjust each pedestal height to the "Top of Pedestal Elevation" marked on the perimeter. Position the pedestal as close to the edge of the perimeter as possible, with the two remaining spacer tabs aligned with the grid line. Using the elevation marked on the perimeter, stretch a mason's line along and slightly ahead of the second row of pedestals. A laser leveling device may also be used for this purpose.
- 5. Slight irregularities in decking paver or tile thickness can be compensated for by using one (1) to two (2) shim segments. Place on top of the pedestal, under the corner(s) of the decking paver or tile. Use no more than two (2) shims on top of the pedestal and always adhere guartered (1/4) wedges with construction adhesive.

# 3.4 FIELD QUALITY CONTROL

A. Inspect often during installation to assure that grid spacer lines are being maintained in a straight and consistent pattern and that deck pavers or tiles are level and not rocking. Unless otherwise specified in writing to allow for expansion, inspect to assure that all paver spacing between tiles and at perimeter walls does not exceed a tab width. Particular attention should be made to assure that all pedestrian entry or access points to the deck are level and that the deck surface tiles are not randomly raised or uneven creating a tripping or safety hazard.

# 3.6 ROUTINE MAINTENANCE AND CARE

- A. The owner must perform routine maintenance of the paver area. Check for rocking pavers and adjust. Pedestals can settle and may have to be realigned. Failure to do so can cause a tripping hazard. Periodically check spacer tabs and immediately replace broken tabs to limit deck movement. Make sure the edge restraint stays intact and structurally sound.
- B. Extra Materials: Deliver supply of maintenance materials to the owner. Furnish not less than 1 percent maintenance materials from same lot as materials installed, and enclosed in protective packaging with appropriate identifying labels.

END OF SECTION 07 76 00
## SECTION 07 84 13 - PENETRATION FIRESTOPPING

## PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- 1.2 SUMMARY
  - A. Section Includes:
    - 1. Penetrations in fire-resistance-rated walls.
    - 2. Penetrations in rated horizontal assemblies.
- 1.3 ACTION SUBMITTALS
  - A. Product Data: For each type of product indicated.
- 1.4 QUALITY ASSURANCE
  - A. Installer Qualifications: A firm experienced in installing penetration firestopping similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its penetration firestopping products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.
  - B. Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:
    - 1. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration Firestopping" Article. Provide rated systems complying with the following requirements:
      - a. Penetration firestopping products bear classification marking of qualified testing and inspecting agency.
      - b. Classification markings on penetration firestopping correspond to designations listed by the following:
        - 1) UL in its "Fire Resistance Directory."

# 1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install penetration firestopping when ambient or substrate temperatures are outside limits permitted by penetration firestopping manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.
- B. Install and cure penetration firestopping per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

### 1.6 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping is installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping.
- C. Notify Owner's testing agency at least seven days in advance of penetration firestopping installations; confirm dates and times on day preceding each series of installations.

# PART 2 - PRODUCTS

## 2.1 PENETRATION FIRESTOPPING

- A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
- B. Penetrations in Fire-Resistance-Rated Walls: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).
  - 1. Fire-resistance-rated walls include fire walls, fire-barrier walls, smoke-barrier walls, and fire partitions.
  - 2. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. Penetrations in Horizontal Assemblies: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).
  - 1. Horizontal assemblies include floor/ceiling assemblies, and ceiling membranes of roof/ceiling assemblies.
  - 2. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.
- D. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

- E. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.
  - 1. Permanent forming/damming/backing materials, including the following:
    - a. Slag-wool-fiber or rock-wool-fiber insulation.
    - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
    - c. Fire-rated form board.
    - d. Fillers for sealants.
  - 2. Temporary forming materials.
  - 3. Substrate primers.
  - 4. Collars.

### 2.2 FILL MATERIALS

- A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
- C. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized-steel sheet.
- D. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- E. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

# PART 3 - EXECUTION

# 3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

# 3.2 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing penetration firestopping to comply with manufacturer's written instructions and with the following requirements:
  - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping.
  - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping. Remove loose particles remaining from cleaning operation.
  - 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

# 3.3 INSTALLATION

- A. General: Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
  - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestopping.
- C. Install fill materials for firestopping by proven techniques to produce the following results:
  - 1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
  - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
  - 3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

#### 3.4 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping is without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping and install new materials to produce systems complying with specified requirements.

END OF SECTION 078413

# SECTION 07 92 00 - JOINT SEALANTS

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- 1.2 SUMMARY
  - A. Section Includes:
    - 1. Silicone joint sealants.
    - 2. Latex joint sealants.
    - 3. Acoustical joint sealants.
    - 4. Silyl Terminated Polyether (STPe) sealants.
  - B. Related Sections:
    - 1. Section 088000 "Glazing" for glazing sealants.
    - 2. Section 092900 "Gypsum Board" for sealing perimeter joints.

### 1.3 PRECONSTRUCTION TESTING

- A. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:
  - 1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
  - 2. Conduct field tests for each application indicated below:
    - a. Each kind of sealant and joint substrate indicated.
  - 3. Notify Architect seven days in advance of dates and times when test joints will be erected.
  - 4. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.
    - a. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
      - For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
  - 5. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.

6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

# 1.4 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Initial Selection (for non-paintable sealants): Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

# 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.

# 1.6 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
  - 1. When ambient and substrate temperature conditions are outside limits permitted by jointsealant manufacturer.
  - 2. When joint substrates are wet.
  - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
  - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

# 1.7 WARRANTY

- A. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
  - 1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
  - 2. Disintegration of joint substrates from natural causes exceeding design specifications.
  - 3. Mechanical damage caused by individuals, tools, or other outside agents.
  - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

# 2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
  - 1. Suitability for Immersion in Liquids. Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.
- C. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- D. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
- E. Colors of non-paintable, exposed Joint Sealants: As selected by Architect from manufacturer's full range.
- 2.2 SILICONE JOINT SEALANTS
  - A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.
    - 1. Products: Subject to compliance with requirements, provide Dow Corning 795 or equal products from another manufacturer, including, but not limited to the following:
      - a. GE, Momentive SCS 2000 Silpruf
      - b. Tremco Incorporated, Spectrem 2
    - 2. Products for Porous Substrates: Subject to compliance with requirements, provide Dow Corning 790 or equal products from another manufacturer, including, but not limited to the following:
      - a. GE, Momentive SCS 2700 Silpruf LM
      - b. Tremco Incorporated, Spectrem 1
    - 3. Products for Weather Barriers and Flashing: Subject to compliance with requirements, provide Dow Corning 758 or equal products from another manufacturer, including, but not limited to the following:
      - a. GE, Momentive SCS 2000 Silpruf
      - b. Tremco Incorporated, Spectrem 2

# 2.3 LATEX JOINT SEALANTS

- A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
- 2.4 ACOUSTICAL JOINT SEALANTS
  - A. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

# 2.5 SILYL TERMINATED POLYETHER (STPe) SEALANTS

- A. Low-modulus, Nonsag, elastomeric, hybrid sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.
  - 1. Products for Paintable Exterior General Sealant: Subject to compliance with requirements, provide BASF Masterseal NP 1150 or equal products.
  - 2. Location: stucco, and metal substrates.

# 2.6 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings (Backer Rod): ASTM C 1330, Type C (closed-cell material with a surface skin), Type B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

# 2.7 MISCELLANEOUS MATERIALS

- A. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- B. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

# PART 3 - EXECUTION

# 3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

# 3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
  - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
  - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
    - a. Concrete.
    - b. Masonry.
    - c. Unglazed surfaces of ceramic tile.
    - d. Exterior insulation and finish systems.
  - 3. Remove laitance and form-release agents from concrete.
  - 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
    - a. Metal.
    - b. Glass.
    - c. Porcelain enamel.
    - d. Glazed surfaces of ceramic tile.
- B. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

# 3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
  - 1. Do not leave gaps between ends of sealant backings.
  - 2. Do not stretch, twist, puncture, or tear sealant backings.
  - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
  - 1. Place sealants so they directly contact and fully wet joint substrates.
  - 2. Completely fill recesses in each joint configuration.
  - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
  - 1. Remove excess sealant from surfaces adjacent to joints.
  - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
  - 3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
  - 4. Provide flush joint profile where indicated per Figure 8B in ASTM C 1193.
  - 5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C 1193.
    - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.
- G. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.

# 3.4 FIELD QUALITY CONTROL

A. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

# 3.5 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

# 3.6 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work. END OF SECTION 079200

# SECTION 083113 - ACCESS DOORS AND FRAMES

## PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Access doors and frames for walls and soffits.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details materials, individual components and profiles, and finishes.
- B. Shop Drawings:
  - 1. Include plans, elevations, sections, details, and attachments to other work.
  - 2. Detail fabrication and installation of access doors and frames for each type of substrate.
- C. Product Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

# PART 2 - PRODUCTS

# 2.1 ACCESS DOORS AND FRAMES

- A. Source Limitations: Obtain each type of access door and frame from single source from single manufacturer.
- B. Flush Access Doors with Exposed Flanges:
  - 1. Assembly Description: Fabricate door to fit flush to frame. Provide manufacturer's standardwidth exposed flange, proportional to door size.
  - 2. Locations: Wall
  - 3. Door Size: 24"x24"
  - 4. Uncoated Steel Sheet for Door: Nominal 0.060 inch (1.52 mm), 16 gauge
    - a. Finish: Factory prime for field paint.

- 5. Frame Material: Same material, thickness, and finish as door
- 6. Hinges: Manufacturer's standard
- 7. Hardware: Lock, cylinder
- 8. Quantity: 10, verify locations w/ Architect

# 2.2 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.
- C. Frame Anchors: Same type as door face.
- D. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.
- 2.3 FABRICATION
  - A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
  - B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
  - C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports indicated.
- 2.4 FINISHES
  - A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
  - B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
  - C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
  - D. Steel and Metallic-Coated-Steel Finishes:
    - 1. Factory Prime: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

# PART 3 - EXECUTION

# 3.1 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

# 3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

### 3.3 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 08 31 13

# SECTION 08 35 00 - HANGER BI-FOLD DOORS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- 1.2 SUMMARY
  - A. Section Includes:
    - 1. Hydraulic Bi-Fold System Doors

### 1.3 RELATED WORK

- A. All header, blocking, support structures and jambs as required.
- C. Paint or otherwise finishing all trim and other materials adjoining door.
- D. Provide hydraulic fluid in quantity necessary for proper system operation.

# 1.4 ACTION SUBMITTALS

- A. Product Data: Submit manufacturer's product data and roughing-in diagrams.
- B. Shop Drawings: Complete shop drawings are to be provided prior to fabrication indicating construction and installation details.

# 1.5 QUALITY ASSURANCE

- A. Provide Welding each Hydraulic Bi-Fold System as a complete unit by one manufacturer, including frames, panels, brackets, guides, hardware, operators, and installation accessories to suit opening.
- B. Wind Loading: Design and reinforce Hydraulic Bi-Fold system to withstand a wind loading pressure to comply with state and federal code requirements.
- C. Preparation of the opening shall conform to current criteria set forth by the International and Standard Building Code.
- 1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

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A. Proper storage of the system before installation and continued protection during and after installation will be the responsibility of the general contractor.

# 1.6 WARRANTY

All materials and components, supplied by manufacturers shall be guaranteed against defects in materials and workmanship, for a period of one year from date of delivery.

### PART 2 – PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated into the work, include, but are not limited to, the following:

Crown Doors, LLC 135 McLeod Avenue South Plato, MN. 55370 (320) 238-2616 www.crowndoors.com info@crowndoors.com

B. Upon compliance with all the criteria specified in this section, manufacturers wishing to bid products similar to the product specified must submit to the architect in accordance with substitution requirements. The submitting manufacturer guarantees the proposed substituted product complies with the product specified and as detailed on the drawings.

#### 2.2 MATERIALS

- A. Product to be SST-II Hydraulic Bi-Fold System as furnished by Crown Doors, LLC
  - 1. Construct operable panel and frame sections with structural steel (of ASTM-A500 grade minimum) framing to comply with applied wind code.
  - 2. Operable panels and frame shall be constructed of structural steel tubing and other structural steel shapes, and shall be designed to the same loading requirements for live, dead and wind loads as the surrounding construction.
  - 3. System shall be designed so that no center "cane bolt" is required in the floor.
  - 4. Operable panels and frame shall be factory-welded at all joints and connections, with smooth welds not to exceed 1/4" [6] thickness.
  - 5. Inside-Sash (infill) glass retainer system shall be factory pre-installed and seam-sealed, and necessary setting blocks, spacers, butyl and foam tape shall be supplied.
  - System frame, operable panels, and factory pre-installed, inside-sash glass retainer shall be primed with gray-zinc, powder-based, epoxy primer, and finished with manufacturer's standard powder- coat.

7. Factory-Supplied neoprene seals/weather stripping will be shipped loose for field-install to SECTION 08 91 19 2 FIXED LOUVERS

protect against damage during transport.

- B. Bi-fold System shall be operated by hydraulic cylinders that are mechanically fastened to the panel frame.
  - Cylinders are to be located on the top half of the door, only. Cylinders will be designed to carry the required loads during operation, open position, and closed position. Internal stops will be installed so as not to allow over-extension of the cylinders, therefore restricting the system from opening or clos- ing beyond its limit.
  - 2. Lift straps or cables, horizontal top and bottom drive shafts, pulleys, and strap or cable "kick outs" are unacceptable.
  - 3. System shall be locked closed by means of the hydraulic cylinders providing a minimum of 1,000 lbs. of closing force.
- C. Power Operator Standard voltage is 220-240v, single phase.
  - 1. Constant contact push-button or key-switch controls for separate mounting.
  - 2. Power unit to power (2) hydraulic cylinders which open and close the system. Power unit to be pre-wired and factory tested.
  - 3. "Open-Close" control units will be wired for constant-hold operation.
  - 4. Incoming electrical source to hydraulic power unit to be supplied by others (manufacturer's standard).
  - 5. Each door operator shall have thermal overload protection for the motor.
  - 6. Location(s): Per drawings
- D. Finishes
  - 1. Entire system frame, operable panels, and factory pre-installed, inside-sash glass retainer shall be primed with gray-zinc, powder-based, epoxy primer, and finished with custom matched powder-coat color.

a. optional finish: RAL powder-coat colors in gloss or satin, custom matched powder-coat color

# 2.3 OPERATION

A. The Hydraulic Bi-Fold System shall be extended/retracted in the opening using a constant-contact push-button or key switch, operating hydraulic cylinders mounted to the system frame.

# PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates and openings, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

### 3.3 SAFETY

- A. Hydraulic power unit to have a manual emergency let-down valve for closing the system in case of a power outage.
- B. SST-II Hydraulic Bi-Fold System to incorporate pressure compensated orifice valves
- C. Photoelectric or lead-edge pressure sensor optional.

#### 3.4 INSTALLATION

- A. Installation of the Hydraulic Bi-Fold System shall be by a contractor familiar with this type of installation and be in strict accordance with the approved build drawings and manufacturers standard printed specifications, instructions, and recommendations. All moving parts will be left in good operating condition.
- B. Permanent or temporary electric wiring shall be brought to the power unit location before installation. After the Hydraulic Bi-Fold System is installed, the general contractor assumes the responsibility of any dam- age to the system or system components during construction until the building is turned over to the owner.
- C. Fill reservoir with hydraulic fluid (provided by others). Use ATF for cold weather applications or #32 hydraulic fluid for all other applications.

# 3.5 CLEANING

A. All surfaces shall be wiped clean and free of handprints, grease, and oil.

# 3.6 TRAINING

A. Installer shall demonstrate proper operation and maintenance procedures to owner's representative.

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B. Operating keys and owner's manual shall be provided to owner's representative.

END OF SECTION 08 35 00

# SECTION 08 41 13 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

### PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Section Includes:
  - 1. Storefront framing for interior and exterior window walls, including integral column and beam wraps (break metal).
  - 2. Exterior and interior manual-swing entrance doors and door-frame units.
- B. Related Requirements:
  - 1. Section 088000 "Glazing" for glass.
  - 2. Section 087000 "Door Hardware" for hardware.
- 1.3 PREINSTALLATION MEETINGS
  - A. Preinstallation Conference: Conduct conference at Project site.
- 1.4 ACTION SUBMITTALS
  - A. Product Data: For each type of product.
    - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
  - B. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.
    - 1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
    - 2. Include full-size isometric details of each vertical-to-horizontal intersection of aluminumframed entrances and storefronts, showing the following:
      - a. Joinery, including concealed welds.
      - b. Anchorage.
      - c. Expansion provisions.
      - d. Glazing.
      - e. Flashing and drainage.
    - 3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.

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- C. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- 1.5 QUALITY ASSURANCE
  - A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
  - B. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated and accredited by IAS or ILAC Mutual Recognition Arrangement as complying with ISO/IEC 17025.
  - C. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
    - 1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

# PART 2 - PRODUCTS

# 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design aluminum-framed entrances and storefronts.
- B. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
  - 1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
  - 2. Failure also includes the following:
    - a. Thermal stresses transferring to building structure.
    - b. Glass breakage.
    - c. Noise or vibration created by wind and thermal and structural movements.
    - d. Loosening or weakening of fasteners, attachments, and other components.
    - e. Failure of operating units.
- C. Deflection of Framing Members: At design wind pressure, as follows:
  - 1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding 1/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch (19.1 mm), whichever is less.
  - 2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch (3.2 mm), whichever is smaller.

- 3. Cantilever Deflection: Where framing members overhang an anchor point, as follows:
  - a. Perpendicular to Plane of Wall: No greater than 1/240 of clear span plus 1/4 inch (6.35 mm) for spans greater than 11 feet 8-1/4 inches (3.6 m) or 1/175 times span, for spans less than 11 feet 8-1/4 inches (3.6 m).
- D. Structural: Test according to ASTM E 330 as follows:
  - 1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
  - 2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
  - 3. Test Durations: As required by design wind velocity, but not less than 10 seconds.
- E. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:
  - 1. Fixed Framing and Glass Area:
    - a. Maximum air leakage of 0.06 cfm/sq. ft. (0.30 L/s per sq. m) at a static-air-pressure differential of 1.57 lbf/sq. ft. (75 Pa).
  - 2. Entrance Doors:
    - a. Pair of Doors: Maximum air leakage of 1.0 cfm/sq. ft. (5.08 L/s per sq. m) at a staticair-pressure differential of 1.57 lbf/sq. ft. (75 Pa).
    - b. Single Doors: Maximum air leakage of 0.5 cfm/sq. ft. (2.54 L/s per sq. m) at a staticair-pressure differential of 1.57 lbf/sq. ft. (75 Pa).
- F. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:
  - 1. No evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. (300 Pa).
- G. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:
  - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
  - 2. Thermal Cycling: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.
    - a. High Exterior Ambient-Air Temperature: That which produces an exterior metalsurface temperature of 180 deg F (82 deg C).
    - b. Low Exterior Ambient-Air Temperature: 0 deg F (minus 18 deg C).
    - c. Interior Ambient-Air Temperature: 75 deg F (24 deg C).

# 2.2 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

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- 1. Kawneer, an Alcoa Company
- 2. Oldcastle Building Envelope
- 3. Or, approved equal as determined by Architect

### 2.3 FRAMING

- A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
  - 1. Construction: Thermally broken
  - 2. Glazing System: Retained mechanically with gaskets on four sides.
  - 3. Glazing Plane: Front.
  - 4. Fabrication Method: Field-fabricated stick system.
- B. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.
- C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- D. Snap-in Flat Filler: Manufacturer's standard frame filler plates at all exposed frame jambs edges, where occurs.
- E. Materials:
  - 1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
    - a. Sheet and Plate: ASTM B 209 (ASTM B 209M).
    - b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221 (ASTM B 221M).
    - c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
    - d. Structural Profiles: ASTM B 308/B 308M.

## 2.4 ENTRANCE DOOR SYSTEMS

- A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.
  - 1. Door Construction: 1-3/4-inch (44.5-mm) overall thickness, with minimum 0.125-inch-(3.2mm-) thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
  - 2. Door Design: Wide stile; 5-inch (127-mm) nominal width
  - 3. Glazing Stops and Gaskets: Square snap-on, extruded-aluminum stops and preformed gaskets.

# 2.5 ACCESSORIES

- A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
  - 1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.

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- 2. Reinforce members as required to receive fastener threads.
- 3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.
- B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch (25.4 mm) that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
  - 1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.
- C. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.
- D. Break metal: Minimum 0.040" or 0.090" aluminum break metal flashings and trims, finished to match framing system.
- E. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil (0.762-mm) thickness per coat.

# 2.6 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Fabricate components that, when assembled, have the following characteristics:
  - 1. Profiles that are sharp, straight, and free of defects or deformations.
  - 2. Accurately fitted joints with ends coped or mitered.
  - 3. Physical and thermal isolation of glazing from framing members.
  - 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
  - 5. Provisions for field replacement of glazing from exterior.
  - 6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
- E. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.
- F. Storefront Framing: Fabricate components for assembly using shear-block system.
- G. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
- H. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
- I. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.

J. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

#### 2.7 **ALUMINUM FINISHES**

- Α. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
  - 1. Color: Black, excluding continuous horizontal break shape at vestibule between upper and lower glazing assemblies where finish is to match existing adjacent mill aluminum finish.

# PART 3 - EXECUTION

#### 3.1 **EXAMINATION**

- Examine areas, with Installer present, for compliance with requirements for installation tolerances Α. and other conditions affecting performance of the Work.
- Β. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

Α. Prepare surfaces that are in contact with structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

#### 3.3 INSTALLATION

- Α. General:
  - 1. Comply with manufacturer's written instructions.
  - 2. Do not install damaged components.
  - 3. Fit joints to produce hairline joints free of burrs and distortion.
  - Rigidly secure nonmovement joints. 4.
  - Install anchors with separators and isolators to prevent metal corrosion and electrolytic 5. deterioration and to prevent impeding movement of moving joints.
  - Seal perimeter and other joints watertight unless otherwise indicated. 6.
- Metal Protection: Β.
  - 1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
  - 2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Set continuous sill members and flashing in full sealant bed as specified in Section 079200 "Joint Sealants" to produce weathertight installation.
- Install components plumb and true in alignment with established lines and grades. D.
- Ε. Install operable units level and plumb, securely anchored, and without distortion. Adjust weatherstripping contact and hardware movement to produce proper operation.

Install glazing as specified in Section 088000 "Glazing." F. **SECTION 08 41 13** 6

- G. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
  - 1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
  - 2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

# 3.4 ERECTION TOLERANCES

- A. Erection Tolerances: Install aluminum-framed entrances and storefronts to comply with the following maximum tolerances:
  - 1. Plumb: 1/8 inch in 10 feet (3.2 mm in 3 m); 1/4 inch in 40 feet (6.35 mm in 12.2 m).
  - 2. Level: 1/8 inch in 20 feet (3.2 mm in 6 m); 1/4 inch in 40 feet (6.35 mm in 12.2 m).
  - 3. Alignment:
    - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch (12.7 mm) wide, limit offset from true alignment to 1/16 inch (1.6 mm).
    - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch (12.7 to 25.4 mm) wide, limit offset from true alignment to 1/8 inch (3.2 mm).
    - c. Where surfaces are separated by reveal or protruding element of 1 inch (25.4 mm) wide or more, limit offset from true alignment to 1/4 inch (6 mm).
  - 4. Location: Limit variation from plane to 1/8 inch in 12 feet (3.2 mm in 3.6 m); 1/2 inch (12.7 mm) over total length.

# 3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Field Quality-Control Testing: Perform the following test on representative areas of aluminumframed entrances and storefronts.
  - 1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.
    - a. Perform tests in each test area as directed by Architect. Perform at least three tests, prior to 10, 35, and 70 percent completion.
- C. Aluminum-framed entrances and storefronts will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

END OF SECTION 08 41 13

# SECTION 08 71 13 – AUTOMATIC DOOR OPERATORS

# PART 1 GENERAL

### 1.01 SECTION INCLUDES

- A. Hardware for wood, aluminum and hollow metal doors.
- B. Hardware for fire-rated doors.
- C. Thresholds.
- D. Smoke and draft control seals.
- E. Weatherstripping and gasketing.
- 1.02 RELATED REQUIREMENTS
  - A. Section 05 50 00 Metal Fabrications for Fencing and Gate Hardware
  - B. Section 06 20 00 Finish Carpentry: Wood door frames.
  - C. Section 08 11 13 Hollow Metal Doors and Frames.
  - D. Section 08 14 16 Flush Wood Doors.
  - E. Section 08 33 23 Overhead Coiling Doors: Door hardware, except cylinders.
  - F. Section 08 36 13 Sectional Doors: Door hardware, except cylinders.
  - G. Section 08 43 13 Aluminum-Framed Storefronts: Door hardware, except as noted in section.
  - H. Section 08 71 13 Automatic Operators
  - I. Section 28 10 00 Access Control: Electronic access control devices.

#### 1.03 REFERENCE STANDARDS

- A. ADA Standards Americans with Disabilities Act (ADA) Standards for Accessible Design 2010.
- B. ASTM E283/E283M Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen 2019.
- C. DHI Sequence and Format for the Hardware Schedule 2019.
- D. DHI Keying Systems and Nomenclature 2019.
- E. DHI Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames 2004.
- F. DHI WDHS.3 Recommended Locations for Architectural Hardware for Flush Wood Doors 1993, also in WDHS-1/WDHS-5 Series, 1996.
- G. IBC International Building Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. ICC A117.1 Accessible and Usable Buildings and Facilities 2017.
- I. NFPA 70 National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. NFPA 80 Standard for Fire Doors and Other Opening Protectives 2022.
- K. NFPA 101 Life Safety Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- L. NFPA 105 Standard for Smoke Door Assemblies and Other Opening Protectives 2022.
- M. NFPA 252 Standard Methods of Fire Tests of Door Assemblies 2022.

- N. UL 10C Standard for Positive Pressure Fire Tests of Door Assemblies Current Edition, Including All Revisions.
- 1.04 ADMINISTRATIVE REQUIREMENTS
  - A. Coordinate the manufacture, fabrication, and installation of products that door hardware is installed on.
  - B. Sequence installation to ensure facility services connections are achieved in an orderly and expeditious manner.
  - C. Preinstallation Meeting: Convene a preinstallation meeting one week prior to commencing work of this section; require attendance by affected installers and the following:
    - 1. Architect.
    - 2. Hardware Supplier's Architectural Hardware Consultant (AHC).
    - 3. Hardware Installer.
    - 4. Owner's Security Consultant.
  - D. Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal reinforcement for door hardware.
  - E. Keying Requirements Meeting:
    - 1. Schedule meeting at project site prior to Contractor occupancy.
    - 2. Attendance Required:
      - a. Contractor.
        - b. Owner.
        - c. Hardware Supplier's Architectural Hardware Consultant (AHC).
        - d. Door Hardware Installer.
        - e. Owner's Security Consultant.
        - f. Manufacturer's Representative (if required)
    - 3. Agenda:
      - a. Establish keying requirements.
      - b. Verify locksets and locking hardware are functionally correct for project requirements.
      - c. Verify that keying and programming complies with project requirements.
      - d. Establish keying submittal schedule and update requirements.
    - 4. Incorporate "Keying Requirements Meeting" decisions into keying submittal upon review of door hardware keying system including, but not limited to, the following:
      - a. Access control requirements.
      - b. Key control system requirements.
    - 5. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.
    - 6. Deliver established keying requirements to manufacturers.
- 1.05 SUBMITTALS
  - A. See Section 01 30 00 Administrative Requirements for submittal procedures.
  - B. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project, and includes construction details, material descriptions, finishes, and dimensions and profiles of individual components.
  - C. Shop Drawings Door Hardware Schedule: A detailed listing that includes each item of hardware to be installed on each door.
    - 1. Prepared by or under supervision of Architectural Hardware Consultant (AHC).
    - 2. Comply with DHI using door numbering scheme and hardware set numbers as indicated in Contract Documents.
      - a. Submit in vertical format.
    - 3. List groups and suffixes in proper sequence.
    - 4. Include complete description for each door listed.

- 5. Include manufacturer's and product names, and catalog numbers; include functions, types, styles, sizes and finishes of each item.
- 6. Include account of abbreviations and symbols used in schedule.
- D. Shop Drawings Electrified Door Hardware: Include diagrams for power, signal, and control wiring for electrified door hardware that include details of interface with building safety and security systems. Provide elevations and diagrams for each electrified door opening as follows:
  - 1. Prepared by or under supervision of Architectural Hardware Consultant (AHC) and Electrified Hardware Consultant (EHC).
  - 2. Elevations: Include front and back elevations of each door opening showing electrified devices with connections installed and an operations narrative describing how opening operates from either side at any given time.
  - 3. Diagrams: Include point-to-point wiring diagrams that show each device in door opening system with related colored wire connections to each device.
  - 4. Provide electrical operation technical sheets including product schematics, point to point diagrams, and electrical requirements of all electrified hardware. Completely coordinate with the general contractor, electrical engineer, electrician, security access subcontractor and the installer. Operational descriptions are for demonstration only verify operational intent with the owner, architect and electrical engineer.
- E. Samples for Verification:
  - 1. Submit samples if requested.
  - 2. Architect will return full-size samples to Contractor.
  - 3. Include product description with samples.
- F. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- G. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
  - 1. Bitting List: List of combinations as furnished.
- H. Keying Schedule:
  - 1. Submit three (3) copies of Keying Schedule in compliance with requirements established during Keying Requirements Meeting unless otherwise indicated.
- I. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- J. Maintenance Materials and Tools: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 60 00 Product Requirements, for additional provisions.
  - 2. Tools: One set of each special wrench or tool applicable for each different or special hardware component, whether supplied by hardware component manufacturer or not.

# 1.06 QUALITY ASSURANCE

- A. Standards for Fire-Rated Doors: Maintain one copy of each referenced standard on site, for use by Architect and Contractor.
- B. Installer Qualifications: Company specializing in performing work of the type specified for commercial door hardware with at least three years of documented experience.
- C. Supplier Qualifications: Company with certified Architectural Hardware Consultant (AHC) and Electrified Hardware Consultant (EHC) to assist in work of this section.
- D. Regulatory and Operational Requirements:
  - Provide hardware for all openings, whether specified or not, in compliance with NFPA Standard No. 80, proper operation and local building code requirements. Where required, provide only hardware which has been tested and listed by UL or FM for types and sizes of doors required and complies with requirements of door and door frame labels. Label hardware, as required, for compliance with pressure testing criteria as dictated in IBC.

# 1.07 DELIVERY, STORAGE, AND HANDLING

A. Package hardware items individually; label and identify each package with door opening code to match door hardware schedule.

# 1.08 WARRANTY

- A. Manufacturer Warranty: Provide manufacturer warranty against defects in material and workmanship for period indicated, from Date of Substantial Completion. Complete forms in Owner's name and register with manufacturer.
  - 1. Closers: Twenty Five years, minimum.
  - 2. Exit Devices: Five years, minimum.
  - 3. Locksets and Cylinders: Five years, minimum.
  - 4. Other Hardware: Two years, minimum.
  - 5. Provide a manufacturer's variance on the manufacturer's letterhead that indicates that they will comply with these requirements (if not compliant).

# PART 2 PRODUCTS

### 2.01 GENERAL REQUIREMENTS

- A. Provide specified door hardware as required to make doors fully functional, compliant with applicable codes, and secure to extent indicated.
- B. Door Pulls and Push Plates:
  - 1. Provide door pulls and push plates on doors without a lockset, latchset, exit device, or auxiliary lock unless otherwise indicated.
- C. Closers:
  - 1. Provide door closer on each exterior door, unless otherwise indicated.
  - 2. Provide door closer on each fire-rated and smoke-rated door.
- D. Thresholds:
  - 1. Exterior Applications: Provide at each exterior door, unless otherwise indicated.
- E. Smoke and Draft Control Seals:
  - 1. Provide gasketing for smoke and draft control doors (Indicated as "S" on Drawings) that complies with local codes, requirements of assemblies tested in accordance with UL 1784.
- F. Weatherstripping and Gasketing:
  - 1. Provide weatherstripping on each exterior door at head, jambs, and meeting stiles of door pairs, unless otherwise indicated.
  - 2. Provide door bottom sweep on each exterior door, unless otherwise indicated.
  - 3. Fabricate as continuous gasketing, do not cut or notch gasketing material.
- G. Electrically Operated and/or Controlled Hardware: Provide necessary power supplies, power transfer hinges, relays, and interfaces as required for proper operation; provide wiring between hardware and control components and to building power connection in compliance with NFPA 70.
- H. Fasteners:
  - 1. Provide fasteners of proper type, size, quantity, and finish that comply with commercially recognized standards for proposed applications.
  - 2. Provide machine screws for attachment to reinforced hollow metal and aluminum frames.
  - 3. Provide stainless steel machine screws and lead expansion shields for concrete and masonry substrates.
  - 4. Provide wall grip inserts for hollow wall construction.
  - 5. Fire-Resistance-Rated Applications: Comply with NFPA 80.

6. Concealed Fasteners: Do not use through or sex bolt type fasteners on door panel sides indicated as concealed fastener locations, unless otherwise indicated or required per manufacturer's testing requirements.

# 2.02 PERFORMANCE REQUIREMENTS

- A. Provide door hardware products that comply with the following requirements:
  - 1. Applicable provisions of federal, state, and local codes.
    - a. IBC.
    - b. NFPA 101.
  - 2. Accessibility: ADA Standards and ICC A117.1.
  - Fire-Resistance-Rated Doors: NFPA 80, listed and labeled by qualified testing agency for fire protection ratings indicated, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.
  - 4. Hardware Preparation for Steel Doors and Steel Frames: BHMA A156.115.
  - 5. Hardware Preparation for Wood Doors with Wood or Steel Frames: BHMA A156.115W.
  - 6. Products Requiring Electrical Connection: Listed and classified by UL as suitable for the purpose specified.

# 2.03 HINGES

- A. Manufacturers: Conventional hinges.
  - 1. Listed in Door Hardware Schedule: Best
  - 2. Approved Substitutions: Hager, McKinney
  - 3. Continuous hinges are as manufactured by Best. Equal products by Select or ABH ae acceptable.
- B. Properties:
  - 1. Butt Hinges: As applicable to each item specified.
    - a. Standard Weight Hinges: Minimum of two (2) permanently lubricated non-detachable bearings.
    - b. Heavy Weight Hinges: Minimum of four (4) permanently lubricated bearings on heavy weight hinges.
    - c. Template screw hole locations.
    - d. Pins:
      - 1. Easily seated, non-rising pins
      - 2. Non removable pins (NRP) as needed.
    - e. UL 10C listed for fire-resistance-rated doors.
  - 2. Continuous Hinges: As applicable to each item specified.
    - a. Geared Continuous Hinges: As applicable to each item specified.
      - 1. Non-handed.
      - 2. UL 10C listed for fire-resistance-rated doors.
      - 3. Sufficient size to permit door to swing 180 degrees
- C. Finishes: See Door Hardware Schedule.
- D. Grades:
  - 1. Butt Hinges: Comply with BHMA A156.1 and BHMA A156.7 for templated hinges.
- E. Types:
  - 1. Butt Hinges: Include full mortise hinges.
- F. Options: As applicable to each item specified.
- G. Quantities:
  - 1. Butt Hinges: Three (3) hinges per leaves up to 90 inches in height. Add one (1) for each additional 30 inches in height or fraction thereof.
    - a. Hinge weight and size unless otherwise indicated in hardware sets:
      - 1. For doors up to 36 inches wide and up to 1-3/4 inches thick provide hinges with a minimum thickness of 0.134 inch and a minimum of 4-1/2 inches in height.

- 2. For doors from 36 inches wide up to 42 inches wide and up to 1-3/4 inches thick provide hinges with a minimum thickness of 0.145 inch and a minimum of 4-1/2 inches in height.
- 3. For doors from 42 inches wide up to 48 inches wide and up to 1-3/4 inches thick provide hinges with a minimum thickness of 0.180 inch and a minimum of 5 inches in height.
- 4. For doors greater than 1-3/4 inches thick provide hinges with a minimum thickness of 0.180 inch and a minimum of 5 inches in height.
- 2. Continuous hinges are gear type aluminum.
- H. Applications: At swinging doors.
  - 1. Provide non-removable pins at out-swinging doors with locking hardware and all exterior doors.
- I. Products:
  - 1. Butt Hinges:
    - a. Concealed or Exposed bearing, five (5) knuckle.
    - b. Plain Bearing, Five (5) Knuckle.
    - c. Continuous Hinges

# 2.04 BOLTS

- A. Manufacturers:
  - 1. Listed in Door Hardware Schedule: Trimco
  - 2. Approved Substitutions: ABH, Ives
- B. Properties:
  - 1. Flush Bolts:
    - a. Pairs of Swing Doors: At inactive leaves, provide flush bolts of type as required to comply with code.
    - b. Automatic where required by code or application.
    - c. Manual Flush Bolts: Manually latching upon closing of door leaf.
      - 1. Bolt Throw: 3/4 inch, minimum.
- C. Options:
  - 1. Extension Bolts: In leading edge of door, one bolt into floor, one bolt into top of frame.

# 2.05 EXIT DEVICES

- A. Manufacturers:
  - 1. Listed in Door Hardware Schedule: Precision 2000
  - 2. Approved Substitutions: Von Duprin 98/35, Sargent 88
- B. Properties:
  - 1. Touchpads: 'T" style metal touchpads and rail assemblies with matching chassis covers end caps.
  - 2. Latch Bolts: Stainless steel deadlocking with 3/4 inch projection using latch bolt.
  - 3. Cylinder: Include where cylinder dogging or locking trim is indicated.
  - 4. Strike as recommended by manufacturer for application indicated.
  - 5. Sound dampening on touch bar.
  - 6. Dogging:
    - a. Fire-Resistance-Rated Devices: Manual dogging not permitted.
  - 7. Handing: Field-reversible.
- C. Grades: Complying with BHMA A156.3, Grade 1.
- D. Standards Compliance:
  - 1. Provide UL listed exit device assemblies for fire-resistance-rated doors.
  - 2. Comply with UL 10C.
- E. Code Compliance: As required by authorities having jurisdiction.

# 2.06 LOCK CYLINDERS

- A. Manufacturers:
  - 1. Listed in Door Hardware Schedule: Best Cormax Premium
  - 2. Approved Substitutions: None facility standard
- B. Properties:
  - 1. Lock Cylinders: Provide key access on outside of each lock, unless otherwise indicated.
    - a. Provide cylinders from same manufacturer as locking device.
    - b. Provide cams and/or tailpieces as required for locking devices.
    - c. Provide cylinders with appropriate format interchangeable cores where indicated.
- C. Material:
  - 1. Manufacturer's standard corrosion-resistant brass alloy.
- D. Products:
  - 1. Rim/mortise/removable cores
- 2.07 MORTISE LOCKS
  - A. Manufacturers:
    - 1. Listed in Door Hardware Schedule: Best 45H
    - 2. Substitutions: Schlage L9000, Sargent 8200
  - B. Properties:
    - 1. Mechanical Locks: Manufacturer's standard.
      - a. Fitting modified ANSI A115.1 door preparation.
      - b. Door Thickness Coordination Fitting 1-3/4 inch to 2-1/4 inch thick doors.
      - c. Latch: Solid, one-piece, anti-friction, self-lubricating stainless steel or manufacturer's standard anti friction as required.
        - 1. Latchbolt Throw: 3/4 inch, minimum.
      - d. Auxiliary Deadlatch: One piece stainless steel, permanently lubricated.
      - e. Backset: 2-3/4 inch.
      - f. Lever Trim:
        - 1. Functionality: Allow the lever handle to move up to 45 degrees from horizontal position prior to engaging the latchbolt assembly.
        - 2. Strength: Locksets outside locked lever designed to withstand minimum 1,400 inch-lbs of torque. In excess of that, a replaceable part will shear. Key from outside and/or inside lever will still operate lockset.
        - 3. Spindle: Designed to prevent forced entry from attacking of lever.
        - 4. Independent spring mechanism for each lever.
          - (1) Trim to be self-aligning and thru-bolted.
    - 2. Electrified Locks: Same properties as standard locks, and as follows:
      - a. Voltage: 24 VDC.
      - b. Function: Electrically locked (Fail Safe) or unlocked (Fail Secure), as indicated for each lock in Door Hardware Schedule.
  - C. Finishes: See Door Hardware Schedule.
    - 1. Core Faces: Match finish of lockset.
  - D. Products: Mortise locks, including standard and electrified types.

# 2.08 DOOR PULLS AND PUSH PLATES

- A. Manufacturers:
  - 1. Listed in Door Hardware Schedule: Trimco
  - 2. Approved Substitutions: Rockwood, Don Jo
- B. Properties:
  - 1. Pull Type: Straight, unless otherwise indicated.
  - 2. Push Plate Type: Flat, with square corners, unless otherwise indicated.

- C. Grades: Comply with BHMA A156.6.
- D. Material: Stainless steel, unless otherwise indicated.
- E. Products:
  - 1. Push-Pull Plates.
- 2.09 CLOSERS
  - A. Manufacturers:
    - 1. Listed in Door Hardware Schedule: Best QDC100
    - 2. Approved Substitutions: LCN 4040XP, Sargent 250
  - B. Properties:

1.

- Surface Mounted Closers: Manufacturer's standard.
  - a. Construction: Cast Iron
  - b. Covers:
    - 1. Type: Standard for product selected.
      - (1) Full.
    - 2. Material: Plastic.
    - 3. Finish: Painted.
- C. Grades:
  - 1. Closers: Comply with BHMA A156.4, Grade 1.
    - a. Underwriters Laboratories Compliance:
    - b. Testing Standards Compliance: Meeting requirements of UL 10C for positive pressure.
- D. Code Compliance: As required by authorities having jurisdiction in the State in which the Project is located.
- E. Types:
  - 1. Rack-and-pinion, surface-mounted. 1-1/2 inches/36 MM minimum bore.
- F. Installation:
  - 1. Mounting: Includes surface mounted installations.
  - 2. Mount closers on non-public side of door and stair side of stair doors unless otherwise noted in hardware sets.
  - 3. At outswinging exterior doors, mount closer on interior side of door.
  - 4. Provide adapter plates, shim spacers, and blade stop spacers as required by frame and door conditions.
  - 5. Where an overlapping astragal is included on pairs of swinging doors, provide coordinator to ensure door leaves close in proper order.

# 2.10 PROTECTION PLATES

- A. Manufacturers:
  - 1. Listed in Door Hardware Schedule: Trimco
  - 2. Approved Substitutions: Rockwood, Don Jo
- B. Properties:
  - 1. Plates:
    - a. Kick Plates: Provide along bottom edge of push side of every wood door with closer, except aluminum storefront and glass entry doors, unless otherwise indicated.
    - b. Edges: Beveled, on four (4) unless otherwise indicated.
- C. Grades: Comply with BHMA A156.6.
- D. Material: As indicated for each item by BHMA material and finish designation.1. Metal Properties: Stainless steel.
- E. Installation:
  - 1. Fasteners: Countersunk screw fasteners

# 2.11 STOPS AND HOLDERS

- A. Manufacturers:
  - 1. Listed in Door Hardware Schedule: Trimco
  - 2. Approved Substitutions: Rockwood, Don Jo
- B. General: Provide overhead stop/holder when wall or floor stop is not feasible.
- C. Grades:
  - 1. Door Holders, Wall Bumpers, and Floor Stops: Comply with BHMA A156.16 and Resilient Material Retention Test as described in this standard.
- D. Material: Base metal as indicated for each item by BHMA material and finish designation.
- E. Types:
  - 1. Wall Bumpers: Bumper, concave, wall stop.
  - 2. Floor Stops: Provide with bumper floor stop.
- F. Installation:
  - 1. Non-Masonry Walls: Confirm adequate wall reinforcement has been installed to allow lasting installation of wall bumpers.

### 2.12 WEATHERSTRIPPING AND GASKETING

- A. Manufacturers:
  - 1. Listed in Door Hardware Schedule: National Guard
  - 2. Approved Substitutions: Pemko, Zero
- B. Grades: Comply with BHMA A156.22.
- C. Products:
  - 1. Weatherstripping/Smoke Seal: See Door Hardware Schedule.

### 2.13 MISCELLANEOUS ITEMS

- A. Manufacturers:
  - 1. Listed in Door Hardware Schedule: Trimco
  - 2. Approved Substitutions: Rockwood, Don Jo
- B. Properties:
  - 1. Silencers: Provide at equal locations on door frame to mute sound of door's impact upon closing.
    - a. Single Door: Provide three on strike jamb of frame.
    - b. Pair of Doors: Provide two on head of frame, one for each door at latch side.
    - c. Material: Rubber, gray color.

# 2.14 KEYS AND CORES

- A. Manufacturers:
  - 1. Listed in Door Hardware Schedule: Best Cormax Premium
  - 2. Approved Substitutions: None facility standard
- B. Properties: Complying with guidelines of BHMA A156.28.
  - 1. Provide small format interchangeable core.
  - 2. Provide keying information in compliance with DHI standards.
  - 3. Keying Schedule: Arrange for a keying meeting, with Architect, Owner and hardware supplier, and other involved parties to ensure locksets and locking hardware, are functionally correct and keying complies with project requirements.
  - 4. Keying: Master keyed.
  - 5. Include construction keying and control keying with removable core cylinders.
  - 6. Do not make brass construction cores and construction control and operating keys a part of Owner's permanent keying system, nor furnish in the same keyway (or key section) as Owner, permanent keying system.
  - 7. Key to new keying system.

- 8. Supply keys in following quantities:
  - a. Grand Master Keys: 2 each.
  - b. Master Keys: 4 each.
  - c. Construction Master Keys: 6 each.
  - d. Construction Keys: 15 each.
  - e. Construction Control Keys: 2 each.
  - f. Permanent Control Keys: 2 each.
  - g. Extra Cylinder Cores: 10 each.
  - h. Change Keys: 2 each for each keyed core.
- 9. Provide key collection envelopes, receipt cards, and index cards in quantity suitable to manage number of keys (see 2.15).
- 10. Deliver keys with identifying tags to Owner by security shipment direct from manufacturer.
- 11. Permanent Keys and Cores: Stamped with applicable key marking for identification. Do not include actual key cuts within visual key control marks or codes. Stamp permanent keys "Do Not Duplicate."
- 12. Include installation of permanent cores and return construction cores to hardware supplier. Construction cores and keys to remain property of hardware supplier.
- C. Material: Steel.
- 2.15 FINISHES
  - A. Finishes: Provide door hardware of same finish, unless otherwise indicated.
    - 1. Finish: 626/652, Satin Chrome Plated, 630, Satin Stainless Steel and 628, Satin Anodized Aluminum

# PART 3 EXECUTION

# 3.01 EXAMINATION

- A. Verify that doors and frames are ready to receive this work; labeled, fire-rated doors and frames are properly installed, and dimensions are as indicated on shop drawings.
- B. Correct all defects prior to proceeding with installation.
- C. Verify that electric power is available to power operated devices and of correct characteristics.

# 3.02 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions and applicable codes.
- B. Install hardware using the manufacturer's fasteners provided. Drill and tap all screw holes located in metallic materials. Do not use "Riv-Nuts" or similar products.
- C. Install hardware on fire-rated doors and frames in accordance with applicable codes and NFPA 80.
- D. Install hardware for smoke and draft control doors in accordance with NFPA 105.
- E. Use templates provided by hardware item manufacturer.
- F. Do not install surface mounted items until application of finishes to substrate are fully completed.
- G. Wash down masonry walls and complete painting or staining of doors and frames.
- H. Complete finish flooring prior to installation of thresholds.
- I. Door Hardware Mounting Heights: Distance from finished floor to center line of hardware item. As indicated in following list; unless noted otherwise in Door Hardware Schedule or on drawings.
  - 1. For Steel Doors and Frames: Install in compliance with DHI recommendations.
  - 2. For Wood Doors: Install in compliance with DHI WDHS.3 recommendations.
- 3. Mounting heights in compliance with operational and ADA Standards:
- J. Set exterior door thresholds with full-width bead of elastomeric sealant at each point of contact with floor providing a continuous weather seal; anchor thresholds with stainless steel counter-sunk screws.
- K. Include in installation for existing doors and frames any necessary field modification and field preparation of doors and frames for new hardware. Provide necessary fillers, reinforcements, and fasteners for mounting new hardware and to cover existing door and frame preparations (See L).
- L. Where existing doors are to receive new hardware, prepare and re-certify as needed to receive new hardware as specified. Provide stainless wrap around as manufactured by Mag Engineering or Don Jo as required to accept new hardware.

### 3.03 FIELD QUALITY CONTROL

- A. Perform field inspection and testing under provisions of Section 01 40 00 Quality Requirements.
- B. Provide an Architectural Hardware Consultant (AHC) to inspect installation and certify that hardware and installation has been furnished and installed in accordance with manufacturer's instructions and as specified.

### 3.04 ADJUSTING

A. Adjust work under provisions of Section 01 70 00 - Execution and Closeout Requirements.

# 3.05 CLEANING

- A. Clean finished hardware in accordance with manufacturer's written instructions after final adjustments have been made.
- B. Clean adjacent surfaces soiled by hardware installation activities.
- C. Replace items that cannot be cleaned to manufacturer's level of finish quality at no additional cost.
- D. See Section 01 74 19 Construction Waste Management and Disposal, for additional requirements.

# 3.06 PROTECTION

- A. Protect finished Work under provisions of Section 01 70 00 Execution and Closeout Requirements.
- B. Do not permit adjacent work to damage hardware or finish.

# 3.07 MAINTENANCE

- A. Approximately six months after the acceptance of hardware in each area, the hardware installer shall:
  - 1. Return to the project and re-adjust every item of hardware to restore proper function of doors and hardware.
  - 2. Consult with and instruct Owner's personnel in recommended additions to the maintenance procedures.
  - 3. Replace hardware items which have deteriorated or failed due to faulty design, materials or installation of hardware units.
  - 4. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware and submit to the Architect.

# HARDWARE SCHEDULE

### Manufacturer's Abbreviations

BE	Best Access Systems	Locks, Cylinders, Hinges, Wiring Components
DM	Dorma USA	Power Supplies
NA	National Guard	Gaskets, Thresholds
PR	Precision	Exit Devices
TR	Trimco	Stops, Flat Goods

### Finish List

628	Satin Anodized Aluminum
626/652	Satin Brushed Chrome
630	Satin Stainless Steel
689	Painted Statuary Bronze

## **Option List**

С	Quick Connect Wiring System (Precision)
MLR	Motorized Latch Retraction (Precision)
TS	Touchbar Switch (Precision)
LBR	Less Bottom Rod (Precision)
N Mounting	Spanner Through Bolt Mounting (Trimco)
CS	Countersunk Screws – Kick Plates (Trimco)
B4E	Beveled Four Edges – Kickplates (Trimco)
SSMS/EA	Stainless Machine Screws/Expansion Anchors

#### Set #1 - Exterior - Card Access - Automatic

#### Doors: 201A

6	Hinges	CB199 4.5" x 4.5" NRP	630	BE
*2	Electric Hinges	CECB199-12C 4.5" x 4.5"	630	BE
*1	Exit Device	C MLR TS 2203 LBR	630	PR
*1	Exit Device	C MLR TS 2201 LBR	630	PR
2	Rim Cylinders	12E-72 PREM	626	BE
2	Door Pulls	1191-4 Type N Mounting	630	TR
*2	Power Operators	In Section 087113		
2	Floor Stops	1214H	626	TR
1	Weatherstrip	5075 B Head & Jambs		NA
1	Gasketing Set	A605 A SET		NA
2	Door Sweeps	200 NA		NA
1	Saddle Threshold	426 SSMS/EA		NA
*2	Harnesses	WH-6E		BE
*2	Harnesses	WH-12		BE
*2	Harnesses	WH-192		BE
*1	Power Supply	DKPS-2A		DM
	Auto operator - single hou	using. Card activation momentarily retracts	latches a	and allow

Auto operator - single housing. Card activation momentarily retracts latches and allows access/automatic operation. Coordinate operation with the architect and owner. Card reader by security access. Verify threshold application.

KIRKI SERV CONT	AND CITY HALL - VIRTUAL ICE CENTER RACT DOCUMENTS		S	ECTION 08 71 00 – DOOR HARDWARE
Set #2	2 - Custom Doors			
D	Doors: 201C, 201D, 201E, 201F, 201G, 201Y			
1	Mortise Cylinder Balance by custom door	1E-74 PREM manufacturer.	626	BE
Set #3	3 - Exterior Exit - Card Acce	ess - Automatic		
D	oors: 201B			
1 *1 1 1 1 *1 1 *1 *1 *1 *1	Continuous Hinge Power Transfer Exit Device Rim Cylinder Door Pull Closer Power Operator Floor Stop Door Sweep Saddle Threshold Harness Harness Harness Power Supply Card activation momenta eration with the architect turer. Verify threshold app	661HD EPT EPT-12C C MLR TS 2403 12E-72 PREM 1191-4 Type N Mounting HD7016 SPA DP70 In Section 087113 1214H 200 NA 426 SSMS/EA WH-6E WH-12 WH-12 DKPS-2A rily retracts latch and allows access/automa and owner. Card reader by security access.	628 689 630 626 630 689 626 tic opera Gaskets	BE PR PR BE TR BE TR BE BE BE BE DM tion. Coordinate op- s by door manufac-
Set #4	1 - Lobby			
D	oors: 202			
1 *1 *1 1 1	Continuous Hinge Power Transfer Exit Device Rim Cylinder Door Pull	661HD EPT EPT-12C C MLR TS 2403 12E-72 PREM 1191-4 Type N Mounting	628 689 630 626 630	BE PR PR BE TR

			000	
1	Rim Cylinder	12E-72 PREM	626	BE
1	Door Pull	1191-4 Type N Mounting	630	TR
*1	Power Operator	In Section 087113		
1	Overhead Stop	1020 SA Series	630	AB
1	Door Sweep	200 NA		NA
1	Saddle Threshold	426 SSMS/EA		NA
*1	Harness	WH-6E		BE
*1	Harness	WH-12		BE
*1	Harness	WH-192		BE
*1	Power Supply	DKPS-2A		DM

Operator activated retracts latch and opens the door. Coordinate operation with the architect and owner. Gaskets by door manufacturer.

\* Requires Electronic Coordination.

Set #5 – Fencing Gate

Doors: G1 (see section 055000).

END OF SECTION 08 71 00

# SECTION 08 71 13 – AUTOMATIC DOOR OPERATORS

PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. This section includes the following types of automatic door operators:
  1. Low-energy door operators for swinging doors.
- B. Related Sections:
  - 1. Division 7 Sections for caulking to the extent not specified in this section.
  - 2. Division 8 Sections "Hanger Bi-Fold Doors"
  - 3. Division 8 Sections "Aluminum-Framed Entrances and Storefronts"
  - 4. Division 8 Section "Door Hardware" for hardware to the extent not specified in this section.
  - 5. Division 8 Section "Glazing" for materials and installation requirements of glazing for automatic entrances.
  - 6. Division 26 and 28 Sections for electrical connections including conduit and wiring for automatic entrance operators and access-control devices.

### 1.3 REFERENCES

- A. References: Comply with the version year adopted by the Authority Having Jurisdiction.
  - 1. ANSI A117.1 Accessible and Usable Buildings and Facilities.
  - 2. ICC/IBC International Building Code.
  - 3. CUL Approved for use in Canada.
  - 4. NFPA 70 National Electrical Code.
  - 5. NFPA 80 Fire Doors and Windows.
  - 6. NFPA 101 Life Safety Code.
  - 7. NFPA 105 Installation of Smoke Door Assemblies.
- B. American National Standards Institute (ANSI) / Builders Hardware Manufacturers Association (BHMA).
  - 1. ANSI/BHMA A156.19 Standards for Power Assist and Low Energy Power Operated Doors.
- C. Underwriters Laboratories (UL).
  - 1. UL10C Positive Pressure Fire Tests of Door Assemblies.
  - 2. UL 325 Standard for Safety for Door, Drapery, Gate, Louver, and Window Operators and Systems.
- D. American Association of Automatic Door Manufacturers (AAADM).
- E. American Society for Testing and Materials (ASTM).
  - 1. ASTM B221 Standard Specification for Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Profiles and Tubes.

- 2. ASTM B209 Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate.
- F. American Architectural Manufacturers Association (AAMA).
  1. AAMA 611 Voluntary Specification for Anodized Architectural Aluminum.
- G. National Association of Architectural Metal Manufacturers (NAAMM).
   1. Metal Finishes Manual for Architectural Metal Products.
- H. International Code Council (IBC).
  1. IBC: International Building Code Building Code as adopted by the local jurisdiction.

### 1.4 DEFINITIONS

- A. Activation device: Device that, when actuated, sends an electrical signal to the door operator to initiate the door operation.
- B. Monitored Safety Devices: A tested system that works in conjunction with the automatic door control that detects the presence of a person or an object within a zone where contact could occur and provides a signal to stop the movement of the door.
- C. AAADM: American Association of Automatic Door Manufacturers.
- D. Operating ambient Temperature Range: 5 Degrees F to plus 122 degrees F (minus 15 C to 50 degrees C).
- E. For automatic door terminology, refer to ANSI/BHMA A 156.19 for definitions of terms.

### 1.5 PERFORMANCE REQUIREMENTS

- A. General: Provide automatic doors that have been designed and fabricated to comply with specified performance requirements, as demonstrated by testing manufacturers corresponding systems.
- B. Compliance:
  - 1. ICC/IBC International Building Code
  - 2. ANSI/BHMA A 156.19 American National Standard for Power Operated Doors Pedestrian Doors.
  - 3. UL 325 Listed
  - 4. NFPA 70 National Electrical Code.
  - 5. NFPA 101 Life Safety Code
  - 6. CUL Approved for use in Canada
  - 7. UL Listed Fire Door Operator with Automatic Closer
- C. Automatic Door equipment accommodates medium to heavy pedestrian traffic.
- D. Opening Force Requirements:
  - Power-Operated swinging doors shall open with a manual force not to exceed 30 lbf (133N) to set the door in motion and 15 lbf to fully open the door with force applied at 1" (25mm) from the latched edge of the door. The required force to prevent a stopped door from opening or closing shall to exceed 15 lbf (67N) measured 1" (25mm) from the latch edge of the door at any point during the opening or closing.
- E. Closing Time:

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- 1. Door operators shall be field adjustable to close 90 degrees to 10 degrees in 3 seconds or longer per ANSI/BHMA A 156.19 standard.
- 2. Door shall be field adjusted to close from 10 degrees to fully closed position in not less than 1.5 seconds.

### 1.6 SUBMITTALS

- A. Comply with Division 01 Submittal Procedures.
- B. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles fabrication, operational descriptions and finishes.
- C. Shop Drawings: For automatic entrances. Include plans, elevations, sections, details, hardware mounting heights, additional accessories and attachments to other work.
- D. Samples: color samples of exposed finish as required.
- E. Informational Submittals: Manufacturers product information and applicable sustainability program credits that are available towards a LEED rated product certification.
  - 1. Credit MR 4.1 and 4.2: Manufacture's or fabricator's certificate indicating percentage of post-consumer recycled content by weight and pre-consumer recycled content by weight for each product specified under this section.
- F. Manufacturers Field Reports: Submit manufacturer's field reports from AAADM certified technician of inspection and approval of doors for compliance with ANSI/BHMA A 156.19 after completion of installation.
- G. Operating and Maintenance Manuals: Provide manufacturers operating, owners and maintenance manuals for each item specified as required in Division 01, Closeout Submittals.

### 1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: 10 years minimum of documented experience in manufacturing door equipment similar to that indicated within this specification with a proven record of successful service performance. A manufacturer with company certificate issued by AAADM.
- B. Installer Qualifications: Installers, trained by the primary product manufacturers, with a minimum 5 years documented experience installing and maintenance of units similar in material, design, and extent to that indicated in this specification and whose work has resulted in construction with a record of successful in-service performance. Manufacturer's authorized representative who is trained and approved for installation and maintenance of units by AAADM required for this Project. Contact Dormakaba representative Matt Wood for costing and installation. 971-219-9287.
- C. Source Limitations for Automatic Operators: Obtain each type of automatic door operator and senor components specified in this section from single source from single manufacturer.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- E. Power-Operated Door Standard: ANSI/BHMA A 156.19 Current year.

F. Emergency-Exit Door Requirements: Comply with requirements of authorities having jurisdiction for automatic entrances serving as a required means of egress.

#### 1.8 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings to receive automatic entrances by field measurements before fabrication.

#### 1.9 COORDINATION

- A. Coordinate door operators with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish. Coordinate hardware for automatic entrances with hardware required for rest of project.
- B. Electrical System Roughing-in: Coordinate layout and installation of automatic power door operator with connections to power supplies and access-control system.

#### 1.10 WARRANTY

- A. Automatic Door Operators to be free of defects in material and workmanship for a period of One (1) year from the date of substantial completion.
- B. During the warranty period a factory trained technician shall preform service and affect repairs. A safety inspection shall be performed after each adjustment or repair and a completed inspection form submitted to the owner.
- C. During the warranty period all warranty work shall be performed during normal working hours.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURER

- A. Basis of Design: dormakaba Reamstown, PA 1-844-773-2669 Website: <u>www.dormakaba.us</u>
- B. Substitutions: Requests for substitution and product approval in compliance with the specification must be submitted in writing and in accordance with the procedures outlined in Division 1, Section "Substitution Procedures". Approval of requests is at the discretion of the architect, owner, and their designated consultants.

### 2.2 AUTOMATIC SWING DOOR OPERATOR

- A. Model: DORMA, ED Series ED250 (Basis of Design) An Integrated, self-learning automatic swing door operator with an advanced CPU, a multistage gearbox with real time adaptive software and available user interface.
  - 1. Automatic Door Configuration:
    - a. Configuration: Single swing door or pair of doors swinging.
    - b. Traffic Pattern: as shown on drawings
    - **c.** Mounting: Surface applied

- B. Control Features
  - 1. Power-hold Close
  - 2. Built in Lock Delay
  - 3. On-Off-Hold Open switch control to control door function
  - 4. On-Off Power Switch
  - 5. Fire Alarm Integration
  - 6. Field Adjustable Handing
  - 7. Push and Go
  - 8. Power Assist Opening Activation
  - 9. Intergraded Connections for Monitored Safety Sensors and other accessories.
  - 10. Integrated access control
- C. Door Control Features
  - 1. Wind Load and Stack Pressure microprocessor monitored with power boost to ensure secure opening and closing in changing conditions.
  - 2. Door Weight Max. ED 250 800 lbs.
- D. Header Size: Narrow header at 4" height by 6" depth. Optional Fine header height at 2 3/4" by 5" 1/8" depth if the application requires such. Provide full width at pairs of doors.

#### 2.3 ACTIVATION DEVICES

- A. Activation Device:
  - 1. Touchless Wave Plates: activation sensor plate in stainless steel Microwave technology has an adjustable range of 2 inches to 24 inches.
  - 2. RCI 910TC-SS Touchless Switches
- 2.4 ELECTRICAL
  - A. Electrical 115 V AC +/- 10% 50/60 Hz 6.6 A max.

#### 2.5 ALUMINUM FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Anodized Finish:
  1. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine doors and frames with Installer present, for compliance with requirements for installation tolerances, wall and floor construction and other conditions affecting performance of automatic entrances.
- B. Examine roughing in for electrical source power to verify actual locations of wiring connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

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### 3.2 INSTALLATION

- A. General: Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure non-movement joints.
- B. Entrances: Install automatic entrances plumb and true in alignment with established lines and grades without warp or rack of framing members and doors. Anchor securely in place.
  - 1. Install surface-mounted hardware using concealed fasteners to greatest extent possible.
  - 2. Set headers, carrier assemblies, tracks, operating brackets, and guides level and true to location with anchorage for permanent support.
- C. Door Operators: Connect door operators to electrical power distribution system as specified in Division 26 Sections
- D. Sealants: Comply with requirements specified in Division 07 Section "Joint Sealants" to provide seal between the operator housing and wall surface. installation.
- E. Signage: Apply signage on both sides of each door and each sidelight as required by ANSI/BHMA A 156.19

#### 3.3 FIELD QUALITY CONTROL

- A. Manufacturer's representative shall provide technical assistance and guidance for installation of automatic doors.
  - 1. Factory trained and AAADM certified representative shall test and inspect each automatic door to determine compliance of the installed system to ANSI/BHMA A 156.19

#### 3.4 ADJUSTING

A. Adjust door operators and controls for smooth and safe operation.

### 3.5 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by automatic operator installation promptly after installation.

### 3.6 DEMONSTRATION

Engage a factory authorized representative to train Owner's maintenance personnel to adjust, operate, and maintain safe operation of automatic entrances.

END OF SECTION 08 71 13

SECTION 08 80 00 - GLAZING

### PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
  - 1. Windows.
  - 2. Doors.
  - 3. Interior borrowed lites (relites).

### B. Related Sections:

- 1. Division 8 Sections "Aluminum-Framed Entrances and Storefronts"
- 2. Division 8 Sections "Hanger Bi-Fold Doors"

### 1.3 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.
- C. Interspace: Space between lites of an insulating-glass unit.

### 1.4 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
  - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

### 1.5 ACTION SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- B. Glass Samples: For each type of the following products; 12 inches (300 mm) square.
  - 1. Clear glass
  - 2. Tinted glass.
  - 3. Laminated glass with colored interlayer.
  - 4. Insulating glass.
- C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

### 1.6 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For glass and glazing products, from manufacturer.
- B. Warranties: Sample of special warranties.

# 1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved and certified by coated-glass manufacturer.
- B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- C. Source Limitations for Glass: Obtain glass from single source from single manufacturer for each glass type.
- D. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.
- E. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
  - 1. GANA Publications: GANA's "Glazing Manual."
  - 2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR-A7, "Sloped Glazing Guidelines."
  - 3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
  - 4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- F. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- G. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall

indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other openings, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of 450 deg F (250 deg C), and the fire-resistance rating in minutes.

H. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

# 1.9 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
  - 1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F (4.4 deg C).

#### 1.10 WARRANTY

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form in which coated-glass manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
  - 1. Warranty Period: 10 years from date of Substantial Completion.
- B. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form in which laminated-glass manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
  - 1. Warranty Period: 10 years from date of Substantial Completion.
- C. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

### PART 2 - PRODUCTS

### 2.1 GLASS PRODUCTS, GENERAL

- A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.
  - 1. Minimum Glass Thickness for Exterior Lites: Not less than 6.0mm.
  - 2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.
- B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.
- C. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
  - 1. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick.
  - 2. For laminated-glass lites, properties are based on products of construction indicated.
  - 3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
  - 4. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
  - 5. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
  - 6. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

# 2.2 FLOAT GLASS PRODUCTS

- A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.
- B. Uncoated Tinted Float Glass: Class 2, complying with other requirements specified, colors per types noted within this section.

### 2.3 LAMINATED GLASS

- A. Laminated Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
  - 1. Construction: Laminate glass with polyvinyl butyral interlayer to comply with interlayer manufacturer's written recommendations.
  - 2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
  - 3. Interlayer Color: Clear unless otherwise indicated.

B. Glass: Comply with applicable requirements in "Glass Products" Article as indicated by designations in "Laminated-Glass Types" Article.

# 2.4 INSULATING GLASS

- A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.
  - 1. Sealing System: Dual seal, with manufacturer's standard primary and secondary.
  - 2. Spacer: Manufacturer's standard black finish spacer material and construction.
  - 3. Desiccant: Molecular sieve or silica gel, or blend of both.
- B. Glass: Comply with applicable requirements in "Glass Products" Article as indicated by designations in "Insulating-Glass Types" Article.

# 2.5 TEMPERED GLASS

A. Heat-Treated Float Glass, Fully Tempered: ASTM C1048; Type I (transparent flat glass); Quality-Q3; ing FT, of class and condition indicated; where safety glass is indicated. Safety glazing must comply with ANSI Z97.1 and CPSC 16CFR-1201.

# 2.6 GLAZING GASKETS

- A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:
  - 1. Neoprene complying with ASTM C 864.
  - 2. EPDM complying with ASTM C 864.
  - 3. Silicone complying with ASTM C 1115.
  - 4. Thermoplastic polyolefin rubber complying with ASTM C 1115.

# 2.7 GLAZING SEALANTS

- A. General:
  - 1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
  - 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
  - 3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

#### 2.8 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
  - 1. AAMA 804.3 tape, where indicated.
  - 2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
  - 3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

### 2.9 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.
- G. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

### 2.10 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.
- C. Grind smooth and polish exposed glass edges and corners.

## 2.11 MONOLITHIC-GLASS TYPES

- A. Glass Type 1 at interior conditions: Clear float glass and fully tempered float glass (where indicated to be tempered.)
  - 1. Thickness: per selected frame manufacturer, 6.0mm minimum
  - 2. Provide safety glazing labeling.

### 2.12 INSULATING-GLASS TYPES

- A. Glass Type 2 at exterior conditions: Low-e-coated, insulating tinted glass.
  - 1. Overall Unit Thickness: 1 inch (25 mm).
  - 2. Thickness of Each Glass Lite: 6.0 mm.
  - 3. Outdoor Lite: Tinted float glass and fully tempered float glass (where indicated to be tempered on drawings)
  - 4. Outdoor Lite Tint: Basis-of-Design: Vitro Architectural Glass Solargray
  - 5. Interspace Content: Argon.
  - 6. Indoor Lite: Basis-of-Design: Vitro Architectural Glass Solarban<sup>®</sup> 70 Clear float glass and fully tempered float glass (where indicated to be tempered on drawings)
  - 7. Provide safety glazing labeling at tempered glass.
  - 8. Locations: All exterior glazing <u>NOT</u> indicated as 'SPANDREL'
- B. Glass Type 3 at exterior conditions: Low-e-coated, insulating tinted glass.
  - 1. Overall Unit Thickness: 1 inch (25 mm).
  - 2. Thickness of Each Glass Lite: 6.0 mm.
  - 3. Outdoor Lite: Tinted fully tempered float glass.
  - 4. Outdoor Lite Tint: Basis-of-Design: Solarban<sup>®</sup> 70
  - 5. Interspace Content: Argon.
  - 6. Indoor Lite: Tinted float glass and fully tempered float glass (where indicated to be tempered on drawings)
  - 7. Indoor Lite Tint: Basis-of-Design: Vitro Architectural Glass Graylite® II Clear float glass and fully tempered float glass (where indicated to be tempered on drawings)
  - 8. Provide safety glazing labeling at tempered glass.
  - 9. Locations: All exterior glazing indicated as 'SPANDREL'

### PART 3 - EXECUTION

# 3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
  - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
  - 2. Presence and functioning of weep systems.

- 3. Minimum required face and edge clearances.
- 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

### 3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).
  - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
  - 2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

- I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
- K. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- L. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

### 3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until right before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.
- G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

### 3.5 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- C. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce

a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Install gaskets so they protrude past face of glazing stops.

#### 3.6 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

### 3.7 CLEANING AND PROTECTION

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.
- E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 088000

### SECTION 09 22 16 - NON-STRUCTURAL METAL FRAMING

### PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Section Includes:
  - 1. Non-load-bearing steel framing systems for interior gypsum board assemblies.
  - 2. Suspension systems for interior gypsum ceilings and soffits and grid systems.

### B. Related Requirements:

- 1. Section 09 29 00 "Gypsum Board" for gypsum wall board and tile backer board.
- 2. Section 06 10 00 "Rough Carpentry"
- 3. Section 05 50 00 "Metal Fabrications" for pony wall steel supports in framed low walls.

#### 1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

### 1.4 QUALITY ASSURANCE

A. Contractor shall provide effective, full time quality control over all fabrication and erection complying with the pertinent codes and regulations of government agencies having jurisdiction. Conduct pre-installation meeting to verify project requirements, substrate conditions, and manufacturer's installation instructions.

### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Notify manufacturer of damaged materials received prior to installation.
- B. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- C. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling as required by AISI's "Code of Standard Practice."

PART 2 - PRODUCTS

## 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate nonload-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by, and displaying a classification label from, an independent testing agency acceptable to the authority having jurisdiction.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.
- C. Design framing systems in accordance with American Iron and Steel Institute Publication "North American Specification for the Design of Cold-Formed Steel Framing NonStructural Members", except as otherwise shown or specified.
- D. Design loads: 5 PSF minimum as required by the International Building Code.

### 2.2 FRAMING SYSTEMS

- A. Framing Members, General
  - 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
  - 2. Protective Coating: Comply with ASTM C645; roll-formed hot-dipped galvanized steel; complying with ASTM A 1003/A 1003M and ASTM A653/A 653M G40 (Z120) or having a coating that provides equivalent corrosion resistance. A40 galvannealed products are not acceptable.
  - 3. Basis-of-Design Product: Subject to compliance with requirements, provide ClarkDietrich Building Systems products listed or comparable products from the manufacturer's list below:
    - a. SCAFCO Corporation.
    - b. Clarkwestern Dietrich Building Systems LLC
    - c. Super Stud Building Products, Inc.
    - d. <or approved equal by Architect >
- B. Studs and Tracks: ASTM C 645.
  - 1. Steel Studs and Tracks:
    - a. Minimum Base-Steel Thickness: As indicated on Drawings, unless otherwise noted.
    - b. Minimum Base-Metal Thickness at walls with ceramic tile: 20 ga.
    - c. Depth: As indicated on Drawings.

### 2.3 SUSPENSION SYSTEMS

A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- diameter wire, or double strand of 0.048-inch- diameter wire.

- B. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.
- C. Flat Hangers: Steel sheet, 1x3/16-inch by length indicated in Drawings.
- D. Carrying Channels (Main Runners): Cold-rolled, commercial-steel sheet with a base-steel thickness of 0.0538 inch and minimum 1/2-inch- wide flanges.
  - 1. Depth: As indicated on Drawings
- E. Furring Channels (Furring Members):
  - 1. Cold-Rolled Channels: 0.0538-inch uncoated-steel thickness, with minimum of 1/2 -inchwide flanges, <sup>3</sup>/<sub>4</sub>-inch deep.
- F. Grid Suspension System for Gypsum Board Ceilings: ASTM C 645, direct-hung system composted of main beams and cross-furring members that interlock.

### 2.4 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
  - 1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

# PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Installation of non-structural metal framing shall be coordinate with remediation and removal of regulated materials. Refer to "Related Requirements" of this specification section.

### 3.2 PREPARATION

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
  - 1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.
- B. Coordination with Sprayed Fire-Resistive Materials:
  - 1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling tracks to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches o.c.
  - 2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive

materials below that are required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage

- 3.3 INSTALLATION, GENERAL
  - A. Installation Standard: ASTM C 754.
    - 1. Gypsum Plaster Assemblies: Also comply with requirements in ASTM C 841 that apply to framing installation.
    - 2. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C 1063 that apply to framing installation.
    - 3. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
  - B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.
  - C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
  - D. Install bracing at terminations in assemblies.
  - E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

#### 3.4 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
  - 1. Single-Layer Application: 16 inches (406 mm) o.c. unless otherwise indicated.
  - 2. Multilayer Application: 16 inches (406 mm) o.c. unless otherwise indicated.
  - 3. Tile Backing Panels: 16 inches (406 mm) o..c unless otherwise indicated.
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.
- D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.
  - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
  - 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.
    - a. Install two studs at each jamb unless otherwise indicated.
    - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.

- c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
- 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
- 4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
  - a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
- 5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
- 6. Curved Partitions:
  - a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
  - b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches o.c.
- E. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

# 3.5 INSTALLING CEILING SUSPENSION SYSTEMS

- A. Install suspension system components according to spacings indicated by manufacturer.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend hangers from building structure as follows:
  - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
    - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
  - 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
    - a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
  - 3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
  - 4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
  - 5. Do not attach hangers to steel roof deck.
  - 6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.

- 7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
- 8. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Seismic Bracing: Sway-brace suspension systems with hangers used for support.
- E. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
- F. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 09 22 16

# SECTION 09 29 00 - GYPSUM BOARD

### PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Interior gypsum board.
  - 2. Trim accessories.
  - 3. Joint treatment materials.
- B. Related Requirements:
  - 1. Section 06 16 00 "Sheathing" for gypsum sheathing.
  - 2. Section 07 92 00 "Joint Sealants" for acoustical joint sealants installed in gypsum board assemblies.
  - 3. Section 09 22 16 "Non-Structural Metal Framing" for non-structural steel framing and suspension systems that support gypsum board panels.

#### 1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

#### 1.4 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

#### 1.5 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, moisture damaged, and mold damaged.

### PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

### 2.2 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

### 2.3 INTERIOR GYPSUM BOARD

- B. <u>Manufacturers</u>: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. <u>American Gypsum</u>
  - 2. CertainTeed Corporation
  - 3. <u>Georgia-Pacific Building Products</u>.
  - 4. USG Corporation.
- C. Gypsum Board: ASTM C 1396/C 1396M.
  - 1. Thickness: 5/8 inch, Type X.
  - 2. Long Edges: Tapered.
  - 3. Mold and moisture resistant where indicated
- D. Abuse-Resistant Gypsum Board: ASTM C 1629/C 1629M, Level 1.
  - 1. Core: 5/8 inch, Type X.
  - 2. Long Edges: Tapered.
  - 3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

### 2.4 TRIM ACCESSORIES

- A. Interior Trim: ASTM C1047.
  - 1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paperfaced galvanized steel sheet.
  - 2. Shapes:
    - a. Cornerbead.
    - b. Bullnose bead.
    - c. Z-reveal.
    - d. F-reveal.
    - e. J-Trim.

- f. LC-Bead: J-shaped; exposed long flange receives joint compound.
- g. L-Bead: L-shaped; exposed long flange receives joint compound.
- h. U-Bead: J-shaped; exposed short flange does not receive joint compound.
- i. Expansion (control) joint.

## 2.5 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C475/C475M.
- B. Joint Tape:
  - 1. Interior Gypsum Board: Paper.
  - 2. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
  - 1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
  - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
    - a. Use setting-type compound for installing paper-faced metal trim accessories.
  - 3. Fill Coat: For second coat, use setting-type, sandable topping compound.
  - 4. Finish Coat: For third coat, use setting-type, sandable topping compound.

#### 2.6 AUXILIARY MATERIALS

- A. Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate. Provide one of the following:
  - 1. SikaBond Construction Adhesive
  - 2. Loctite Power Grab Heavy Duty Clear Exterior Construction Adhesive
  - 3. Liquid Nails Drywall Adheisve (DWF-24)
  - 4. <or approved equal by Architect>
- C. Steel Drill Screws: ASTM C1002 unless otherwise indicated.
  - 1. Use screws complying with ASTM C954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
  - 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- D. Acoustical Sealant: As specified in Section 07 92 00 " Joint Sealants."

### PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION AND FINISHING OF PANELS, GENERAL

- A. Comply with ASTM C840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
  - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
  - 2. Fit gypsum panels around ducts, pipes, and conduits.
  - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
- J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

### 3.3 INSTALLATION OF INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
  - 1. Type X: At ceilings and walls per drawings.
  - 2. Flexible Type: At council chambers only.
- B. Single-Layer Application:
  - 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
  - 2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
    - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
    - b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
  - 3. On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
  - 4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- C. Multilayer Application:
  - 1. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face- layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
  - 2. Fastening Methods: Fasten base layers and face layers separately to supports with screws.
- D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written instructions and temporarily brace or fasten gypsum panels until fastening adhesive has set.
- E. Curved Surfaces:
  - 1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12-inch-long straight sections at ends of curves and tangent to them.

### 3.4 INSTALLATION OF TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Interior Trim: Install in the following locations:
  - 1. Cornerbead: Use at outside corners.
  - 2. LC-Bead: Use at exposed panel edges.

3. Curved-Edge Cornerbead: Use at curved openings.

### 3.5 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C840:
  - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
  - 2. Level 2: Panels that are substrate for acoustical tile and back-of-house areas such as mechanical and electrical rooms.
  - Level 4: At panel surfaces that will be exposed to view, unless otherwise indicated.
     a. Primer and its application to surfaces are specified in Section 09 91 23 "Interior Painting."
- E. Cementitious Backer Units: Finish according to manufacturer's written instructions.

### 3.6 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
  - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 29 00

SECTION 09 54 26 - LINEAR WOOD CEILINGS

PART 1 - GENERAL

### 1.0 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

### 1.1 SUMMARY

- A. Section includes:
  - 1. Concealed suspension system for Wood Slat Ceilings ceiling panels.
  - 2. Wood slat ceiling panels for concealed suspension system.
  - 3. Trim and accessories.
  - 4. Seismic restraints for suspended ceiling system.
  - 5. Acoustical insulation @ wood slat ceiling panels.
  - 6. Wood wall paneling.

### 1.2 RELATED WORK IN OTHER SECTIONS:

- A. Division 1 "General Conditions" for substitution requests, submittals, etc.
- B. Division 21 "Fire Suppression" for sprinkler coordination.
- C. Division 23 "Mechanical" for work to be coordinated with ceiling.
- D. Division 26 "Electrical" for light fixture coordination.
- F. Division 28 "Telecom" for telecommunications coordination.

### 1.3 REFERENCES

- A. ASTM A 641: Standard Specification for Zinc Coated (Galvanized) Carbon Steel Wire; 1992.
- B. ASTM C 423: Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 1990.
- C. ASTMC C 635: Standard Specifications for Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings.
- D. ASTM C 636: Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels; 1992.
- E. ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials; 1991.
- F. ASTM E 580: Standard Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint; 1991.
- G. AWI (QSI): Architectural Woodwork Quality Standards Illustrated; 2003.
- H. CISCA: Ceiling Systems Handbook.

### 1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturers other than those listed in Paragraph 2.1 are required to submit for approval prior to bidding per Section One.

- B. Installer Qualifications: Engage an experienced Installer, approved by wood ceiling manufacturer, who has completed panel ceilings similar in species, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- C. Inspection: All work must pass inspection and approval of architect, as well as the local codes and regulations or authorities having jurisdiction.
- D. Single-Source Responsibility for Wood Ceiling System: Obtain each type of Wood Grille ceiling panels from a single fabricator, with in-house Shop Drawing capabilities, in-house assembly and finishing capabilities, and with resources to provide products of consistent quality in appearance and physical properties without delaying the project.
- E. Single-Source Responsibility for Suspension System: Obtain each type of suspension system from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying project.
- F. Pre-Installation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings."

# 1.5 SUBMITTALS

- A. Product Data: For each type of product specified.
- B. Samples: For verification of each type of exposed finish required, prepared on samples of size indicated below. Where finishes involve normal color and texture variations, include sample sets showing the range of variations expected.
  - 1. 12" x 18" samples of each panel type, pattern, and color.
- C. Shop Drawings: Provide Shop Drawings/Coordination Drawings for all ceilings, which should include RCP and product details. Coordinate Wood Grille ceiling panels layout and installation of wood panels and suspension system components with other construction elements that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system components, partition assemblies and all perimeter conditions.

# 1.7 PROJECT CONDITIONS

A. Space Enclosure and Environmental Limitations: Do not install wood panel ceilings until spaces are enclosed and weatherproof, wet-work in spaces is completed and dry, work above ceilings is complete, and ambient temperature and humidity conditions are being maintained at the levels indicated for Project when occupied for its intended use.

# 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Delivery & Unloading: Coordinate crate sizes, weights, unloading options, and delivery schedule with manufacturer prior to fabrication. Deliver wood panels and suspension system components to Project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other mistreatment.
- B. Acclimatization: Before installing wood panels, permit them to reach room temperature and a stabilized moisture content (at least 72 hours) per AWI standards.
- C. Handling: Handle Wood Grille ceiling panels carefully to avoid chipping edges or damaging units in any way.
- D. Protection:
  - 1. Personnel: Follow good safety and industrial hygiene practices during handling and installing of all products and systems, with personnel to take necessary precautions and wear appropriate protective equipment as needed. Read related literature for important information on products before installation. Contractor to be

solely responsible for all personal safety issues during and subsequent to installation; architect, specifier, owner, and manufacturer will rely on contractor's performance in such regard.

2. Existing completed work: Protect completed work above suspension system from damage during installation of suspension system components.

## 1.9 EXTRA MATERIALS/WARRANTIES

- A. Extra Materials: Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels clearly describing contents.
  - 1. Wood Grille ceiling panels: Furnish quantity of full-size units equal to 2.0 percent of amount installed.
  - 2. Suspension System Components: Furnish quantity of each component equal to 2.0 percent of amount installed.
- B. Warranties: Provide owner with a (1) year warranty for material and workmanship on all installed products.
  - 1. Manufacturers: All materials, wood ceiling and grid, shall be warranted for (1) one year for material and workmanship.
  - 2. Installer: All work shall be warranted for (1) year from final acceptance of completed work.

### PART 2 – PRODUCTS

### 2.1 WOOD SLAT CEILING PANELS AND SUSPENSION SYSTEM

- A. General: The following manufacturer is basis of design:
  - 1. 9Wood, Inc. (www.9wood.com): 1100 Cross Piece Backer.
- B. Or equal, as prior approved by architect.

### 2.2 WOOD SLAT CEILING PANELS

- A. Basis of Design: 9Wood, Inc. Wood Grille, Series 1000
  - 1. Wood Panels: 1100 Cross Piece Backer, SKU 1114-5
    - 1) Species: Douglas Fir
    - 2) Member Size: 3/4" x 3-1/4"
    - 3) Edge Profile: Square
    - 4) Members/LF: 5 Members/LF
    - 5) Assembly Style: Cross Piece Backer, Black
    - 6) Panel Sizes: 1' x 10' (Nom)
    - 7) Fire Rating: Class 1(A) Fire Rating
    - 8) Finish: Dressed-to-the-Nines"™ Clear Interior Finish
    - 9) Reveal Scrim: Premium Black Scrim (Acoustone 345 FR)
    - 10) Perimeter Trim: Sheet metal perimeter trim, 2" tall, black, all sides

### 2.3 WOOD WALL PANELING

- A. Basis of Design: 9Wood, Inc. Liner Wood, Series 2000
  - 1. Wood Panels: 2400 Tongue and Groove Linear, SKU 2414-4
    - 1) Species: Douglas Fir
    - 2) Member Size: 5/8"
    - 3) Spacing: 3" O.C.
    - 4) Members/LF: 4 Members/LF

5) Finish: Dressed-to-the-Nines"™ Clear Interior Finish

# 2.3 METAL SUSPENSION SYSTEMS, GENERAL

- A. Metal T-Grid Suspension System: Provide standard interior Metal Heavy Duty 15/16" <9/16", 1 ½"> suspension T-Grid system using Main Runners, Cross-tees, Wall Angle, Perimeter Edge Trim, or Shadow Moldings of types, structural classifications, and finishes indicated and that comply with applicable ASTM C 635 requirements. Comply with all applicable <seismic> codes and ordinances.
- B. Attachment Devices: Size for 3 times the design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.
- C. Wire, Braces, Ties, Hanger Rods, Flat Hangers and Angle Hangers: Provide wires, rods and hangers that comply with applicable ASTM specifications.

### 2.4 INSULATION

- A. Manufacturer:\_ Owens Corning, One Owens Corning Parkway, Toledo, Ohio 43659, Tel: 1-800-GET-PINK, <u>www.owenscorning.com</u>.
- B. Product: SelectSound® Black Acoustic Board
- C. Thickness / Finish: 2" / Mat Faced.
- D. Locations: All linear wood ceilings.

## PART 3 – EXECUTION

- 3.1 EXAMINATION
  - A. General: Examine substrates and structural framing to which ceilings attach or abut, with installer present, for compliance with requirements specified in this and other sections that affect ceiling installation and anchorage. Do not proceed with installation until unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Coordination: Furnish layouts for cast-in-place anchors, clips, and other ceiling anchors whose installation is specified in other Sections.
- B. Layout: Measure each ceiling area and establish the layout of Wood Grille Panel to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and conform to the layout shown on reflected ceiling plans in accordance with wood ceiling manufacturer's approved Shop Drawings.

### 3.3 INSTALLATION

- A. General: Install 9Wood, Inc. Interior Wood Grille Style 1100 to comply with manufacturer's instructions and CISCA "Ceiling Systems Handbook."
- B. Attachments: Suspend ceiling hangers from building's structural members per manufacturer's instructions and in compliance with all local codes and regulations.
- C. Installation of Metal T-Bar Grid: Install, align, brace, tie-off, mount, handle interferences, and space suspension T-Grid in accordance with suspension manufacturer's instructions and in compliance with all local codes and regulations.
- D. Installation of Wood Grille: Install Wood Grille ceiling panels in accordance with manufacturer's installation instructions and in compliance with all local codes and regulations. In-
stall with undamaged edges and fitted accurately to suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit, as required.

E. Suspension Runners: Install suspension system runners so they are square and securely interlocked with one another. Install number and use on-center spacing per wood ceiling manufacturer's instructions, as indicated on approved Shop Drawings and in compliance with all local codes.

# 3.4 CLEANING

A. General: Clean exposed wood surfaces of 9Wood, Inc. Style 1100 Wood Grille ceiling panels. Comply with manufacturer's instructions for cleaning and touchup of minor finish damage. Remove and replace wood ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 54 26

SECTION 09 65 13 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Resilient base and accessories.

#### 1.3 RELATED SECTIONS

- A. Division 06 for interior stained wood wall base.
- 1.4 ACTION SUBMITTALS
  - A. Product Data: For each type of product.
  - B. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples, but not less than 3" inches long.
- 1.5 DELIVERY, STORAGE, AND HANDLING
  - A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C).

#### 1.6 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C, in spaces to receive resilient products during the following time periods:
  - 1. 48 hours before installation.
  - 2. During installation.
  - 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C)or more than 95 deg F (35 deg C).
- C. Install resilient products after other finishing operations, including painting, have been completed.

# PART 2 - PRODUCTS

- 2.1 RUBBER BASE (noted as Rubber Base, Base or Wall Base on drawings)
  - A. <u>Manufacturers</u>: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include:
    - 1. Johnsonite
    - 2. Roppe
    - 3. < or approved equal by Architect >
  - B. Product Standard: ASTM F 1861, Type TS (rubber, vulcanized thermoset), Group I (solid, homogeneous).
    - 1. Style: Standard Toe
  - C. Thickness: 0.125 inch (3.2 mm).
  - D. Height: 4" typical
  - E. Lengths: Coils in manufacturer's standard length.
  - F. Outside Corners: Preformed.
  - G. Inside Corners: Preformed.
  - H. Basis-of-Design & Color: As selected from manufacturer's full range to match existing city hall rubber base.

# 2.2 INSTALLATION MATERIALS

A. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
  - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
  - 1. Installation of resilient products indicates acceptance of surfaces and conditions.

#### 3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Do not install resilient products until they are the same temperature as the space where they are to be installed.
  - 1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.
- C. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

## 3.3 INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Preformed Corners: Install preformed corners before installing straight pieces.

# 3.4 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

## 3.5 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Perform the following operations immediately after completing resilient-product installation:
  - 1. Remove adhesive and other blemishes from exposed surfaces.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 09 65 13

SECTION 09 68 13 - TILE CARPETING

#### PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes:1. Modular, fusion-bonded carpet tile
- B. Related Requirements:
  - 1. Section 096513 "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet tile.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
  - 2. Include installation recommendations for each type of substrate.

#### 1.4 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For special warranty.

## 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:
  - 1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
  - 2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

### 1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd. .

## 1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI 104.

#### 1.8 FIELD CONDITIONS

- A. Comply with CRI 104 for temperature, humidity, and ventilation limitations.
- B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at occupancy levels during the remainder of the construction period.
- C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.
- D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

### 1.9 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
  - 1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
  - 2. Failures include, but are not limited to, more than 10 percent edge raveling, snags, runs, dimensional stability, loss of face fiber, and delamination.
  - 3. Warranty Period: 10 years from date of Substantial Completion.

## PART 2 - PRODUCTS

- 2.1 CARPET TILE #1 noted as CARPET 1 on drawings
  - A. Manufacture: Shaw Contract
  - B. Style: Plain Weave Tile 5T098
  - C. Color: Tradition 99496
  - D. Pattern: Match existing lobby (ashlar)
  - E. Size: 24 x 24 inches.

# 2.2 INSTALLATION ACCESSORIES

- A. pH Blocker / liquid latex floor primer: As approved by selected carpeting manufacturer. Basis-of-Design product: Shaw 9050
- B. Solvent-free, polymer-based sealer for existing floor adhesives: As approved by selected carpeting manufacturer. Basis-of-Design product: Shaw 6200.

- C. Floorsheild adhesive sealer: As approved by selected carpeting manufacturer. Basis-of-design product: Shaw 9000.
- D. Premium grade pressure sensitive adhesive: As approved by selected carpeting manufacturer. Basis-of-design product: Shaw 5000/5100.
- E. Trowelable Leveling and Patching Compounds: cement-based, repair mortar, allowing thin or feather edged cross sections. Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following: "DURATHIN PATCH" by L&M Construction Chemicals, Inc. Prepare concrete in accordance with ICRI 03732.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.
- B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
  - 1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet tile manufacturer.
  - 2. Subfloor finishes comply with requirements specified in Section 033000 "Cast-in-Place Concrete" for slabs receiving carpet tile.
  - 3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 PREPARATION

- A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider and protrusions more than 1/32 inch unless more stringent requirements are required by manufacturer's written instructions.
- C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.
- D. Clean metal substrates of grease, oil, soil and rust, and prime if directed by adhesive manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand aluminum surfaces, to remove metal oxides, immediately before applying adhesive.
- E. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

#### 3.3 INSTALLATION

- A. General: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: Glue down; install every tile with full-spread, releasable, pressure-sensitive adhesive.
- C. Maintain dye lot integrity. Do not mix dye lots in same area.
- D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.
- G. Install pattern parallel to walls and borders.

#### 3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet tile:
  - 1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
  - 2. Remove yarns that protrude from carpet tile surface.
  - 3. Vacuum carpet tile using commercial machine with face-beater element.
- B. Protect installed carpet tile to comply with CRI 104, Section 16, "Protecting Indoor Installations."
- C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 096813

## SECTION 09 77 13 - STRETCHED-FABRIC WALL SYSTEM

PART 1 - GENERAL

- 1.01 RELATED DOCUMENTS
  - A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.02 SUMMARY

A. Section Includes: Stretched-fabric wall system including, but not limited to, track, insulation backing, wall fabrics and accessories.

## 1.03 REFERENCES

- A. ASTM E84 Surface Burning Characteristics of Building Materials.
- B. ASTM C208 Cellulosic Fiber Insulating Board.
- C. ASTM C423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
- D. ASTM C612 Mineral Fiber Block and Board Thermal Insulation.
- E. NFPA 255 Surface Burning Characteristics of Building Materials.
- F. NFPA 701 Fire Tests for Flame Propagation of Textiles and Films.

## 1.04 SYSTEM DESCRIPTION

A. System shall consist of track, core materials, and fabric that are site-fabricated to permit the installation of continuous, unbroken lengths (and widths) beyond those available in pre-assembled panels. System shall allow for removal and replacement of fabric without the removal and replacement of any other components.

### 1.05 SUBMITTALS

- A. Product Data:
  - 1. Manufacturer's Technical Data: Submit for track, core, and fabric showing compliance with Specifications.
  - 2. Installation Instructions: Submit track manufacturer's installation instructions.
  - 3. Cleaning Instructions: Submit fabric manufacturer's cleaning and instructions for fabric.
  - 4. Fabric Replacement Agreement: Submit sample copy.
- B. Shop Drawings:
  - 1. Show types and locations of track, cores, fabrics; fabric direction; pattern matching or repeats; and how each type of track transitions into adjacent track.
  - 2. Show special installation instructions not included in product data.
- C. Samples:
  - 1. Track: 4" long sample
  - 2. Core: 8-1/2" X 11" sample.
  - 3. Fabric Submittal for verifications: 1 square yd.
- D. Installer Qualification Statement: Submit certification of installer qualifications.

#### 1.06 DELIVERIES, STORAGE, AND HANDLING

A. Comply with instructions of manufacturer. Protect from moisture in shipment, storage, and handling. Deliver in unopened bundles and store in a dry place with adequate air circulation.

Do not deliver cores or fabrics until wet work such as concrete and plaster has been completed.

## 1.07 PROJECT CONDITIONS

- A. Do not install core or fabric until building is enclosed and temperature and humidity are maintained at approximate conditions planned for occupancy and in accordance with instructions of manufacturer.
- B. Install fabric under lighting conditions similar to permanent lighting. If permanent lighting is not operable when fabric is installed, provide not less than 50 footcandles of illumination on surfaces to be covered.

#### 1.08 WARRANTY

- A. Provide track manufacturer's five-year limited warranty against defects and workmanship in wall system.
- 1.09 NO-COST FABRIC REPLACEMENT PROGRAM
  - A. Provide fabric replacement agreement signed by installer. Owner will not be liable for additional payments for work performed under agreement.
  - B. Agreement shall have a 3-year term and include replacement of up to ten percent of fabric on Project.
  - C. Provide materials and labor to replace fabric damaged for any reason. Replacement fabric may not exceed cost of original fabric.
  - D. If fabric in excess of specified percent requires replacement during term of agreement, installer shall replace fabric for the cost of the fabric plus prevailing labor rate at owner's expense.
  - E. Installer shall make reasonable efforts to respond to Owner's service requests within 48 hours.
  - F. Agreement will not cover removal or replacement of items not specified in this section.

## PART 2 - PRODUCTS

- 2.01 TRACK
  - A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
     a. Fabricmate Systems Inc. (www.fabricmate.com)
  - B. Fabrication: One-piece extruded polymer track with 0.062" minimum wall thickness. Hinged, self-locking, snap-lock, and 2-piece extrusions do not satisfy design intent and are not acceptable.
  - C. Performance: Track shall be able to securely hold fabric without sagging, allow fabric to be easily removed, and permit repeated cycles of fabric attachment and removal.
  - A. Depth: 1"

- B. Track color: Natural
- C. Track Profiles:
  - 1. Front-Load Edge Track (when terminating at perpendicular surfaces); Beveled, FS250
  - 2. Side-Load Edge Track (when terminating 8" from perpendicular surfaces); Beveled, FS260
  - 3. Front-Load Seam Track: Beveled, FS280
- D. Tracks for electrical and data outlet cutouts: Square butt joint, FS160
- E. Fasteners: Provide screws, staples, or other fasteners suitable for use on different surfaces as recommended by track manufacturer.
- 2.02 BACKING MATERIALS
  - A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
     1. Fabricmate Systems Inc. (www.fabricmate.com)
  - B. Acoustical Backing Material:
    - 1. Types: Fabricmate ReCore® Single-Solution Substrate 65% post consumer product content, lightweight, tackable, high-impact.
    - 2. Thickness: 1"
    - 3. NRC Rating: Minimum 0.70
  - B. Fasteners: Provide types suitable for conditions of use.
  - C. Tape: Self-adhesive tape in color similar to color of core.

#### 2.03 FABRIC SCHEDULE

- A. Wall Fabric
  - Manufacturer: Maharam Style: Prose Directional Grain: Horizontal Color: 511503-013 Icing Location / Dimensions: Per Drawings

## PART 3 - EXECUTION

- 3.01 EXAMINATION
  - A. Examine substrates and conditions under which the wall system is to be applied and notify Architect in writing of conditions detrimental to proper and timely completion. Do not proceed until unsatisfactory conditions have been corrected.
  - B. Where practical, do not install track until stationary objects abutting top and sides of wall system, such as casework, door jams, chair rails and ceiling grids have been installed and work that will be concealed by wall system has been installed and accepted. If stationary objects are installed after wall system, protect wall system against damage.

# 3.02 INSTALLATION

- A. Install wall system in accordance with track manufacturer's instructions.
- B. Layout: Fabric shall be installed to avoid horizontal fabric seams.

# C. Track:

- 1. Install around perimeter of and openings within wall system and where required at intermediate locations.
- 2. Fasten with screws, anchors, staples or adhesives in accordance with manufacturer's instructions and as required to prevent track from separating from substrate under tension applied by stretched fabric.
- 3. Install plumb and level and in proper relation to building lines. Follow contours of wall and scribe to adjoining work at borders and penetrations,
- 4. Abut adjacent pieces of track. Trim or sand joints to remove visible surface irregularities.

# D. Core:

- 1. Prepare substrates; remove wall plates and other obstacles.
- 2. Cut core material to accurately fit inside tracked perimeter, maintaining the same plane.
- 3. Fix in place with adhesive. Mechanically fasten if necessary to prevent gaps between abutting core pieces and track and to assure proper adhesion.
- 4. Gap between core and track shall not exceed 1/4".
- 5. If necessary, for a uniform looking appearance, tape joints, if required by architect.
- E. Fabric:
  - 1. Install fabric plumb, level, and in proper relation to building lines.
  - 2. Direction of fabric shall be consistent on a wall and on adjacent walls. Install fabric with consideration for pattern matching and repeats.
  - 3. Stretch over core and tucked into the track's locking jaws using track manufacturer's heavy-duty roller with roller bearings.
  - 4. Fabric shall "float" above core; do not fix in place with adhesives, fasteners, sewn seams or tape.
  - 5. Fabric shall be sufficiently taut to avoid sagging under seasonal temperature and humidity variations; shall maintain its shape after being touched or leaned against without leaving any indentations or blisters; and shall be free from ripples, waviness or "hourglass" effects.

# 3.03 CLEANING AND PROTECTION

- A. Clean exposed surfaces and repair minor damage in accordance with track manufacturer's instructions. Remove and replace work that cannot be cleaned and repaired to permanently eliminate evidence of damage.
- B. Protect finished installation against damage by other Work.

END OF SECTION 09 77 13

# SECTION 09 91 13 - EXTERIOR PAINTING

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following exterior substrates:
  - 1. Cement plaster / drywall surfaces.
  - 2. Anti-Graffiti Coatings for Concrete, non-traffic surfaces
  - 3. Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work
- B. Related Requirements:
  - 1. Section 09 91 23 "Interior Painting" for interior painted finishes.
  - 2. Section 09 96 00 "High-Performance Coatings<sup>†</sup> for interior/exterior structural steel coatings.

## 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
  - 2. Indicate VOC content.
- B. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
  - 1. Submit Samples on rigid backing, 8 inches square.
  - 2. Apply coats on Samples in steps to show each coat required for system.
  - 3. Label each coat of each Sample.
  - 4. Label each Sample for location and application area.

## 1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Paint Products: 5 percent, but not less than 1 gal. of each material and color applied.

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
  - 1. Maintain containers in clean condition, free of foreign materials and residue.
  - 2. Remove rags and waste from storage areas daily.

#### 1.6 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

## PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
  - 1. Sherwin-Williams
  - 2. Benjamin Moore & Company
  - 3. Rodda Paint Co.
  - 4. Kelly-Moore Paint Company
  - 5. <or approved equal by Architect>
- B. Source Limitations: Obtain each paint product from single source from single manufacturer.

## 2.2 PAINT PRODUCTS, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists"
- B. Material Compatibility:
  - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer based on testing and field experience.
  - 2. For each coat in a paint system, provide products recommended in writing by topcoat manufacturer for use in paint system and on substrate indicated.
- C. Colors:
  - 1. Custom colors to match existing surfaces to remain, assume 10 percent of surface area will be painted with deep tones.
- 2.3 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
  - 1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
  - 2. Testing agency will perform tests for compliance with product requirements.
  - 3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

# PART 3 - EXECUTION

# 3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meteras follows:
  - 1. Concrete: 12 percent.
  - 2. Masonry (Clay and Concrete Masonry Units): 12 percent.
  - 3. Portland Cement Plaster: 12 percent.
- C. Portland Cement Plaster Substrates: Verify that plaster is fully cured.
- D. Verify suitability of substrates, including surface conditions and compatibility, with finishes and primers.
- E. Proceed with coating application only after unsatisfactory conditions have been corrected.
  - 1. Application of coating indicates acceptance of surfaces and conditions.

## 3.2 PREPARATION

- A. Comply with manufacturer's written instructions applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

- 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
  - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems specified in this Section.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

## 3.3 INSTALLATION

- A. Apply paints in accordance with manufacturer's written instructions.
  - 1. Use applicators and techniques suited for paint and substrate indicated.
  - 2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
  - 3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
  - 4. Paint entire exposed surface of window frames and sashes.
  - 5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
  - 6. Primers specified in the Exterior Painting Schedule may be omitted on items that are factory primed or factory finished if compatible with intermediate and topcoat coatings and acceptable to intermediate and topcoat paint manufacturers.
- B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
  - 1. Paint the following work where exposed to view:
    - a. Equipment, including panelboards and switch gear.
    - b. Uninsulated metal piping.
    - c. Uninsulated plastic piping.
    - d. Pipe hangers and supports.
    - e. Metal conduit.
    - f. Plastic conduit.

g. Tanks that do not have factory-applied final finishes.

## 3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
  - 1. Contractor shall touch up and restore painted surfaces damaged by testing.
  - 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written instructions, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written instructions.

## 3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
  - 1. Do not clean equipment with free-draining water and prevent solvents, thinners, cleaners, and other contaminants from entering into waterways, sanitary and storm drain systems, and ground.
  - 2. Dispose of contaminants in accordance with requirements of authorities having jurisdiction.
  - 3. Allow empty paint cans to dry before disposal.
  - 4. Collect waste paint by type and deliver to recycling or collection facility.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

# 3.6 EXTERIOR PAINTING SCHEDULE

- A. Concrete Substrates, Nontraffic Surfaces:
  - 1. Anti-Graffiti Coating:
    - a. Prime Coat: Sherwin Williams Anti-Graffiti Coating B97C150.
    - b. Intermediate Coat: Same as prime coat
    - c. Topcoat: Same as prime coat
- B. Portland Cement Plaster Substrates:
  - Latex System MPI EXT 9.1A:
    - a. Prime Coat: Primer, alkali resistant, water based, MPI #3.
    - b. Intermediate Coat: Latex, exterior, matching topcoat.
    - c. Topcoat: Latex, exterior, flat (MPI Gloss Level 1), MPI #10.
- C. Exterior Gypsum Board Substrates:

1.

- 1. Latex System MPI EXT 9.2A:
  - a. Prime Coat: Primer, latex for exterior wood (reduced), MPI #6.
  - b. Intermediate Coat: Latex, exterior, matching topcoat.
  - c. Topcoat: Latex, exterior, flat (MPI Gloss Level 1), MPI #10.

END OF SECTION 09 91 13

SECTION 09 91 23 - INTERIOR PAINTING

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following interior substrates:
  - 1. Steel.
  - 2. Cast iron.
  - 3. Galvanized metal.
  - 4. Wood.
  - 5. Gypsum board.
  - 6. Cotton or canvas insulation covering.
  - 7. ASJ insulation covering.
  - 8. Concrete

## 1.3 DEFINITIONS

- A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- D. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- G. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

## 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.

- 1. Submit Samples on rigid backing, 8 inches 200 mm square.
- 2. Label each Sample for location and application area.
- C. Product List: For each product indicated, include the following:
  - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
  - 2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.
  - 3. VOC content.

# 1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Paint: 5 percent, but not less than 1 gal. 3.8 L of each material and color applied.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F 7 deg C.
  - 1. Maintain containers in clean condition, free of foreign materials and residue.
  - 2. Remove rags and waste from storage areas daily.

## 1.7 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F 10 and 35 deg C.
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg
   F 3 deg C above the dew point; or to damp or wet surfaces.

## PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Benjamin Moore & Co.
  - 2. Benjamin Moore & Co., Ltd. Canada.
  - 3. Cloverdale Paint.
  - 4. Miller Paint Co.
  - 5. PPG Architectural Finishes, Inc.
  - 6. Pratt & Lambert.
  - 7. Sherwin-Williams Company The;

## 2.2 PAINT, GENERAL

- A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."
- B. Material Compatibility:
  - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- C. VOC Content: Products shall comply with VOC limits required for LEED credits Referenced in Division 1 specification sections.
- D. Colors: As indicated in a color schedule.

#### 2.3 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
  - 1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
  - 2. Testing agency will perform tests for compliance with product requirements.
  - 3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
  - 1. Wood: 15 percent.
  - 2. Gypsum Board: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- E. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

#### 3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
  - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
  - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- E. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- F. Wood Substrates:
  - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
  - 2. Sand surfaces that will be exposed to view, and dust off.
  - 3. Prime edges, ends, faces, undersides, and backsides of wood.
  - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- G. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

## 3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
  - 1. Use applicators and techniques suited for paint and substrate indicated.
  - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
  - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
  - 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
  - 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
  - 1. Paint the following work where exposed in occupied spaces:
    - a. Uninsulated metal piping.
    - b. Pipe hangers and supports.
    - c. Metal conduit.
    - d. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
    - e. Exposed ducts, grilles and registers.
  - 2. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.
- 3.4 FIELD QUALITY CONTROL
  - A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
    - 1. Contractor shall touch up and restore painted surfaces damaged by testing.
    - 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

# 3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

# 3.6 INTERIOR PAINTING SCHEDULE

- A. Steel Substrates:
  - 1. See "09 96 00 High Performance Coatings" for all steel surfaces.
- B. Galvanized-Metal Substrates:
  - 1. Institutional Low-Odor/VOC Latex System:
    - a. Prime Coat: Primer, galvanized, water based, MPI #134.
    - b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
    - c. Topcoat: Latex, interior, institutional low odor/VOC, Gloss Level 3, MPI #145.
- C. Gypsum Board Substrates:
  - 1. Institutional Low-Odor/VOC Latex System:
    - a. Prime Coat: Primer sealer, interior, institutional low odor/VOC, MPI #149.
    - b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
    - c. Topcoat: Latex, interior, institutional low odor/VOC, Gloss Level 3, MPI #145.
- D. Cast-in-Place and CMU Substrates:
  1. See "09 91 13 Exterior Painting" for anti-graffiti coatings.
- E. Cotton or Canvas and ASJ Insulation-Covering Substrates: Including pipe and duct coverings.
  - 1. Institutional Low-Odor/VOC Latex System:
    - a. Prime Coat: Primer sealer, latex, interior, MPI #50.
    - b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
    - c. Topcoat: Latex, interior, institutional low odor/VOC, Gloss Level 3, MPI #145.

## 3.7 3.7 COLOR SCHEDULE

A. Refer to Finish Drawing A10.0.

END OF SECTION 09 91 23

# SECTION 09 93 00 - STAINING AND TRANSPARENT FINISHING

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes surface preparation and application of wood finishes on the following substrates:
  - 1. Interior Substrates:
    - a. Wood Veneered Paneling
    - b. Wood Board Base, Caps and Trim

#### 1.3 DEFINITIONS

- A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- C. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- D. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- E. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

# 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include preparation requirements and application instructions.
- B. Samples for Verification: For each type of finish system and in each color and gloss of finish indicated.
  - 1. Submit Samples on representative samples of actual wood substrates, 8 inches (200 mm) square or 8 inches (200 mm) long.
  - 2. Label each Sample for location and application area.

## 1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Stains and Transparent Finishes: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

# 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
  - 1. Maintain containers in clean condition, free of foreign materials and residue.
  - 2. Remove rags and waste from storage areas daily.

## 1.7 FIELD CONDITIONS

- A. Apply finishes only when temperature of surfaces to be finished and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
- B. Do not apply finishes when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.
- C. Do not apply exterior finishes in snow, rain, fog, or mist.

# PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. <u>Manufacturers (Products)</u>: Subject to compliance with requirements, provide products by the following:
  - 1. Lenmar (350 VOC POLYURETHANE WOOD FINISH 1Y.35X SATIN)
  - 2. Rudd Company, Inc. (CataLuxe™ WC, 651820, WATER CLEAR HIGH-BUILD PRE-CATALYZED LACQUER)
  - 3. < or approved equal by Architect >

# 2.2 SOURCE QUALITY CONTROL

- A. Testing of Materials: Owner reserves the right to invoke the following procedure:
  - 1. Owner will engage the services of a qualified testing agency to sample wood finishing materials. Contractor will be notified in advance and may be present when samples are taken. If materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
  - 2. Testing agency will perform tests for compliance with product requirements.
  - 3. Owner may direct Contractor to stop applying wood finishes if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying materials from Project site, pay for testing, and refinish surfaces finished with rejected materials. Contractor will be required to remove rejected materials from previously finished surfaces before refinishing with complying materials if the two finishes are incompatible or produce results that, in the opinion of the Architect, are aesthetically unacceptable.

## 3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Interior Wood Substrates: 13 percent, when measured with an electronic moisture meter.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Proceed with finish application only after unsatisfactory conditions have been corrected.
  - 1. Beginning finish application constitutes Contractor's acceptance of substrates and conditions.

## 3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and finishing.
  - 1. After completing finishing operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean and prepare surfaces to be finished according to manufacturer's written instructions for each particular substrate condition and as specified.
  - 1. Remove dust, dirt, oil, and grease by washing with a detergent solution; rinse thoroughly with clean water and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.
  - 2. Remove mildew by scrubbing with a commercial wash formulated for mildew removal and as recommended by stain manufacturer.

## 3.3 APPLICATION

- A. Apply finishes according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
  - 1. Use applicators and techniques suited for finish and substrate indicated.
  - 2. Finish surfaces behind movable equipment and furniture same as similar exposed surfaces.
  - 3. Do not apply finishes over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- B. Apply finishes to produce surface films without cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other surface imperfections.

## 3.4 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

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- B. After completing finish application, clean spattered surfaces. Remove spattered materials by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from finish application. Correct damage by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced finished wood surfaces.
- 3.5 INTERIOR WOOD-FINISH-SYSTEM SCHEDULE
  - A. Wood substrates
    - 1. Polyurethane Varnish System
      - a. Prime Coat: matching topcoat.
      - b. Intermediate Coat: matching topcoat.
      - c. Topcoat: Varnish, Lacquer, interior, polyurethane, oil-modified, satin (Gloss Level 4), MPI #57.

END OF SECTION 09 93 00

# SECTION 09 96 00 – HIGH PERFORMANCE COATINGS

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes surface preparation and application of high-performance coating systems on the following substrates:
  - 1. Exterior / Interior Substrates: a. Steel
- B. Related Requirements:
  - 1. Division 5 sections "Metal Fabrications"

#### 1.3 DEFINITIONS

- A. Gloss Level 4: 20-35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- C. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include preparation requirements and application instructions.
- B. Samples for Verification: For each type of coating system and in each color and gloss of topcoat indicated.
  - 1. Label each Sample for location and application area.

#### 1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Coatings: 5 percent, but not less than 1 gal. (3.8 L) Insert number of each material and color applied.

# 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
  - 1. Maintain containers in clean condition, free of foreign materials and residue.
  - 2. Remove rags and waste from storage areas daily.

#### 1.7 FIELD CONDITIONS

- A. Apply coatings only when temperature of surfaces to be coated and surrounding air temperatures are between 50 and 95 deg F (10 and 35 deg C).
- B. Do not apply coatings when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.
- C. Do not apply exterior coatings in snow, rain, fog, or mist.

# PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Benjamin Moore & Co.
  - 2. Kelly-Moore Paints.
  - 3. Miller Paint.
  - 4. Parker Paint Mfg. Co. Inc.
  - 5. Rodda Paint Co.
  - 6. Sherwin-Williams Company (The).
  - 7. Tnemec
- B. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in other Part 2 articles for the paint category indicated.

# 2.2 HIGH-PERFORMANCE COATINGS, GENERAL

- A. MPI Standards: Provide products that comply with MPI standards indicated and are listed in "MPI Approved Products List."
- B. Material Compatibility:
  - 1. Provide materials for use within each coating system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  - 2. For each coat in a coating system, provide products recommended in writing by manufacturers of topcoat for use in coating system and on substrate indicated.
  - 3. Provide products of same manufacturer for each coat in a coating system.
- C. Colors Schedule:

1. Custom color to match selected metal siding, basis-of-design color Kingspan High Performance Coating, Color: Zinc Gray.

## PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- C. Proceed with coating application only after unsatisfactory conditions have been corrected.
  - 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

## 3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
  - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
- C. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulates.
  - 1. Remove incompatible primers and re-prime substrate with compatible primers or apply tie coat as required to produce coating systems indicated.
- D. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer. but not less than the following:
   1. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
- E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- F. Aluminum Substrates: Remove loose surface oxidation.

# 3.3 APPLICATION

- A. Apply high-performance coatings according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
  - 1. Use applicators and techniques suited for coating and substrate indicated.

- 2. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
- 3. Coat back sides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
- 4. Do not apply coatings over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.
- D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

# 3.4 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from coating operation. Correct damage by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

## 3.5 EXTERIOR HIGH-PERFORMANCE COATING SCHEDULE

- A. Steel Substrates:
  - 1. High-Build Epoxy System:
    - a. Prime Coat: Primer, epoxy, anti-corrosive, for metal, MPI #101, unless noted otherwise.
    - b. Intermediate Coat: Epoxy, high-build, low gloss, MPI #108.
    - c. Topcoat: Epoxy, gloss, MPI #77.

END OF SECTION 09 96 00

SECTION 10 14 23 – SIGNAGE

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  - a. Room-identification, maximum occupancy panel signs
  - b. Dimensional Lettering Signage
  - c. Hours of Operation Signage (Vinyl Lettering Signage over glass)
  - d. CNC routed high performance laminate paneling signage (City Logo)

# 1.3 DEFINITIONS

A. Accessible: In accordance with the accessibility standard.

#### 1.4 COORDINATION

A. Furnish templates for placement of sign-anchorage devices embedded in permanent construction by other installers.

#### 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For signs.
  - a. Include fabrication and installation details and attachments to other work.
  - b. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
  - c. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign at least half size.
- C. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.
  - a. Include representative Samples of available typestyles and graphic symbols.
- D. Sign Schedule: Use same designations for rooms and doors and indicated contract documents. Room names to be verified with Architect and Owner prior to submitting shop drawings

# 1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

## 1.7 FIELD CONDITIONS

A. Field Measurements: Verify locations of anchorage devices and electrical service embedded in permanent construction by other installers by field measurements before fabrication and indicate measurements on Shop Drawings.

#### 1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
  - a. Failures include, but are not limited to, the following:
    - 1. Deterioration of finishes beyond normal weathering.
    - 2. Deterioration of embedded graphic image.
    - 3. Separation or delamination of sheet materials and components.
  - b. Warranty Period: Five years from date of Substantial Completion.

# PART 2 - PRODUCTS

## 2.1 PERFORMANCE REQUIREMENTS

A. Accessibility Standard: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for signs.

## 2.2 SIGNS

- A. General: Room names to be verified with Architect and Owner prior to submitting shop drawings.
- B. Room Identification, Maximum Occupancy Panel Signs: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles, and as follows:
  - a. Laminated-Sheet Sign: Photopolymer face sheet with raised graphics laminated to Insert material backing sheet to produce composite sheet.
    - 1. Composite-Sheet Thickness: 1/8" Interior Photopolymer
    - 2. Panel Color: 34 Gunmetal
    - 3. Panel Size:

4.

- a. Maximum Occupancy: 8"w x 3.75"h
- b. Room Identification: 4"w x 4"h
- Text / Pictogram Color: 66 Bright White
- 5. Font: Neutra Face
- 6. Content: per drawings

- b. Sign Perimeter: Finish edges smooth.
  - 1. Edge Condition, Vertical Edges, Horizontal Edges: Square cut.
  - 2. Corner Condition in Elevation: Square.
- c. Mounting: Manufacturer's standard method for substrates indicated with two-face tape.
- d. Text and Typeface: Accessible raised characters and Braille, typeface is Arial Narrow unless otherwise noted. Finish raised characters to contrast with background color, and finish Braille to match background color.
- e. Provide blank panel for mounting at room side where signs are mounted on glass.
- f. Locations:
  - 1. Room Identification: 201 Virtual Service Center, 202 Lobby (locate on both sides of door 202)
  - 2. Maximum Occupancy: 201 Virtual Service Center, 202 Lobby; see T sheets for occupant load
- C. Hours of Operation Vinyl Lettering Signage:
  - a. Type: Vinyl Lettering
  - b. Material: Cut Vinyl, colored (not printed)
  - c. Thickness: 2-mil cast film
  - d. Size: 11" x 17"
  - e. Mount: Vinyl surface on inside glass
  - f. Font: Neutra face
  - g. Color: white letter, no film background.
  - h. Content: Images to be provided by Architect
  - i. Location: On glazing lite beside entry Doors 201A, 201B
- D. Formed Aluminum Signage:
  - a. Material: Cast Aluminum
  - b. Sizes: As indicated on drawings
  - c. Mounting: Back stud, concealed flush mounted
  - d. Finish: Smooth
  - e. Color: Match aluminum storefront
  - f. Font: Neutra face
  - g. Text Height: Per Drawings
  - h. Locations/Content:
    - 1. "KIRKLAND CITY HALL" North Elevation
- E. CNC routed high performance laminate paneling signage (City Logo)
  - a. Material: Trespa® Meteon® Wood Decors
  - b. Color: Montreux Sunglow NW07
  - c. Size: As indicated on drawings
  - d. Thickness: 13mm
  - e. Type: Single sided decorative
  - f. Layers: (2)
  - g. Grade: Fire retardant, standard
  - h. CNC routing: Exterior face; city logo, diameter per drawings; image to be provided by architect; routing depth <sup>1</sup>/<sub>4</sub>".
  - i. Installation: stopped into aluminum storefront system, per drawings.
# 2.3 ACCESSORIES

- A. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045 inch (1.14 mm) thick, with adhesive on both sides.
- B. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:
  - a. Sign Mounting Fasteners:
    - 1. Projecting Studs: Threaded studs with sleeve spacer, welded or brazed to back of sign material or screwed into back of sign assembly, unless otherwise indicated.
    - 2. Standoffs: Manufacturer aluminum round standoff cap, standoff and threaded rod fastener(s) as required to mount to required substrate.

### 2.4 FABRICATION

- A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
  - a. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
  - b. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
  - c. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
  - d. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
  - e. Internally brace signs for stability and for securing fasteners.
  - f. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.

# 2.5 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.

# PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of signage work.
- B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.
- C. Verify that anchor inserts are correctly sized and located to accommodate signs.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
  - a. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
  - b. Install signs so they do not protrude or obstruct according to the accessibility standard.
  - c. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
- B. Room-Identification Signs and Other Accessible Signage: Install in locations on walls as indicated.
- C. Mounting Methods:
  - a. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position and push to engage tape adhesive.

### 3.3 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 10 14 23

# SECTION 10 26 00 - WALL AND DOOR PROTECTION

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Corner guards (CG).

### 1.2 ACTION SUBMITTALS

- A. Product Data: Include construction details, material descriptions, impact strength, dimensions of individual components and profiles, and finishes for each impact-resistant wall protection unit.
- B. Shop Drawings: For each impact-resistant wall protection unit showing locations.
- C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
  - 1. Corner Guards,: 12 inches (300 mm) long.
- 1.3 CLOSEOUT SUBMITTALS
  - A. Maintenance Data: For each impact-resistant wall protection unit to include in maintenance manuals.
- 1.4 QUALITY ASSURANCE
  - A. Source Limitations: Obtain impact-resistant wall protection units from single source from single manufacturer.
- 1.5 DELIVERY, STORAGE, AND HANDLING
  - A. Store impact-resistant wall protection units in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.
- PART 2 PRODUCTS

### 2.1 CORNER GUARDS

- A. Surface-Mounted, Metal Corner Guards (Corner Guards, CG): Fabricated from one-piece, formed or extruded metal with formed edges; with turn to match wall condition.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
    - a. KoroGard or approved equivalent
  - 2. Material: 16.ga Stainless Steel

- 3. Finish: #4 satin
- 4. Wing Size: Nominal 2 by 2inches
- 5. Height: 48"
- 6. Corner Radius: 1/8 inch (3 mm).
- 7. Mounting: Manufacturer's Heavy Duty Adhesive. Bottom of corner guard to be mounted at top of rubber wall base, where occurs, otherwise install to finish floor.
- 8. Location: as placed by Owner/Arch include quantity of 4(total).

#### 2.2 METAL FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
  - 1. Run grain of directional finishes with long dimension of each piece.
- B. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

#### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Complete finishing operations, including painting, before installing impact-resistant wall protection system components.
- B. Before installation, clean substrate to remove dust, debris, and loose particles.

#### 3.3 INSTALLATION

- A. General: Install impact-resistant wall protection units level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, scratches or other defects that might be visible in the finished Work.
  - 1. Provide splices, mounting hardware, anchors, and other accessories required for a complete installation.
    - a. Provide anchoring devices to withstand imposed loads.
    - b. Where splices occur in horizontal runs of more than 20 feet (6.1 m), splice aluminum retainers and plastic covers at different locations along the run, but no closer than 24" (305 mm).
    - c. Adjust end and top caps as required to ensure tight seams.
- B. Impact-Resistant Wall Covering: Install top and edge moldings, corners, and divider bars as required for a complete installation.

- C. Apply a bead of manufacturer's Heavy Duty Adhesive in a zigzag pattern over the back of each wing of the corner guard. Position corner guard on the wall and apply pressure until a tight fit is achieved.
- D. Remove the protective plastic covering from the exposed surface of the corner guard.

# 3.4 CLEANING

A. Immediately after completion of installation, clean plastic covers and accessories using a standard, ammonia-based, household cleaning agent.

END OF SECTION 10 26 00

# SECTION 10 44 00 - FIRE PROTECTION SPECIALTIES

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Semi-recessed fire-extinguisher cabinets.
  - 2. Portable fire extinguishers.
- 1.2 ACTION SUBMITTALS
  - A. Product Data: For each type of product. Show door hardware, cabinet type, trim style, and panel style. Include roughing-in dimensions and details showing semi-recessed mounting method and relationships of box and trim to surrounding construction.
  - B. Product Schedule: For each type of product. Coordinate final fire-extinguisher schedule with drawings to ensure proper fit and function.
- 1.3 INFORMATIONAL SUBMITTALS
  - A. Warranty: Sample of special warranty.
- 1.4 CLOSEOUT SUBMITTALS
  - A. Maintenance Data: For fire-protection cabinets to include in maintenance manuals.
- 1.5 COORDINATION
  - A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
  - B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

### 1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
  1. Failures include, but are not limited to, the following:
  - - a. Failure of hydrostatic test according to NFPA 10.
    - b. Faulty operation of valves or release levers.
  - 2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
  - 1. Provide fire extinguishers approved, listed, and labeled by FM Global.

# 2.2 FIRE-PROTECTION CABINET (FEC)

- A. Manufacturers: Subject to compliance with requirements, available manufacturers and products that may be incorporated into the Work include the following:
  - 1. Larsen's Manufacturing Company
    - a. Series: Architectural Series
    - b. Model Number: 2409-5R
    - c. Trim Style and Projection: Semi-recessed, 1-1/2", square trim
    - d. Door Style: Vertical Duo Clear Tempered Glass Safety Door (#4 Stainless Steel)
    - e. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
    - f. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
  - 2. J. L. Industries, Inc., a division of Activar Construction Products Group
    - a. Series: Cosmopolitan Series
    - b. Cabinet Style: Semi-recessed
    - c. Tub: Stainless steel; #4 directional satin finish.
    - d. Door and Trim Construction: Stainless steel; flush doors with 5/8 inch (15.88 mm) door stop attached by continuous hinge and equipped with zinc-plated handle with roller catch.
    - e. Trim Style and Projection: Semi-recessed, 1-1/2", square trim
    - f. Door Style: V Vertical duo with pull
  - 3. < or approved equal by Architect >
- B. Materials:
  - 1. Aluminum: ASTM B 221 (ASTM B 221M), with strength and durability characteristics of not less than Alloy 6063-T5 for aluminum sheet. ASTM B 221 (ASTM B 221M) for extruded shapes.
    - a. Finish: Clear anodic.
  - 2. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

# 2.3 PORTABLE FIRE EXTINGUISHER

- A. Multi-Purpose Chemical Type: Extinguisher unit containing a fluidized and siliconized mono ammonium phosphate powder; nonconductive and nontoxic.
  - 1. Construction: Heavy duty steel cylinder with metal valve and siphon tube, O-ring seal, replaceable valve stem seal, visual pressure gage, pull pin and upright squeeze grip.
  - 2. Finish: Factory powder-coated; Red.
  - 3. Effectiveness (Rating): Class A, B, and C fires.
  - 4. Manufacturer: Same as fire extinguisher cabinet manufacturer
  - 5. Model: as recommend by fire extinguisher cabinet manufacturer

# 2.4 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's AMP 500, "Metal Finishes Manual for Architectural and Metal Products," for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces of fire-protection cabinets from damage by applying a strippable, temporary protective covering before shipping.
- C. Finish fire-protection cabinets after assembly.
- D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

### PART 3 - EXECUTION

# 3.1 EXAMINATION

- A. Examine walls and partitions for suitable framing depth and blocking where semi-recessed cabinets will be installed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Examine fire extinguishers for proper charging and tagging.

#### 3.2 PREPARATION

A. Prepare recesses for semi-recessed fire-protection cabinets as required by type and size of cabinet and trim style.

### 3.3 INSTALLATION

- A. General: Install fire-protection cabinets in locations and at mounting heights per manufacturer's guidelines to meet requirements of the International Building Code:
- B. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.

- 1. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.
- C. General: Install fire extinguishers in locations indicated and in compliance with requirements of authorities having jurisdiction.

### 3.4 ADJUSTING AND CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as fire-protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.
- B. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
- C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.
- D. Touch up marred finishes, or replace fire-protection cabinets that cannot be restored to factoryfinished appearance. Use only materials and procedures recommended or furnished by fireprotection cabinet and mounting bracket manufacturers.
- E. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 10 44 00

# SECTION 13 34 19 - METAL BUILDING SYSTEMS

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

#### A. Section Includes:

- 1. Structural-steel framing.
- 2. Metal roof-panels.
- 3. Metal wall panels.
- 4. Metal insulated wall panels.
- 5. Metal insulated roof panels.
- 6. Thermal insulation.
- 7. Accessories.

### B. Related Requirements:

- 1. Section 033001 "Cast-in-Place Concrete".
- 2. Section 072100 "Thermal Insulation" for thermal insulation products.
- 3. Section 072113 "Blanket Insulation for Metal Buildings" for roof insulation products.
- 4. Section 074213 "Metal Wall Panels" for insulated metal wall panels.
- 5. Section 083500 "Hanger Bi-Fold Doors" for sectional doors in metal building systems.
- 6. Section 084113 "Aluminum-Framed Entrances and Storefronts" for storefront products.

#### 1.3 DEFINITIONS

A. Terminology Standard: See MBMA's "Metal Building Systems Manual" for definitions of terms for metal building system construction not otherwise defined in this Section or in standards referenced by this Section.

### 1.4 COORDINATION

A. The architectural and super structure basis of design intent as presented in the documents is NOT expected to be revised. Should modification to meet specific or proprietary bidder requirements be necessary, it is the bidder's (or GC's) responsibility to explain any proposed changes necessary at time of bid (NOT after bid). All assumption of costs for potential modifications to the basis of design and related disciplines should be included in the bid price.

- B. Coordinate sizes and locations of concrete foundations and casting of anchor-rod inserts into foundation walls and footings. Anchor rod installation, concrete, reinforcement, and formwork requirements are specified in Section 033001 "Cast-in-Place Concrete."
- C. Coordinate metal panel assemblies with rain drainage work, flashing, trim, and construction of supports and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

# 1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site 123 5th Ave, Kirkland, WA.
  - 1. Review methods and procedures related to metal building systems including, but not limited to, the following:
    - a. Condition of foundations and other preparatory work performed by other trades.
    - b. Structural load limitations.
    - c. Construction schedule. Verify availability of materials and erector's personnel, equipment, and facilities needed to make progress and avoid delays.
    - d. Required tests, inspections, and certifications.
    - e. Unfavorable weather and forecasted weather conditions and impact on construction schedule.
  - 2. Review methods and procedures related to metal roof panel assemblies including, but not limited to, the following:
    - a. Compliance with requirements for purlin and rafter conditions, including flatness and attachment to structural members.
    - b. Structural limitations of purlins and rafters during and after roofing.
    - c. Flashings, special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect metal roof panels.
    - d. Temporary protection requirements for metal roof panel assembly during and after installation.
    - e. Roof observation and repair after metal roof panel installation.
  - 3. Review methods and procedures related to metal wall panel assemblies including, but not limited to, the following:
    - a. Compliance with requirements for support conditions, including alignment between and attachment to structural members.
    - b. Structural limitations of girts and columns during and after wall panel installation.
    - c. Flashings, special siding details, wall penetrations, openings, and condition of other construction that will affect metal wall panels.
    - d. Temporary protection requirements for metal wall panel assembly during and after installation.
    - e. Wall observation and repair after metal wall panel installation.

### 1.6 ACTION SUBMITTALS

A. Product Data: For each type of metal building system component.

- 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
  - a. Metal insulated roof panels.
  - b. Metal insulated wall panels.
  - c. Thermal insulation and vapor-retarder facings.
  - d. Roof ventilators.
  - e. Louvers.
- B. Shop Drawings: Indicate components by others. Include full building plan, elevations, sections, details and the following:
  - 1. Anchor-Rod Plans: Submit anchor-rod plans and templates before foundation work begins. Include location, diameter, and minimum required projection of anchor rods required to attach metal building to foundation. Indicate column reactions at each location.
  - 2. Structural-Framing Drawings: Show complete fabrication of primary and secondary framing; include provisions for openings. Indicate welds and bolted connections, distinguishing between shop and field applications. Include transverse cross-sections.
    - a. Show provisions for attaching mezzanines roof curbs platforms and pipe racks.
  - 3. Metal Roof and Wall Panel Layout Drawings: Show layouts of panels including methods of support. Include details of edge conditions, joints, panel profiles, corners, anchorages, clip spacing, trim, flashings, closures, and special details. Distinguish between factory- and field-assembled work; show locations of exposed fasteners.
    - a. Show roof-mounted items including roof hatches, equipment supports, pipe supports and penetrations, lighting fixtures, and items mounted on roof curbs.
    - b. Show wall-mounted items including personnel doors, vehicular doors, windows, louvers, and lighting fixtures.
    - c. Show translucent panels.
  - 4. Accessory Drawings: Include details relative scale of the following items.
    - a. Flashing and trim.
    - b. Gutters.
    - c. Downspouts.
    - d. Awning
- C. Samples for Initial Selection: For units with factory-applied finishes.
- D. Samples for Verification: For the following products:
  - 1. Panels: Nominal 12 inches long by actual panel width. Include fasteners, closures, and other exposed panel accessories.
  - 2. Flashing and Trim: Nominal 12 inches long. Include fasteners and other exposed accessories.
  - 3. Accessories: Nominal 12-inch- long Samples for each type of accessory.
- E. Delegated-Design Submittal: For metal building systems.
  - 1. Include analysis data indicating compliance with performance requirements and design data signed and sealed by the qualified professional engineer responsible for their preparation.

2. Design required to comply with the loads given in the within the structural drawings by KPFF.

# 1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For erector manufacturer.
- B. Welding certificates.
- C. Letter of Design Certification: Signed and sealed by a qualified professional engineer. Include the following:
  - 1. Name and location of Project.
  - 2. Order number.
  - 3. Name of manufacturer.
  - 4. Name of Contractor.
  - 5. Building dimensions including width, length, height, and roof slope.
  - 6. Indicate compliance with AISC standards for hot-rolled steel and AISI standards for coldrolled steel, including edition dates of each standard.
  - 7. Governing building code and year of edition.
  - 8. Design Loads: Include dead load, roof live load, collateral loads, roof snow load, deflection, wind loads/speeds and exposure, seismic design category or effective peak velocity-related acceleration/peak acceleration, and auxiliary loads (cranes).
  - 9. Load Combinations: Indicate that loads were applied acting simultaneously with concentrated loads, according to governing building code.
  - 10. Building-Use Category: Indicate category of building use and its effect on load importance factors.
- D. Erector Certificates: For qualified erector, from manufacturer.
- E. Material Test Reports: For each of the following products:
  - 1. Structural steel including chemical and physical properties.
  - 2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
  - 3. Tension-control, high-strength, bolt-nut-washer assemblies.
  - 4. Shop primers.
- F. Field quality-control reports.
- G. Sample Warranties: For special warranties.

# 1.8 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal panel finishes to include in maintenance manuals.

### 1.9 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer.

- Accreditation: Manufacturer's facility accredited according to the International Accreditation Service's AC472, "Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems."
- 2. Engineering Responsibility: Preparation of comprehensive engineering analysis and Shop Drawings by a professional engineer who is legally qualified to practice in jurisdiction where Project is located.
- B. Erector Qualifications: An experienced erector who specializes in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1/D1.1M, "Structural Welding Code Steel" and Washington Association of Building Officials (WABO) welder certification program.
  - 2. AWS D1.3, "Structural Welding Code Sheet Steel."

# 1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, sheets, panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Protect foam-plastic insulation as follows:
  - 1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
  - 2. Protect against ignition at all times. Do not deliver foam-plastic insulation materials to Project site before installation time.
  - 3. Complete installation and concealment of foam-plastic materials as rapidly as possible in each area of construction.

### 1.11 FIELD CONDITIONS

A. Weather Limitations: Proceed with panel installation only when weather conditions permit metal panels to be installed according to manufacturers' written instructions and warranty requirements.

### 1.12 WARRANTY

A. Special Warranty on Metal Panel Finishes: Manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

- 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
  - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
  - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
  - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
- 2. Finish Warranty Period: **[20]** years from date of Substantial Completion.
- B. Special Weathertightness Warranty for Standing-Seam Metal Roof Panels: Manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that leak or otherwise fail to remain weathertight within specified warranty period.
  - 1. Warranty Period: **[20]** years from date of Substantial Completion.

# PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. <u>Manufacturers:</u> Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. <u>Varco-Pruden Buildings; a division of BlueScope Buildings North America, Inc.</u>, basis of design.
  - 2. Butler Manufacturing Company; a division of BlueScope Buildings North America, Inc.
  - 3. <u>Nucor Building Systems.</u>
- B. Source Limitations: Obtain metal building system components, including primary and secondary framing and metal panel assemblies fully coordinated and provided through a single metal building manufacturer.

### 2.2 SYSTEM DESCRIPTION

- A. Provide a complete, integrated set of mutually dependent components and assemblies that form a metal building system capable of withstanding structural and other loads, thermally induced movement, and exposure to weather without failure or infiltration of water into building interior.
- B. <u>Primary-Frame Type</u>: See Drawings for structural system configuration of each building:
  - 1. Rigid Clear Span: Solid-member, structural-framing system without interior columns, interior frames.
- C. End-Wall Framing: Manufacturer's standard, for buildings not required to be expandable, consisting of primary frame, capable of supporting one-half of a bay design load, end-wall columns, and rod bracing.
- D. Secondary-Frame Type: Manufacturer's standard purlins and joists and exterior-framed (bypass) girts plus HSS gits, jambs, headers, and sills required to support the bi-fold doors and storefront framing.

- E. Eave Height: Eave height is determined by the intersection of the outside flange of the wall girts and outside flange of the roof purlins at Line Z. Basis of design is 18'-9 1/2.
- F. Bay Spacing: As indicated on Drawings.
- G. Roof Slope: As indicated on Drawings.
- H. Roof Panels: Standing seam roof panels; 16" wide net coverage with 2" high standing seams at the panel side laps. Field seaming using electrically operated seaming machine is required.
  - 1. Basis of design is Varco-Pruden Buildings SLR II architectural standing seam roof panels.
- I. Exterior Wall System: Manufacturer's standard insulated metal wall panels.
  - 1. Basis-of-design: Kingspan Insulated Metal Panels
    - a. Wall Panel
      - 1) Series: KS Series Wall Panel
      - 2) Profile: Mini-Wave
      - 3) Orientation: Vertical
      - 4) Color: Selected by Architect from manufacturer's full range. Basis-of-design: Zinc Gray
    - b. Accent Panel
      - 1) Series: KS Series Wall Panel
      - 2) Profile: Azteco
      - 3) Orientation: vertical
      - 4) Color: Selected by Architect from manufacturer's full range. Basis-of-design: Zinc Gray

### 2.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design metal building system.
- B. Structural Performance: Metal building systems shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to procedures in MBMA's "Metal Building Systems Manual."
  - 1. Design Loads: As indicated on Drawings.
  - Deflection and Drift Limits: Design metal building system assemblies to withstand serviceability design loads without exceeding deflections and drift limits recommended in AISC Steel Design Guide No. 3 "Serviceability Design Considerations for Steel Buildings."
  - 3. Deflection and Drift Limits: No greater than the following:
    - a. Purlins and Rafters: Vertical deflection of 1/240 of the span.
    - b. Girts: Horizontal deflection of 1/240 of the span.
    - c. Metal Roof Panels: Vertical deflection of 1/180 of the span.
    - d. Metal Wall Panels: Horizontal deflection of 1/180 of the span.
    - e. Design secondary-framing system to accommodate deflection of primary framing and construction tolerances, and to maintain clearances at openings.
    - f. Lateral Drift: Maximum of 1/180 of the building height.

- C. Seismic Performance: Metal building system shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- E. Fire-Resistance Ratings: Where assemblies are indicated to have a fire-resistance rating, provide metal panel assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 or ASTM E 108 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Indicate design designations from UL's "Fire Resistance Directory," FM Global's "Approval Guide," or from the listings of another qualified testing agency.
- F. Fire Propagation Characteristics: Exterior wall assemblies containing foam plastics pass NFPA 285 fire test.
- G. Structural Performance for Metal Roof and Wall Panels: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:
  - 1. Wind Loads: As indicated on Drawings.
- H. Air Infiltration for Metal Wall Panels: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E 283 at the following test-pressure difference:
  - 1. Test-Pressure Difference: 1.57 lbf/sq. ft.
- I. Water Penetration for Metal Wall Panels: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:
  - 1. Test-Pressure Difference: 2.86 lbf/sq. ft.
- J. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for winduplift-resistance class indicated.
  - 1. Uplift Rating: UL 60 at enclosed structures, UL 90 at open or partially enclosed structures.
- K. FM Global Listing: Provide metal roof panels and component materials that comply with requirements in FM Global 4471 as part of a panel roofing system and that are listed in FM Global's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Global markings. To be determined with Owner's insurance requirements.
- L. Energy Star Listing: Roof panels that are listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for **low** slope roof products.
- M. Energy Performance: Provide roof panels according to one of the following when tested according to CRRC-1:
  - 1. Three-year, aged, solar reflectance of not less than 0.55 and emissivity of not less than 0.75

- 2. Three-year, aged, Solar Reflectance Index of not less than **64**when calculated according to ASTM E 1980.
- N. Thermal Performance for Opaque Elements: Provide the following maximum U-factors and minimum R-values when tested according to ASTM C 1363 or ASTM C 518:
  - 1. Roof Metal Building:
    - a. U-Factor: .026.
    - b. R-Value: R25 + R11 LS + R11 LS.
  - 2. Walls Metal Building:
    - a. U-Factor: .042.
    - b. R-Value: **R24-ci**.

# 2.4 STRUCTURAL-STEEL FRAMING

- A. Structural Steel: Comply with AISC 360, "Specification for Structural Steel Buildings."
- B. Bolted Connections: Comply with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
- C. Cold-Formed Steel: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" for design requirements and allowable stresses.
- D. Primary Framing: Manufacturer's standard primary-framing system, designed to withstand required loads and specified requirements. Primary framing includes transverse and lean-to frames; rafters, rake, and canopy beams; sidewall, intermediate, end-wall, and corner columns; and wind bracing.
  - 1. General: Provide frames with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly. Provide frame span and spacing indicated.
    - a. Slight variations in span and spacing may be acceptable if necessary to comply with manufacturer's standard, as approved by Architect.
  - 2. Rigid Clear-Span Frames: I-shaped frame sections fabricated from shop-welded, built-up steel plates or structural-steel shapes. Interior columns are not permitted.
  - 3. Frame Configuration: As indicated on Drawings.
  - 4. Exterior Column: As indicated on Drawings.
  - 5. Rafter: As indicated on Drawings.
- E. End-Wall Framing: Manufacturer's primary end-wall framing fabricated for field-bolted assembly to comply with the following:
  - 1. End-Wall and Corner Columns: I-shaped sections fabricated from; shop-welded, built-up steel plates.
  - 2. End-Wall Rafters: I-shaped sections fabricated from shop-welded, built-up steel plates Column locations per the plan are critical to the design.

- F. Secondary Framing: Manufacturer's standard secondary framing, including purlins, girts, eave struts, flange bracing, base members, gable angles, clips, headers, jambs, and other miscellaneous structural members. Unless otherwise indicated, fabricate framing from either cold-formed, structural-steel sheet or roll-formed, metallic-coated steel sheet, prepainted with coil coating, to comply with the following.
  - 1. Purlins: C- or Z-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes; minimum 2-1/2-inch- wide flanges.
    - a. Depth: As needed to comply with system performance requirements.
  - 2. Girts: C- or Z-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes. Form ends of Z-sections with stiffening lips angled 40 to 50 degrees from flange, with minimum 2-1/2-inch- wide flanges. Reference basis of design Varco-Pruden Buildings drawings for special HSS girts, headers, sills and jambs for special secondary framing at the bi-fold doors and storefront window framing.
    - a. Depth: As required to comply with system performance requirements.
  - 3. Eave Struts: Unequal-flange, C-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes; to provide adequate backup for metal panels.
  - 4. Flange Bracing: Minimum 2-by-2-by-1/8-inch structural-steel angles or 1-inch- diameter, cold-formed structural tubing to stiffen primary-frame flanges.
  - 5. Sag Bracing: Minimum 1-by-1-by-1/8-inch structural-steel angles.
  - 6. Base or Sill Angles: Manufacturer's standard base angle, minimum 3-by-2-inch, fabricated from zinc-coated (galvanized) steel sheet.
  - 7. Purlin and Girt Clips: Manufacturer's standard clips fabricated from steel sheet. Provide galvanized clips where clips are connected to galvanized framing members.
  - 8. Framing for Openings: Channel shapes; fabricated from cold-formed, structural-steel sheet or structural-steel shapes. Frame head and jamb of door openings and head, jamb, and sill of other openings.
  - 9. Miscellaneous Structural Members: Manufacturer's standard sections fabricated from coldformed, structural-steel sheet; built-up steel plates; or zinc-coated (galvanized) steel sheet; designed to withstand required loads.
- G. Awning: Manufacturer's standard structural-framing system, designed to withstand required loads; fabricated from shop-welded, built-up steel plates or structural-steel shapes. Provide frames with attachment plates and splice members, factory drilled for field-bolted assembly. Extent of canopies, as shown on drawings.
- H. Bracing: Provide adjustable wind bracing as follows:
  - 1. Rods: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50; or ASTM A 529/A 529M, Grade 50; minimum 1/2-inch- diameter steel; threaded full length or threaded a minimum of 6 inches at each end.
- I. Anchor Rods: Quantity and diameter of anchor rods to be determined by the pre-engineered metal building manufacturer. Embedment depth and design to be determined by the project foundation engineer. Grade of steel to be coordinated with both designers.
- J. Materials:
  - 1. W-Shapes: ASTM A 992/A 992M; ASTM A 572/A 572M, Grade 50 or 55; or ASTM A 529/A 529M, Grade 50 or 55.

- 2. Channels, Angles, M-Shapes, and S-Shapes: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50 or 55; or ASTM A 529/A 529M, Grade 50 or 55.
- 3. Plate and Bar: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50 or 55; or ASTM A 529/A 529M, Grade 50 or 55.
- 4. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.
- 5. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B or C, structural tubing.
- Structural-Steel Sheet: Hot-rolled, ASTM A 1011/A 1011M, Structural Steel (SS), Grades 30 through 55, or High-Strength Low-Alloy Steel (HSLAS) or High-Strength Low-Alloy Steel with Improved Formability (HSLAS-F), Grades 45 through 70; or cold-rolled, ASTM A 1008/A 1008M, Structural Steel (SS), Grades 25 through 80, or HSLAS, Grades 45 through 70.
- 7. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, SS, Grades 33 through 80, or HSLAS or HSLAS-F, Grades 50 through 80; with G60 coating designation; mill phosphatized.
- 8. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
  - a. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, SS, Grades 33 through 80, or HSLAS or HSLAS-F, Grades 50 through 80; with G90 coating designation.
  - b. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, SS, Grade 50 or 80; with Class AZ50 coating.
- 9. Non-High-Strength Bolts, Nuts, and Washers: ASTM A 307, Grade A, carbon-steel, hexhead bolts; ASTM A 563 carbon-steel hex nuts; and ASTM F 844 plain (flat) steel washers.
  - a. Finish: Plain, where concealed. Hot-dip zinc coating, ASTM F 2329, Class C at all unheated spaces and where exposed to weather.
- 10. High-Strength Bolts, Nuts, and Washers: ASTM F 3125/F 3125M,Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F 436/F 436M, Type 1, hardened carbon-steel washers.
  - a. Finish: Plain, where concealed. Hot-dip zinc coating, ASTM F 2329, Class C at all unheated spaces and where exposed to weather.
- 11. High-Strength Bolts, Nuts, and Washers: ASTM F 3125/F 3125M, Grade A490, Type 1, heavy-hex steel structural bolts or Grade F2280 tension-control, bolt-nut-washer assemblies with splined ends; ASTM A 563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F 436/F 436M, Type 1, hardened carbon-steel washers; all with plain finish.
- 12. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 3125/F 3125M, Grade F1852, Type 1, heavy-hex or round head assemblies consisting of steel structural bolts with splined ends; ASTM A 563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F 436/F 436M, Type 1 hardened carbon-steel washers.
  - a. Finish: Plain, where concealed. Mechanically deposited zinc coating, ASTM B 695, Class 50 at all unheated spaces and where exposed to weather.
- 13. Unheaded Anchor Rods: ASTM F 1554, Grade as indicated on drawings.
  - a. Configuration: Straight.
  - b. Nuts: ASTM A 563 hex carbon steel.
  - c. Plate Washers: ASTM A 36/A 36M carbon steel.
  - d. Washers: ASTM F 436 hardened carbon steel.

- e. Finish: Plain, where concealed. Hot-dip zinc coating, ASTM F 2329, Class C at all unheated spaces and where exposed to weather.
- 14. Headed Anchor Rods: ASTM F 1554, Grade as indicated on drawings.
  - a. Configuration: Straight.
  - b. Nuts: ASTM A 563 hex carbon steel.
  - c. Plate Washers: ASTM A 36/A 36M carbon steel.
  - d. Washers: ASTM F 436 hardened carbon steel.
  - e. Finish: Plain, where concealed. Hot-dip zinc coating, ASTM F 2329, Class C at all unheated spaces and where exposed to weather.
- 15. Threaded Rods: ASTM A 36/A 36M.
  - a. Nuts: ASTM A 563 hex carbon steel.
  - b. Washers: **ASTM F 436** hardened carbon steel.
  - c. Finish: Plain, where concealed. Hot-dip zinc coating, ASTM F 2329, Class C at all unheated spaces and where exposed to weather.
- K. Finish: Factory primed. Apply specified primer immediately after cleaning and pretreating.
  - 1. Clean and prepare in accordance with SSPC-SP2.
  - 2. Coat with manufacturer's standard primer. Apply primer to primary and secondary framing to a minimum dry film thickness of 1 mil .
    - a. Prime secondary framing formed from uncoated steel sheet to a minimum dry film thickness of 0.5 mil on each side.

### 2.5 METAL ROOF PANELS

- A. Standing seam roof panels; 16" wide net coverage with 2" high standing seams at the panel side laps. Field seaming using electrically operated seaming machine is required. Basis of design is Varco-Pruden Buildings SLR II architectural standing seam roof panels.
  - 1. Material: AZ50 Galvalume coated steel.
  - 2. Thickness: 24 gauge.
  - 3. Side Joints: Factory applied sealant for field forming.
  - 4. Length: Continuous from eave to ridge.
  - 5. Panel-to-roof purlin structural attachments: SLR clips, with movable tabs that interlock with seamed SLR panel ribs and provide 1 inch of panel movement in either direction from center of clip to compensate for thermal effects. Panel clips sized to accommodate 1" thermal blocks.
  - 6. Roof panels and related flashing to have a PVDF finish applied to the zinc aluminum coated steel to give a long life color that resists fading and chalking. Paint shall have a 1 mil nom. PVDF finish with 70 percent Kynar 500 or Hylar 5000 standard.
  - 7. UL-90 wind uplift rating is available with support at 60 inches on center. SLRII is also US Army Corps of Engineers approved for wind uplift resistance.
- A. Finishes:
  - 1. Exposed Coil-Coated Finish:

- a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
- 2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil .

# 2.6 METAL WALL PANELS

- A. Metal Insulated Wall Panels: Steel faced, polyurethane (polyisocyanurate) metal wall panels indicated as MS-1, MS-2 on drawings. See Division 07 42 13.
- 2.7 THERMAL INSULATION See Division 07 21 00 & 07 21 16

# 2.8 ACCESSORIES

- A. General: Provide accessories as standard with metal building system manufacturer and as specified. Fabricate and finish accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes. Comply with indicated profiles and with dimensional and structural requirements.
  - 1. Form exposed sheet metal accessories that are without excessive oil-canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
- B. Roof Panel Accessories: Provide components required for a complete metal roof panel assembly including copings, fasciae, corner units, ridge closures, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.
  - 1. Closures: Provide closures at eaves and ridges, fabricated of same material as metal roof panels.
  - 2. Clips: Manufacturer's standard, formed from **steel** sheet, designed to withstand negative-load requirements.
  - 3. Cleats: Manufacturer's standard, mechanically seamed cleats formed from **steel** sheet.
  - 4. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
  - Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or premolded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
  - 6. Thermal Spacer Blocks: Where metal panels attach directly to purlins, provide thermal spacer blocks of thickness required to provide 1-inch standoff; fabricated from extruded polystyrene.
- C. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including copings, fasciae, mullions, sills, corner units, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels unless otherwise indicated.

- 1. Closures: Provide closures at eaves and rakes, fabricated of same material as metal wall panels.
- 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
- 3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or premolded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- D. Flashing and Trim: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018inch nominal uncoated steel thickness, prepainted with coil coating; finished to match adjacent metal panels.
  - 1. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers.
  - 2. Opening Trim: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, [0.018inch] nominal uncoated steel thickness, prepainted with coil coating. Trim head and jamb of door openings, and head, jamb, and sill of other openings.
- E. Gutters: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch nominal uncoated steel thickness, prepainted with coil coating; finished to match roof fascia and rake trim. Match profile of gable trim, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch- long sections, sized according to SMACNA's "Architectural Sheet Metal Manual."
  - 1. Gutter Supports: Fabricated from same material and finish as gutters.
  - 2. Strainers: Bronze, copper, or aluminum wire ball type at outlets.
- F. Downspouts: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.018-inch nominal uncoated steel thickness, prepainted with coil coating; finished to match metal wall panels. Fabricate in minimum 10-foot- long sections, complete with formed elbows and offsets.
  - 1. Mounting Straps: Fabricated from same material and finish as downspouts.
- G. Service Walkways: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.048inch nominal uncoated steel thickness, steel plank grating; with slip-resistant pattern; 18inchoverall width. Support walkways on framing system anchored to metal roof panels without penetrating panels; with predrilled holes and clamps or hooks for anchoring.
- H. Roof Curbs: Provide roof curbs required that are compatible with the roof system and the installation of which can be included in the weathertightness warranty of the roof system. Submit for approval.
- I. Pipe Flashing: Premolded, EPDM pipe collar with flexible aluminum ring bonded to base.
- J. Materials:
  - 1. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads, standard with the manufacturer. Provide fasteners with heads matching color of materials being fastened by means of factory-applied coating.

- 2. Corrosion-Resistant Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
- 3. Metal Panel Sealants:
  - a. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylenecompound sealant tape with release-paper backing. Provide permanently elastic, non-sag, nontoxic, non-staining tape of manufacturer's standard size.
  - b. Joint Sealant: ASTM C 920; one-part elastomeric polyurethane or polysulfide; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended by metal building system manufacturer.

# 2.9 FABRICATION

- A. General: Design components and field connections required for erection to permit easy assembly.
  - 1. Mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.
  - 2. Fabricate structural framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Members shall be free of cracks, tears, and ruptures.
- B. Tolerances: Comply with MBMA's "Metal Building Systems Manual" for fabrication and erection tolerances.
- C. Primary Framing: Shop fabricate framing components to indicated size and section, with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.
  - 1. Make shop connections by welding or by using high-strength bolts.
  - 2. Join flanges to webs of built-up members by a continuous, submerged arc-welding process.
  - 3. Brace compression flange of primary framing with steel angles or cold-formed structural tubing between frame web and purlin web or girt web, so flange compressive strength is within allowable limits for any combination of loadings.
  - 4. Weld clips to frames for attaching secondary framing if applicable, or punch for bolts.
  - 5. Shop Priming: Prepare surfaces for shop priming according to SSPC-SP 2. Shop prime primary framing with specified primer after fabrication.
- D. Secondary Framing: Shop fabricate framing components to indicated size and section by roll forming or break forming, with baseplates, bearing plates, stiffeners, and other plates required for erection welded into place. Cut, form, punch, drill, and weld secondary framing for bolted field connections to primary framing.
  - 1. Make shop connections by welding or by using non-high-strength bolts.
  - 2. Shop Priming: Prepare uncoated surfaces for shop priming according to SSPC-SP 2. Shop prime uncoated secondary framing with specified primer after fabrication.
- E. Metal Panels: Fabricate and finish metal panels at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.

1. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of metal panel.

# PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Before erection proceeds, survey elevations and locations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedment to receive structural framing, with erector present, for compliance with requirements and metal building system manufacturer's tolerances.
- C. Proceed with erection only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition.
- B. Provide temporary shores, guys, braces, and other supports during erection to keep structural framing secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural framing, connections, and bracing are in place unless otherwise indicated.

### 3.3 ERECTION OF STRUCTURAL FRAMING

- A. Erect metal building system according to manufacturer's written instructions and drawings.
- B. Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer.
- C. Set structural framing accurately in locations and to elevations indicated, according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.
- D. Base and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials and roughen surfaces prior to setting plates. Clean bottom surface of plates.
  - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
  - 2. Tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
  - 3. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts. Coordination with general contractor and contractor providing grouting required.

- E. Align and adjust structural framing before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with framing. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
  - 1. Level and plumb individual members of structure.
  - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure will be completed and in service.
- F. Primary Framing and End Walls: Erect framing level, plumb, rigid, secure, and true to line. Level baseplates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use grout to obtain uniform bearing and to maintain a level base-line elevation. Moist-cure grout for not less than seven days after placement.
  - 1. Make field connections using high-strength bolts installed according to RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt type and joint type specified.
    - a. Joint Type: Snug tightened or pretensioned as required by manufacturer.
- G. Secondary Framing: Erect framing level, plumb, rigid, secure, and true to line. Field bolt secondary framing to clips attached to primary framing.
  - 1. Provide rake or gable purlins with tight-fitting closure channels and fasciae.
  - 2. Locate and space wall girts to suit openings such as doors and windows.
  - 3. Provide supplemental framing at entire perimeter of openings, including doors, windows, louvers, ventilators, and other penetrations of roof and walls.
- H. Bracing: Install bracing in roof and sidewalls where indicated on erection drawings.
  - 1. Tighten rod and cable bracing to avoid sag.
  - 2. Locate interior end-bay bracing only where indicated.
- I. Framing for Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to structural framing.
- J. Erection Tolerances: Maintain erection tolerances of structural framing within AISC 303.

# 3.4 METAL PANEL INSTALLATION, GENERAL

- A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.

- C. Examination: Examine primary and secondary framing to verify that structural-panel support members and anchorages have been installed within alignment tolerances required by manufacturer.
  - 1. Examine roughing-in for components and systems penetrating metal panels, to verify actual locations of penetrations relative to seams before metal panel installation.
- D. General: Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
  - 1. Field cut metal panels as required for doors, windows, and other openings. Cut openings as small as possible, neatly to size required, and without damage to adjacent metal panel finishes.
    - a. Field cutting of metal panels by torch is not permitted unless approved in writing by manufacturer.
  - 2. Install metal panels perpendicular to structural supports unless otherwise indicated.
  - 3. Flash and seal metal panels with weather closures at perimeter of openings and similar elements. Fasten with self-tapping screws.
  - 4. Locate and space fastenings in uniform vertical and horizontal alignment.
  - 5. Locate metal panel splices over structural supports with end laps in alignment.
  - 6. Lap metal flashing over metal panels to allow moisture to run over and off the material.
- E. Lap-Seam Metal Panels: Install screw fasteners using power tools with controlled torque adjusted to compress EPDM washers tightly without damage to washers, screw threads, or metal panels. Install screws in predrilled holes.
  - 1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Lap ribbed or fluted sheets one full rib corrugation. Apply metal panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
- F. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.
- G. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal panel assemblies. Provide types of gaskets, fillers, and sealants indicated; or, if not indicated, provide types recommended by metal panel manufacturer.
  - 1. Seal metal panel end laps with double beads of tape or sealant the full width of panel. Seal side joints where recommended by metal panel manufacturer.
  - 2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

### 3.5 METAL ROOF PANEL INSTALLATION

- A. General: Provide metal roof panels of full length from eave to ridge unless otherwise indicated or restricted by shipping limitations.
  - 1. Install ridge caps as metal roof panel work proceeds.

- 2. Flash and seal metal roof panels with weather closures at eaves and rakes. Fasten with self-tapping screws.
- B. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint, at location and spacing and with fasteners recommended by manufacturer.
  - 1. Install clips to supports with self-drilling or self-tapping fasteners.
  - 2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
  - 3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
  - 4. Seamed Joint: Crimp standing seams with manufacturer-approved motorized seamer tool so that clip, metal roof panel, and factory-applied sealant are completely engaged.
  - 5. Rigidly fasten eave end of metal roof panels and allow ridge end free movement for thermal expansion and contraction. Predrill panels for fasteners.
  - 6. Provide metal closures at **rake edges**, **rake wall** caps.
- C. Metal Roof Panel Installation Tolerances: Shim and align metal roof panels within installed tolerance of 1/4 inch in 20 feet on slope and location lines and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

#### 3.6 METAL WALL PANEL INSTALLATION

- A. General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts, extending full height of building, unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.
- B. Insulated Metal Wall Panels: Install insulated metal wall panels on exterior side of girts. Attach panels to supports at each panel joint using concealed clip and fasteners at maximum 42 inches o.c., spaced not more than manufacturer's recommendation. Fully engage tongue and groove of adjacent insulated metal wall panels.
  - 1. Install clips to supports with self-tapping fasteners.
  - 2. Apply continuous ribbon of sealant to panel joint on concealed side of insulated metal wall panels as vapor seal; apply sealant to panel joint on exposed side of panels as weather seal.
- C. Installation Tolerances: Shim and align metal wall panels within installed tolerance of 1/4 inch in 20 feet, noncumulative; level, plumb, and on location lines; and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

# 3.7 DOOR AND FRAME INSTALLATION

- A. General: By Others.
- B. Field Glazing: Comply with installation requirements in Section 088000 "Glazing" and 084113 "Aluminum-Framed Entrances and Storefronts"
- C. Door Hardware:

1. By Others

# 3.8 WINDOW INSTALLATION

A. General: By Others

# 3.9 ACCESSORY INSTALLATION

- A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
  - 1. Install components required for a complete metal roof panel assembly, including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
  - 2. Install components for a complete metal wall panel assembly, including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
  - 3. Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturer.
- B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible and set units true to line and level. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
  - 1. Install exposed flashing and trim that is without excessive oil-canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
  - 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
- C. Gutters: Join sections with riveted-and-soldered or lapped-and-sealed joints. Attach gutters to eave with gutter hangers spaced as required for gutter size, but not more than 36 inches o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.
- D. Downspouts: Join sections with 1-1/2-inch telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.
  - 1. Tie downspouts to underground drainage system as indicated. Connection to underground drainage system provided as part of civil construction.
- E. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to panel as recommended by manufacturer.

### 3.10 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform field quality control special inspections and to submit reports.
- B. Product will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

#### 3.11 CLEANING AND PROTECTION

- A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780/A 780M and manufacturer's written instructions.
- B. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
- C. Touchup Painting: After erection, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted structural framing, **bearing plates**, and accessories.
  - 1. Clean and prepare surfaces by SSPC-SP 2, "Hand Tool Cleaning," or by SSPC-SP 3, "Power Tool Cleaning."
  - 2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.
- D. Touchup Painting: Cleaning and touchup painting are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
- E. Metal Panels: Remove temporary protective coverings and strippable films, if any, as metal panels are installed. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
  - 1. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 13 34 19

### SECTION 21 05 00 – COMMON WORK RESULTS FOR FIRE SUPPRESSION

### PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to work of this section.

### 1.2 SECTION INCLUDES

- A. Aboveground piping.
- B. Escutcheons.
- C. Pipe, fittings, sleeves, escutcheons, seals, and connections for sprinkler and combination sprinkler and standpipe systems.
- D. Mechanical couplings.
- E. Pipe hangers and supports.
- F. Pipe sleeves.

#### 1.3 RELATED REQUIREMENTS

- A. Section 07 84 00 Firestopping.
- B. Section 21 05 53 Identification for Fire Suppression Piping and Equipment: Piping identification.
- C. Section 21 13 00 Fire-Suppression Sprinkler Systems: Sprinkler systems design.

### 1.4 REFERENCE STANDARDS

A. ASME A112.18.1 – Plumbing Supply Fittings.

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1

- B. ASME BPVC-IX Boiler and Pressure Vessel Code, Section IX Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators.
- C. ASME B16.1 Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
- D. ASME B16.3 Malleable Iron Threaded Fittings: Classes 150 and 300.
- E. ASME B16.4 Gray Iron Threaded Fittings: Classes 125 and 250.
- F. ASTM A47/A47M Standard Specification for Ferritic Malleable Iron Castings.
- G. ASTM A53/A53M Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- H. ASTM A536 Standard Specification for Ductile Iron Castings.
- I. ASTM A795/A795M Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use.
- J. ASTM C592 Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type).
- K. ASTM E814 Standard Test Method for Fire Tests of Penetration Firestop Systems.
- L. AWWA C606 Grooved and Shouldered Joints.
- M. ITS (DIR) Directory of Listed Products.
- N. NFPA 13 Standard for the Installation of Sprinkler Systems.
- O. UL (DIR) Online Certifications Directory.

#### 1.5 SCOPE OF WORK – GENERAL

- A. This section specifies general requirements for Fire Suppression installations and includes requirements common to more than one section of Division 21. It expands and supplements the requirements specified in sections of Division 01.
- B. Provide materials, labor, transportation, tools, permits, fees, inspections, utilities, and incidentals necessary for the complete installation of Fire Suppression work indicated and described in the Contract Documents.

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COMMON WORK RESULTS FOR FIRE SUPPRESSION C. It is the intent of the Contract Documents to provide an installation complete in every respect. If additional details or special construction is required for work indicated or specified under this section of work or work specified in other sections, provide material and equipment which is usually furnished with such systems to complete the installation, whether mentioned or not.

### 1.6 SEQUENCE OF WORK

- A. Conduct work in sequence to provide the least possible interference to the activities of the Owner, and to permit orderly transfer of activities and equipment to completed areas.
- B. Work shall be substantially complete by the dates listed in the contract documents.

#### 1.7 DEFINITIONS

- A. Provide: Furnish and install complete and ready for intended use.
- B. Indicated: Indicated on drawings.
- C. Noted: Noted on Drawings or in Specifications.
- D. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- E. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- F. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- G. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in shafts.
- H. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

### 1.8 CODES AND STANDARDS

- A. Code Compliance: Comply with most current edition adopted by the Authority Having Jurisdiction of following:
  - 1. International Building Code (IBC), Standards and Amendments.
  - 2. International Mechanical Code (IMC), Standards and Amendments.
  - 3. International Fire Code (IFC), Standards and Amendments.
  - 4. Uniform Plumbing Code (UPC), Standards and Amendments.
  - 5. International Fuel Gas Code (IFGC).
  - 6. National Fire Protection Association (NFPA).
  - 7. National Electrical Code (NEC); NFPA 70.
- B. Applicable State and local codes, laws, and ordinances.

#### 1.9 SAFETY OF PERSONS AND PROPERTY

A. Comply with applicable laws, ordinances, rules, and regulations of any public authority for the safety of persons and property, including requirements of the Washington Department of Safety and Health (DOSH) or the Occupational Safety and Health Act (OSHA) whichever is most stringent, and Division 01 Specification Sections.

#### 1.10 PERMITS AND FEES

A. Obtain and pay for required permits and fees necessary to fully complete work included in the Contract Documents.

#### 1.11 INTENT AND INTERPRETATION

- A. Drawings and Specifications supplement each other, and any details contained in one and not the other shall be included as if contained in both. Items not specifically mentioned in the specifications or noted on the drawings, but which are obviously necessary to make a complete working installation shall be included.
- B. Drawings are partly diagrammatic and do not necessarily show exact location of new piping and existing utilities, unless specifically dimensioned.
- C. Riser and other diagrams are schematic only and do not necessarily show the physical arrangement of equipment. They shall not be used for obtaining quantities or lineal runs of piping.

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- D. Grilles, fixtures, or other pieces of equipment shall be centered on windows, wall spaces, or other items, unless specifically dimensioned otherwise.
- E. Location of piping shall be checked to determine that it clears openings and structural members; that it may be properly concealed; and that it clears cabinets, lights and equipment having fixed locations.
- F. Mechanical drawings shall serve as working drawings for Division 21 work. Refer to Architectural, Structural and Electrical drawings for additional detail affecting the installation of work. Architectural drawings shall take precedence over the Mechanical drawings if any dimensional discrepancies exist.
- G. Approximate location of each item is indicated on the drawings. These drawings are not intended to give complete and exact details regarding location. Exact locations are to be determined by actual measurements at the building. Not all pipe offsets are indicated on the drawings.

# 1.12 SUBMITTAL OF EQUIPMENT FOR APPROVAL

- A. Refer to Division 01 requirements for submittal definitions, requirements, and procedures. Additional requirements are listed below.
- B. Shop drawings, catalog information, and material schedules shall be submitted for approval on materials and equipment prior to ordering.
- C. Submittals not meeting the following requirements will be returned for revision:
  - 1. Provide a cover page for each item or group of items (schedule group, single fixture plus trim group, etc.).
  - 2. Each cover page must be clearly identified with the project name, specification number and paragraph number.
  - 3. Submittal package must be accompanied by an itemized index listing specification section, paragraph number, item, and manufacturer; larger projects will be index tabbed by specification section with index for each section.

### 1.13 GUARANTEE

A. Guarantee satisfactory operation of material and equipment installed under Division 21. Repair or replace any defective materials, equipment, or workmanship which may show itself within one year from date of Substantial Completion.

#### 1.14 GENERAL MATERIALS AND EQUIPMENT REQUIREMENTS

- A. Where more than one manufacturer is listed, provide products of only one manufacturer for each type of product.
- B. Materials used under this Contract, unless specifically noted otherwise, shall be new and of the latest and most current model line produced by the manufacturer. Outdated "new" equipment is not acceptable.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

#### 1.15 EQUIPMENT AND MATERIAL SUBSTITUTIONS

- A. Throughout these Contract Documents, various materials, equipment, apparatus, etc., are specified by manufacturer, brand name, type, or catalog number. Such designation is to establish standards of desired quality and construction and shall be the basis of the bid.
- B. Where more than one manufacturer is listed, and only one manufacturer's catalog number is indicated, that standard of quality and construction shall be maintained by materials supplied by other manufacturer(s).
- C. Substitutions of equipment or materials shall be made only with written prior approval. Prior approval requests must be received at least ten (10) days prior to bid date unless otherwise instructed. Refer to Division 01 Section, "Substitution Procedures" for procedures in requesting substitutions. The Owner or Owner's representative shall review all substitution requests for final approval.
- D. Acceptance of substitution request signifies manufacturer recognition only. No attempt has been made to check each item as to special features, capacities, or physical dimensions required by this project. Verify requirements before submitting for approval. Acceptance of exact features, sizes, capacities, etc., all of which must meet or exceed design requirements will be determined when submitted during the construction phase.
- E. Substitution request must include manufacturer, specific model number, special features, physical dimensions, and capacities of proposed equipment. Verify requirements before submitting for approval.
- F. The Contractor shall bear full responsibility for substituted equipment and materials, including, but not limited to:

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COMMON WORK RESULTS FOR FIRE SUPPRESSION
- 1. Costs.
- 2. Available space requirements.
- 3. Effect on other trades.
- 4. Changes in electrical requirements.
- 5. Changes in structural requirements.

### 1.16 SUBMITTALS

- A. Product Data: Provide manufacturer's catalog information. Indicate valve data and ratings.
- B. Shop Drawings: Indicate pipe materials used, jointing methods, supports, and floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.
- C. Project Record Documents: Record actual locations of components and tag numbering.
- D. Operation and Maintenance Data: Include installation instructions and spare parts lists.

#### 1.17 QUALITY ASSURANCE

- A. Comply with UL (DIR) and ITS (DIR) or Warnock Hersey requirements.
- B. Valves: Bear UL (DIR) and ITS (DIR) or Warnock Hersey product listing label or marking. Provide manufacturer's name and pressure rating marked on valve body.
- C. Products Requiring Electrical Connection: Listed and classified as suitable for the purpose specified and indicated.
- D. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.
- 1.18 DELIVERY, STORAGE, AND HANDLING
  - A. Deliver and store valves in shipping containers, with labeling in place.
  - B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

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# PART 2 - PRODUCTS

## 2.1 GENERAL REQUIREMENTS

- A. Sprinkler-based System:
  - 1. Comply with NFPA 13.
  - 2. See Section 21 13 00.
- B. Welding Materials and Procedures: Comply with ASME BPVC-IX.
- C. Provide system pipes, fittings, sleeves, escutcheons, seals, and other related accessories.

# 2.2 ABOVEGROUND PIPING

- A. Pipe or tubing shall be metallic and meet or exceed the standards of NFPA 13.
- B. Steel Pipe: ASTM A795 Schedule 40, black.
  - 1. Cast Iron Fittings: ASME B16.1, flanges and flanged fittings and ASME B16.4, threaded fittings.
  - 2. Malleable Iron Fittings: ASME B16.3, threaded fittings and ASTM A47/A47M.
  - 3. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C"shaped elastomeric sealing gasket, steel bolts, nuts, and washers; galvanized for galvanized pipe.

#### 2.3 PIPE SLEEVES

- A. Vertical Piping:
  - 1. Sleeve Length: 1-inch above finished floor.
  - 2. Provide sealant for watertight joint.
  - 3. Blocked-Out Floor Openings: Provide 1<sup>1</sup>/<sub>2</sub>-inch angle set in silicon adhesive around opening.
  - 4. Drilled Penetrations: Provide 1<sup>1</sup>/<sub>2</sub>-inch angle ring or square set in silicone adhesive around penetration.
- B. Plastic, Sheet Metal, or Moisture-Resistant Fiber: Pipe passing through interior walls, partitions, and floors, unless steel or brass sleeves are specified below.

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- C. Pipe Passing Through Below-Grade Exterior Walls:
  - 1. Zinc-coated or cast-iron pipe.
  - 2. Provide watertight space with link rubber or modular seal between sleeve and pipe on both pipe ends.
- D. Pipe Passing Through Quarry Tile, Terrazzo, or Ceramic Tile Floors:
  - 1. Brass pipe.
  - 2. Connect sleeve with floor plate.

# 2.4 ESCUTCHEONS

- A. Manufacturers:
  - 1. Fire Protection Products, Inc.
  - 2. Tyco Fire Protection Products.
  - 3. Viking Group Inc.

## B. Material:

- 1. Fabricate from nonferrous metal.
- 2. Chrome-plated.
- 3. Metals and Finish: Comply with ASME A112.18.1.

# C. Construction:

- 1. One-piece for mounting on chrome-plated tubing or pipe and one-piece or split-pattern type elsewhere.
- 2. Internal spring tension devices or setscrews to maintain a fixed position against a surface.

## 2.5 PIPE HANGERS AND SUPPORTS

- A. Hangers for Pipe Sizes <sup>1</sup>/<sub>2</sub>-inch to 4-inches: Galvanized carbon steel, adjustable, band.
- B. Hangers for Pipe Sizes Over 4-inches: Carbon steel, adjustable, clevis.
- C. Wall Support for Pipe Sizes to 3-inches: Cast iron hook.
- D. Wall Support for Pipe Sizes 4-inches and Over: Welded steel bracket and wrought steel clamp.

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- E. Vertical Support: Steel riser clamp.
- F. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
- 2.6 MECHANICAL COUPLINGS
  - A. Manufacturers:
    - 1. Anvil International.
    - 2. Shurjoint Piping Products, Inc.
    - 3. Tyco Fire Protection Products.
    - 4. Victaulic Company.
  - B. Rigid Mechanical Couplings for Grooved Joints:
    - 1. Dimensions and Testing: Comply with AWWA C606.
    - 2. Minimum Working Pressure: 300 psig.
    - 3. Housing Material: Fabricate of ductile iron complying with ASTM A536.
    - 4. Housing Coating: Factory applied orange enamel.
    - 5. Gasket Material: EPDM suitable for operating temperature range from -30°F to 230°F.
    - 6. Bolts and Nuts: Hot-dipped-galvanized or zinc-electroplated steel.

### 2.7 MECHANICAL PRESSED FITTINGS

A. Provide double-pressed type, utilizing EPDM, nontoxic, synthetic rubber sealing elements for use with Schedule 40 carbon steel piping.

### PART 3 - EXECUTION

#### 3.1 COORDINATION

- A. Refer to Division 01 Section "Project Management and Coordination".
- B. Coordinate available space for equipment and systems with other trades. Refer to Architectural, Structural and Electrical Drawings for additional building details necessary for coordination.
- C. Cutting, patching, wiring, finishing or any other work required for relocation of work installed due to interferences between work of the various trades will be at no additional cost to the Owner.

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## 3.2 MANUFACTURER'S INSTRUCTIONS

A. Furnish proper equipment and/or materials required for installation as intended by the manufacturer, for all work described under Division 21. If needed for proper installation or operation, request advice and supervisory assistance from the representative of the specific manufacturer. Manufacturer's published instructions shall be followed for preparing, assembling, installing, erecting, and cleaning manufactured materials or equipment, unless otherwise indicated. Promptly notify the Architect in writing of any conflict between the requirements of the Contract Documents and the manufacturer's directions and obtain the Architect's instructions before proceeding with the work.

#### 3.3 EXAMINATION OF SITE

A. Visit site of proposed work and become familiar with conditions affecting work. Verify measurements at the building before beginning work.

#### 3.4 EXISTING UTILITIES AND PIPING

A. Locations of existing concealed lines and connection points have been indicated as closely as possible from available information. Assume that such connection points are within a 10-foot (10') radius of indicated locations. Where connection points are not within this radius, contact the Architect for a decision before proceeding.

#### 3.5 LAYING OUT WORK

A. Locations of equipment and devices, as shown on the drawings, are approximate unless dimensioned. Exact locations of such items shall be determined from the Construction Drawings. Verify physical dimensions of each item of mechanical equipment, piping system, to fit available space and promptly notify the Architect prior to roughing-in if conflicts appear. Coordinate equipment to available space and access routes through construction. Offsets or transitions in piping systems required for proper system operation and/or installation, whether indicated on drawings or not, shall be provided at no additional cost to Owner.

## 3.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels, and similar information needed for distinct identifications; adequately packaged and protected to prevent damage during shipment, storage, and handling.

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- B. Store equipment and materials at the site unless offsite storage is authorized in writing. Protect stored equipment and materials from damage.
- C. Coordinate deliveries of mechanical materials and equipment to minimize construction site congestion. Limit each shipment of materials and equipment to the items and quantities needed for the smooth and efficient flow of installations.

## 3.7 ACCESSIBILITY

A. Install equipment and materials to provide required access for servicing and maintenance. Coordinate location of concealed equipment and devices requiring access with location of access panels and doors. Allow ample space for removal of parts that require replacement or servicing.

### 3.8 CUTTING AND PATCHING

- A. Comply with Division 01 Section, "Execution" for general requirements for cutting and patching.
- B. Cutting shall be performed with masonry saws, core drills or similar equipment to provide neat and uniform openings.
- C. Patching shall match adjacent surfaces in materials and finish. Do not endanger or damage installed work through procedures and processes of cutting and patching.
- D. Arrange for repairs required to restore other work, which was damaged as a result of mechanical installations. Upon receipt of written authorization from Architect, Contractor will be authorized for cutting and patching work that is necessitated by ill-timed, defective, or non-conforming installations.
- E. No additional compensation will be authorized for cutting and patching work that is necessitated by ill-timed, defective, or non-conforming installations.
- F. Perform cutting, fitting, and patching of mechanical equipment and materials required to:
  - 1. Uncover work to provide for installation of ill-timed work.
  - 2. Remove and replace defective work.
  - 3. Remove and replace work not conforming to requirements of the Contract Documents.
  - 4. Remove samples of installed work as specified for testing.
  - 5. Install equipment and materials in existing structures.
  - 6. Upon written instructions from the Architect, uncover and restore work to provide for observation of concealed work.

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- G. Cut, remove, and legally dispose of selected mechanical equipment, components, and materials as indicated, including, but not limited to removal of mechanical piping, heating units, and other mechanical items made obsolete by new work.
- H. Protect structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.
- I. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

#### 3.9 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

### 3.10 INSTALLATION

- A. Install sprinkler system and service main piping, hangers, and supports in accordance with NFPA 13.
- B. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.
- C. Install piping to conserve building space, to not interfere with use of space and other work.
- D. Group piping whenever practical at common elevations.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- F. Pipe Hangers and Supports:
  - 1. Install hangers to provide minimum <sup>1</sup>/<sub>2</sub>-inch space between finished covering and adjacent work.
  - 2. Place hangers within 12 inches of each horizontal elbow.
  - 3. Use hangers with 1<sup>1</sup>/<sub>2</sub>-inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
  - 4. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
  - 5. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
  - 6. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

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- G. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.
- H. Prepare pipe, fittings, supports, and accessories for finish painting. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc-rich primer to welding.
- I. Provide sleeves when penetrating footings, floors, walls, and partitions. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.
  - 1. Aboveground Piping:
    - a. Pack solid using mineral fiber complying with ASTM C592.
    - b. Fill space with an elastomer caulk to a depth of ½-inch where penetrations occur between conditioned and unconditioned spaces.
  - 2. All Rated Openings: Caulk tight with firestopping material complying with ASTM E814 in accordance with Section 07 84 00 to prevent the spread of fire, smoke, and gases.
- J. Escutcheons:
  - 1. Install and firmly attach escutcheons at piping penetrations into finished spaces.
  - 2. Provide escutcheons on both sides of partitions separating finished areas through which piping passes.
  - 3. Use chrome plated escutcheons in occupied spaces and to conceal openings in construction.
- K. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, unions, and couplings for servicing are consistently provided.

## 3.11 CLEANING

- A. Upon completion of work, clean all parts of the installation.
- B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

# SECTION 21 05 05 – PROJECT CLOSEOUT FOR FIRE SUPPRESSION

#### PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS
  - A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to work of this section.
- 1.2 SCOPE OF WORK GENERAL
  - A. This section specifies procedural requirements for Fire Suppression installations project closeout, including but not limited to:
    - 1. Project Record Document submittal.
    - 2. Operation and Maintenance Manual submittal.
    - 3. Operation and Maintenance Instruction and Training.
    - 4. Fire Suppression Equipment and Systems Startup.
    - 5. Final Cleaning.
    - 6. Owner Training Session Agenda.
- 1.3 RELATED SECTIONS INCLUDE THE FOLLOWING:
  - A. Division 01 Section, "Submittal Procedures".
  - B. Division 01 Section "Closeout Procedures".

#### 1.4 PROJECT RECORD DOCUMENTS

- A. Record differences between Fire Suppression work as installed and as shown in Contract Drawings on a set of prints of Fire Suppression drawings furnished by Architect. Return these prints to Architect at completion of project. Notations made on drawings shall be neat and legible. Comply with Division 01 Section requirements.
- B. Mark drawings to indicate revisions to Fire Suppression piping, size and location both exterior and interior; including locations of coils, dampers, and other control devices, filters, motors, and similar items requiring periodic maintenance; actual equipment locations; concealed equipment

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PROJECT CLOSEOUT FOR FIRE SUPPRESSION and control devices; mains and branches of piping systems, with valves and control devices located and numbered.

- C. Revise equipment and fixture schedules on the Drawings to indicate actual installed manufacturer and model numbers.
- D. Mark specifications to indicate change orders; actual equipment and materials used.

### 1.5 OPERATION AND MAINTENANCE MANUALS

- A. Prepare and submit Operation and Maintenance (O&M) Manuals for Fire Suppression systems provided. Comply with Division 01 Section requirements.
- B. Provide master index at beginning of Manual showing sections and items included.
- C. Cover section: List name, address, and phone number of Project Architect, General Contractor, Fire Suppression Contractor, and all Fire Suppression Subcontractors. Provide a list of equipment suppliers with address and phone number.
- D. Include descriptive literature (manufacturer's catalog data) of each manufactured item. Literature shall show capacities and size of equipment used and be marked indicating each specific item with applicable data underlined. Data sheets shall be originals or clean copies of originals.
- E. One draft copy of the manual shall be submitted for review, comment, and approval, as applicable, at least 15 days prior to substantial completion or training, whichever is first. After approval, submit three (3) copies of manual to Architect for approval unless otherwise directed by Division 01 Section requirements. Information to be included in manual:
  - 1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of all replaceable parts.
  - 2. Manufacturer's printed operating procedures to include startup, break-in, routine, and normal operating instructions; regulation, control, stopping shutdown, and emergency instructions; and summer and winter operating instructions.
  - 3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
  - 4. Servicing instructions and lubrication charts and schedules.
  - 5. Valve schedule indicating the valve symbol (tag number), valve location by room number and description, valve purpose and system served, and valve size. Provide one (1) corresponding set of full-size Fire Suppression prints showing these valve locations for cross-reference. A second, complete set of valve schedules (8½-inches x 11-inches)

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PROJECT CLOSEOUT FOR FIRE SUPPRESSION encased in transparent plastic laminate and fitted in an aluminum holding frame shall be furnished to the Owner.

- 6. Test records and certifications.
- 7. Equipment startup reports.
- 8. Warranty information and letters of guarantee.
- 9. Instruction period checklist for each equipment item.
- F. Complete O&M Manual shall be available for use by Owner's representatives during instruction and training sessions.

### 1.6 OPERATION AND MAINTENANCE INSTRUCTION AND TRAINING

- A. Instruct Owner's Representative(s) in the Operation and Maintenance procedures described in Operation and Maintenance Manual. Comply with Division 01 Section requirements.
- B. Enlist services of qualified personnel, including each sub-trade and factory trained specialists for each major piece of equipment, to attend training sessions and provide operation and maintenance instructions.
- C. Submit training agenda, schedule, and list of representatives for review 30 days prior to training sessions. Confirm attendance by written notification to all participants.
- D. Prepare checklist of all equipment and systems requiring instruction and maintenance for verification and agreement by the Owner's Representative of satisfactory startup and instruction. Checklist shall include a statement of completion by the Contractor, date and topic(s) covered in each training session, and an attendance list of all participants at each training session. Submit a copy of checklist for review 30 days prior to training sessions. Include copy of the completed checklist in Operation and Maintenance Manual.
- E. Refer to individual Division 21 Sections for additional instruction/training requirements.
- F. All Fire Suppression systems shall be properly functioning prior to instruction period.

## PART 2 - PRODUCTS (Not Applicable)

# PART 3 - EXECUTION

#### 3.1 FIRE SUPPRESSION EQUIPMENT AND SYSTEMS STARTUP

- A. Provide the services of a factory-authorized service representative to test and inspect unit installation, provide startup service, and demonstrate and train Owner's maintenance personnel.
- B. Include certification of factory-authorized representative status as part of equipment submittal from manufacturer. Include copies of any installation and startup instructions, manufacturer's checklists, and other forms used in startup as part of the equipment submittal.
- C. Include written startup reports with test data for equipment in Operation and Maintenance Manual.
- D. All construction debris, including electrical wiring debris, shall be removed from units prior to equipment startup. Areas surrounding and served by equipment being started must be free of construction debris, sheetrock dust, and any materials that may adversely affect the equipment.

#### 3.2 FINAL CLEANING

- A. Refer to Division 01 general requirements for final cleaning.
- B. At time of final cleanup, clean all fixtures and equipment, and leave in condition for use intended. Vacuum cabinet interiors of control panels, air handling units, etc. to remove all construction debris including electrical wiring debris.

# SECTION 21 13 00 - FIRE-SUPPRESSION SPRINKLER SYSTEMS

# PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

A. System design, installation, and certification.

### 1.2 REFERENCE STANDARDS

- A. ASME B16.1 Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
- B. ASME B16.4 Gray Iron Threaded Fittings: Classes 125 and 250.
- C. ASME B16.5 Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard.
- D. ASME B16.9 Factory-Made Wrought Buttwelding Fittings.
- E. ASME B16.21 Nonmetallic Flat Gaskets for Pipe Flanges.
- F. ASTM A47/A47M Standard Specification for Ferritic Malleable Iron Castings.
- G. ASTM A53/A53M Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- H. ASTM A234/A234M Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
- I. ASTM A536 Standard Specification for Ductile Iron Castings.
- J. ASTM A733 Standard Specification for Welded and Seamless Carbon Steel and Austenitic Stainless Steel Pipe Nipples.
- K. ASTM A865/A865M Standard Specification for Threaded Couplings, Steel, Black or Zinc-Coated (Galvanized) Welded or Seamless, for Use in Steel Pipe Joints.
- L. AWS D10.12M/D10.12 Guide for Welding Mild Steel Pipe.
- M. AWWA C606 Grooved and Shouldered Joints.

FIRE-SUPPRESSION SPRINKLER SYSTEMS

- N. NFPA 13 Standard for the Installation of Sprinkler Systems.
- O. UL 213 Rubber Gasketed Fittings for Fire Protection Service.
- P. UL 860 Standard for Pipe Unions for Flammable and Combustible Fluids and Fire Protection Service.

#### 1.3 SUBMITTALS

- A. See Section 21 05 00 Common Work Results for Fire Suppression, for submittal procedures.
- B. Shop Drawings:
  - 1. Sprinkler design shall be signed by a NICET level III or higher professional. Include sprinkler design professional's Registration of Certification.
  - 2. Indicate hydraulic calculations, detailed pipe layout, hangers and supports, sprinklers, components, and accessories. Indicate system controls.
  - 3. Submit shop drawings to Authorities Having Jurisdiction for approval. Submit proof of approval to Architect.
  - 4. Submit hydraulic calculations for each sprinkler system in accordance with NFPA 13. Provide a 10-psi safety factor between the water supply and the calculated demand requirement.
- C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. Extra Sprinklers: Type and size matching those installed in quantity required by referenced NFPA design and installation standard.
  - 2. Sprinkler Wrenches: For each sprinkler type.

## PART 2 - PRODUCTS

## 2.1 STEEL PIPE AND FITTINGS

- A. Standard-Weight, Black Steel Pipe: ASTM A53/A53M, Grade B, Seamless. Pipe ends may be factory or field formed to match joining method.
  - 1. Required for welded fittings, cut groove fittings of all sizes, and threaded fittings 2 inches and smaller.
- B. Black Steel Pipe Nipples: ASTM A733, made of ASTM A53/A53M, standard-weight, seamless steel pipe with threaded ends.

FIRE-SUPPRESSION SPRINKLER SYSTEMS

- C. Uncoated Steel Couplings: ASTM A865/A865M, threaded.
- D. Uncoated, Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.
- E. Malleable- or Ductile-Iron Unions: UL 860.
- F. Cast-Iron Flanges: ASME B16.1, Class 125.
- G. Steel Flanges and Flanged Fittings: ASME B16.5, Class 150.
  - 1. Pipe-Flange Gasket Materials: ASME B16.21, nonmetallic and asbestos free.
    - a. Class 125 and Class 250, Cast-Iron, Flat-Face Flanges: Full-face gaskets.
    - b. Class 150 and Class 300, Ductile-Iron or -Steel, Raised-Face Flanges: Ring-type gaskets.
  - 2. Metal, Pipe-Flange Bolts and Nuts: Carbon steel unless otherwise indicated.
- H. Steel Welding Fittings: ASTM A234/A234M and ASME B16.9.
  - 1. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- I. Grooved-Joint, Steel-Pipe Appurtenances:
  - 1. Pressure Rating:175-psigminimum.
  - 2. Painted Grooved-End Fittings for Steel Piping: ASTM A47/A47M, malleable-iron casting or ASTM A536, ductile-iron casting, with dimensions matching steel pipe.
  - 3. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213 rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.
- 2.2 SPRINKLER SYSTEM
  - A. Sprinkler System: Provide coverage for entire building.
  - B. Occupancy: Light hazard; comply with NFPA 13.
  - C. Water Supply: Determine volume and pressure from water flow test data.
  - D. Storage Cabinet for Spare Sprinklers and Tools: Steel, located adjacent to alarm valve.

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# 2.3 SPRINKLERS

- A. Suspended Ceiling Type: Semi-recessed pendant type with matching push on escutcheon plate.
  - 1. Response Type: Quick.
  - 2. Coverage Type: Standard.
  - 3. Fusible Link: Glass bulb type temperature rated for specific area hazard.
- B. Sidewall Type: Semi-recessed horizontal sidewall type with matching push on escutcheon plate.
  - 1. Response Type: Quick.
  - 2. Coverage Type: Standard.
  - 3. Fusible Link: Glass bulb type temperature rated for specific area hazard.

# 2.4 PIPING SPECIALTIES

# PART 3 - EXECUTION

# 3.1 INSTALLATION

- A. Install in accordance with referenced NFPA design and installation standard.
- B. Install equipment in accordance with manufacturer's instructions.
- C. Place pipe runs to minimize obstruction to other work.
- D. Place piping in concealed spaces above finished ceilings.
- E. Apply masking tape or paper cover to ensure concealed sprinklers, cover plates, and sprinkler escutcheons do not receive field paint finish. Remove after painting. Replace painted sprinklers.
- F. Flush entire piping system of foreign matter.
- G. Hydrostatically test entire system.
- H. Require test be witnessed by Fire Marshal.

# SECTION 23 05 00 – COMMON WORK RESULTS FOR HVAC

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to work of this section.

#### 1.2 SCOPE OF WORK – GENERAL

- A. This section specifies general requirements for HVAC installations and includes requirements common to more than one section of Division 23. It expands and supplements the requirements specified in sections of Division 01.
- B. Provide materials, labor, transportation, tools, permits, fees, inspections, utilities, and incidentals necessary for the complete installation of HVAC work indicated and described in the Contract Documents.
- C. It is the intent of the Contract Documents to provide an installation complete in every respect. If additional details or special construction is required for work indicated or specified under this section of work or work specified in other sections, provide material and equipment which is usually furnished with such systems to complete the installation, whether mentioned or not.

#### 1.3 SEQUENCE OF WORK

- A. Conduct work in sequence to provide least interference to the activities of the Owner, and to permit orderly transfer of activities and equipment to completed areas.
- B. Work shall be substantially complete by the dates listed in the contract documents.

#### 1.4 ALTERNATES

A. Refer to Division 01 Section "Alternates" for description of alternates. Review Contract Documents for additional information.

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#### 1.5 DEFINITIONS

- A. Provide: Furnish and install complete and ready for intended use.
- B. Indicated: Indicated on drawings.
- C. Noted: Noted on Drawings or in Specifications.
- D. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- E. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- F. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- G. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.
- H. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

## 1.6 CODES AND STANDARDS

- A. Code Compliance: Comply with most current edition adopted by the Authority Having Jurisdiction of following:
  - 1. International Building Code (IBC), Standards and Amendments.
  - 2. International Mechanical Code (IMC), Standards and Amendments.
  - 3. International Fire Code (IFC), Standards and Amendments.
  - 4. Uniform Plumbing Code (UPC), Standards and Amendments.
  - 5. International Fuel Gas Code (IFGC).
  - 6. National Fire Protection Association (NFPA).
  - 7. National Electrical Code (NEC); NFPA 70.
  - 8. Washington State Energy Code, Commercial Provisions.
  - 9. Applicable State and local codes, laws, and ordinances.

### 1.7 SAFETY OF PERSONS AND PROPERTY

A. Comply with applicable laws, ordinances, rules, and regulations of any public authority for the safety of persons and property, including requirements of the Washington Department of Safety and Health (DOSH) or the Occupational Safety and Health Act (OSHA) whichever is most stringent, and Division 01 Specification Sections.

#### 1.8 PERMITS AND FEES

A. Obtain and pay for required permits and fees necessary to fully complete work included in the Contract Documents.

#### 1.9 INTENT AND INTERPRETATION

- A. Drawings and Specifications supplement each other, and any details contained in one and not the other shall be included as if contained in both. Items not specifically mentioned in the specifications or noted on the drawings, but which are obviously necessary to make a complete working installation shall be included.
- B. Drawings are partly diagrammatic and do not necessarily show exact location of new piping and existing utilities, unless specifically dimensioned.
- C. Riser and other diagrams are schematic only and do not necessarily show the physical arrangement of equipment. They shall not be used for obtaining quantities or lineal runs of piping.
- D. Grilles, fixtures, or other pieces of equipment shall be centered on windows, wall spaces, or other items, unless specifically dimensioned otherwise.
- E. Location of piping and ductwork shall be checked to determine that it clears openings and structural members; that it may be properly concealed; and that it clears cabinets, lights and equipment having fixed locations.
- F. Mechanical drawings shall serve as working drawings for Division 23 work. Refer to Architectural, Structural, and Electrical drawings for additional detail affecting the installation of work. Architectural drawings shall take precedence over the Mechanical drawings if any dimensional discrepancies exist.
- G. Approximate location of each item is indicated on the drawings. These drawings are not intended to give complete and exact details regarding location. Exact locations are to be determined by actual measurements at the building. Not all pipe and duct offsets are indicated on the drawings.

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### 1.10 SUBMITTAL OF EQUIPMENT FOR APPROVAL

- A. Refer to Division 01 requirements for submittal definitions, requirements, and procedures. Additional requirements are listed below.
- B. Shop drawings, catalog information, and material schedules shall be submitted for approval on materials and equipment prior to ordering.
- C. Submittals not meeting the following requirements will be returned for revision:
  - 1. Provide a cover page for each item or group of items (schedule group, single fixture plus trim group, etc.).
  - 2. Each cover page must be clearly identified with the project name, specification number, and paragraph number.
  - 3. Submittal package must be accompanied by an itemized index listing specification section, paragraph number, item, and manufacturer; larger projects will be index tabbed by specification section with index for each section.

## 1.11 GUARANTEE

A. Guarantee satisfactory operation of material and equipment installed under Division 23. Repair or replace any defective materials, equipment, or workmanship which may show itself within one year from date of Substantial Completion.

## PART 2 - PRODUCTS

## 2.1 GENERAL MATERIALS AND EQUIPMENT REQUIREMENTS

- A. Where more than one manufacturer is listed, provide products of only one manufacturer for each type of product.
- B. Materials used under this Contract, unless specifically noted otherwise, shall be new and of the latest and most current model line produced by the manufacturer. Outdated "new" equipment is not acceptable.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

### 2.2 EQUIPMENT AND MATERIAL SUBSTITUTIONS

- A. Throughout these Contract Documents, various materials, equipment, apparatus, etc., are specified by manufacturer, brand name, type, or catalog number. Such designation is to establish standards of desired quality and construction, and shall be the basis of the bid.
- B. Where more than one manufacturer is listed, and only one manufacturer's catalog number is indicated, that standard of quality and construction shall be maintained by materials supplied by other manufacturer(s).
- C. Substitutions of equipment or materials shall be made only with written prior approval. Prior approval requests must be received at least ten (10) days prior to bid date unless otherwise instructed. Refer to Division 01 Section, "Substitution Procedures" for procedures in requesting substitutions. The Owner or Owner's Representative shall review all substitution requests for final approval.
- D. Acceptance of substitution request signifies manufacturer recognition only. No attempt has been made to check each item as to special features, capacities, or physical dimensions required by this project. Verify requirements before submitting for approval. Acceptance of exact features, sizes, capacities, etc., all of which must meet or exceed design requirements will be determined when submitted during the construction phase.
- E. Substitution request must include manufacturer, specific model number, special features, physical dimensions, and capacities of proposed equipment. Verify requirements before submitting for approval.
- F. The Contractor shall bear full responsibility for substituted equipment and materials, including, but not limited to:
  - 1. Costs.
  - 2. Available space requirements
  - 3. Effect on other trades
  - 4. Changes in electrical requirements
  - 5. Changes in structural requirements.

# PART 3 - EXECUTION

## 3.1 COMMISSIONING

A. At a minimum, comply with requirements of the Washington State Energy Code.

B. Refer to Division 01 Section "Commissioning" for additional requirements.

#### 3.2 COORDINATION

- A. Refer to Division 01 Section "Project Management and Coordination".
- B. Coordinate available space for equipment and systems with other trades. Refer to Architectural, Structural and Electrical Drawings for additional building details necessary for coordination.
- C. Cutting, patching, wiring, finishing or any other work required for relocation of work installed due to interferences between work of the various trades will be at no additional cost to the Owner.

#### 3.3 MANUFACTURER'S INSTRUCTIONS

A. Furnish proper equipment and/or materials required for installation as intended by the manufacturer, for all work described under Division 23. If needed for proper installation or operation, request advice and supervisory assistance from the representative of the specific manufacturer. Manufacturer's published instructions shall be followed for preparing, assembling, installing, erecting, and cleaning manufactured materials or equipment, unless otherwise indicated. Promptly notify the Architect in writing of any conflict between the requirements of the Contract Documents and the manufacturer's directions and obtain the Architect's instructions before proceeding with the work.

#### 3.4 EXAMINATION OF SITE

A. Visit site of proposed work and become familiar with conditions affecting work. Verify measurements at the building before beginning work.

### 3.5 EXISTING UTILITIES AND PIPING

A. Locations of existing concealed lines and connection points have been indicated as closely as possible from available information. Assume that such connection points are within a 10-foot radius of indicated locations. Where connection points are not within this radius, contact the Architect for a decision before proceeding.

## 3.6 LAYING OUT WORK

A. Locations of equipment and devices, as shown on the drawings, are approximate unless dimensioned. Exact locations of such items shall be determined from the Construction Drawings. Verify physical dimensions of each item of mechanical equipment, ductwork system and piping system, to fit available space and promptly notify the Architect prior to roughing-in if conflicts appear. Coordinate equipment to available space and access routes through construction. Offsets or transitions in ductwork or piping systems required for proper system operation and/or installation, whether indicated on drawings or not, shall be provided at no additional cost to Owner.

## 3.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels, and similar information needed for distinct identifications; adequately packaged and protected to prevent damage during shipment, storage, and handling.
- B. Store equipment and materials at the site unless offsite storage is authorized in writing. Protect stored equipment and materials from damage.
- C. Coordinate deliveries of mechanical materials and equipment to minimize construction site congestion. Limit each shipment of materials and equipment to the items and quantities needed for the smooth and efficient flow of installations.

# 3.8 ACCESSIBILITY

A. Install equipment and materials to provide required access for servicing and maintenance. Coordinate location of concealed equipment and devices requiring access with location of access panels and doors. Allow ample space for removal of parts that require replacement or servicing.

## 3.9 TEMPORARY USE OF NEW EQUIPMENT

A. New equipment shall not be used for temporary heating, cooling or ventilation unless authorized in writing by the Owner.

# 3.10 CUTTING AND PATCHING

A. Comply with Division 01 Section, "Execution" for general requirements for cutting and patching.

- B. Cutting shall be performed with masonry saws, core drills or similar equipment to provide neat and uniform openings.
- C. Patching shall match adjacent surfaces in materials and finish. Do not endanger or damage installed work through procedures and processes of cutting and patching.
- D. Arrange for repairs required to restore other work, which was damaged as a result of mechanical installations. Upon receipt of written authorization from Architect, Contractor will be authorized for cutting and patching work that is necessitated by ill-timed, defective, or non-conforming installations.
- E. No additional compensation will be authorized for cutting and patching work that is necessitated by ill-timed, defective, or non-conforming installations.
- F. Perform cutting, fitting, and patching of mechanical equipment and materials required to:
  - 1. Uncover work to provide for installation of ill-timed work.
  - 2. Remove and replace defective work.
  - 3. Remove and replace work not conforming to requirements of the Contract Documents.
  - 4. Remove samples of installed work as specified for testing.
  - 5. Install equipment and materials in existing structures.
  - 6. Upon written instructions from the Architect, uncover and restore work to provide for observation of concealed work.
- G. Cut, remove, and legally dispose of selected mechanical equipment, components, and materials as indicated, including, but not limited to removal of mechanical piping, heating units, and other mechanical items made obsolete by new work.
- H. Protect structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.
- I. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

# 3.11 EXCAVATING AND BACKFILLING

A. Provide trench and pit excavation and backfilling required for mechanical work, inside and outside the building, including repairing of finished surfaces, required shoring, bracing, pumping, and protection for safety of persons and property. The Mechanical Contractor shall remove excess earth resulting from their work from the site. Comply with Local or State safety codes. Check the elevations of the utilities entering and leaving the building. If such elevations require excavations

lower than the footing levels, notify the Architect of such conditions before excavations are commenced. Make the excavations at the minimum required depths to not undercut the footings.

#### 3.12 FILLING, BACKFILLING, AND COMPACTION

- A. General: Remove debris and decayable matter from areas to be filled before proceeding. Use only materials approved by the Architect for fills. Obtain Architect's approval before filling against concrete or masonry walls. Make fills as soon as feasible to insure maximum settlement.
- B. Compaction of Fills: Compact by ASTM D1557, Method "A," 95% density under paved areas and building areas to 10 feet beyond building perimeter, 90% elsewhere. Place fills in lifts which, when compacted, shall not exceed 8-inches in depth and compact with multiple-wheeled pneumatic-tired rollers or other approved methods. Fills made from cuts shall be made and compacted in one operation so that the material is not left exposed to rain while in an uncompacted state.
- C. Fills under Interior Slabs: 4-inches of <sup>3</sup>/<sub>4</sub>-inch to 1<sup>1</sup>/<sub>2</sub>-inches washed gravel, evenly graded. Cover with reinforced Kraft paper. Lap joints 4-inches, turn up 4-inches onto vertical surfaces. Repair any punctures in membrane before pouring concrete.

# SECTION 23 05 05 - PROJECT CLOSEOUT FOR HVAC

### PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS
  - A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to work of this section.
- 1.2 SCOPE OF WORK GENERAL
  - A. This section specifies procedural requirements for HVAC installations project closeout, including but not limited to:
    - 1. Project Record Document submittal.
    - 2. Operation and Maintenance (O&M) Manual submittal.
    - 3. Operation and Maintenance Instruction and Training.
    - 4. HVAC Equipment and Systems Startup.
    - 5. Final Cleaning.
    - 6. Owner Training Session Agenda.
  - B. Related Sections include the following:
    - 1. Division 01 Section, "Submittal Procedures".
    - 2. Division 01 Section "Closeout Procedures".

#### 1.3 PROJECT RECORD DOCUMENTS

- A. Record differences between HVAC work as installed and as shown in Contract Drawings on a set of prints of HVAC drawings furnished by Architect. Return these prints to Architect at completion of project. Notations made on drawings shall be neat and legible. Comply with Division 01 Section requirements.
- B. Mark drawings to indicate revisions to HVAC piping and ductwork, size and location both exterior and interior; including locations of coils, dampers, and other control devices, filters, motors and similar items requiring periodic maintenance; actual equipment locations; concealed equipment and control devices; mains and branches of piping systems, with valves and control devices located and numbered.

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PROJECT CLOSEOUT FOR HVAC

- C. Revise equipment and fixture schedules on the Drawings to indicate actual installed manufacturer and model numbers.
- D. Mark specifications to indicate change orders; actual equipment and materials used.

## 1.4 OPERATION AND MAINTENANCE MANUALS

- A. Prepare and submit Operation and Maintenance (O&M) Manuals for HVAC systems provided. Comply with Division 01 Section requirements.
- B. Provide master index at beginning of Manual showing sections and items included.
- C. Cover section: List name, address, and phone number of Project Architect, General Contractor, Mechanical Engineer, HVAC Contractor, and all HVAC Subcontractors. Provide a list of equipment suppliers with address and phone number.
- D. Provide a separate section for each Section of the Specifications. Provide index for each section listing equipment included. Include all items specified.
- E. Include descriptive literature (manufacturer's catalog data) of each manufactured item. Literature shall show capacities and size of equipment used and be marked indicating each specific item with applicable data underlined. Data sheets shall be originals or clean copies of originals.
- F. One (1) draft copy of the manual shall be submitted for review, comment, and approval, as applicable, at least 15 days prior to substantial completion or training, whichever is first. After approval, submit three (3) copies of manual to Architect for approval unless otherwise directed by Division 01 Section requirements. Information to be included in manual:
  - 1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of all replaceable parts.
  - 2. Manufacturer's printed operating procedures to include startup, break-in, routine, and normal operating instructions; regulation, control, stopping shutdown, and emergency instructions; and summer and winter operating instructions.
  - 3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
  - 4. Servicing instructions and lubrication charts and schedules.
  - 5. Schematic control diagrams for each automatic control system. Mark correct operating setting for each control instrument on these diagrams.
  - 6. Valve schedule indicating the valve symbol (tag number), valve location by room number and description, valve purpose and system served, and valve size. Provide one (1) corresponding set of full-size HVAC prints showing these valve locations for crossreference. A second complete set of valve schedules (8.5 inches x 11 inches) encased in

clear plastic laminate and fitted in an aluminum holding frame shall be furnished to the Owner.

- 7. Testing, Adjusting and Balancing Report.
- 8. Test records and certifications.
- 9. Equipment startup reports.
- 10. Warranty information and letters of guarantee.
- 11. Instruction period checklist for each equipment item.
- G. Complete O&M Manual shall be available for use by Owner's representatives during instruction and training sessions.

#### 1.5 OPERATION AND MAINTENANCE INSTRUCTION AND TRAINING

- A. Instruct Owner's Representative(s) in the Operation and Maintenance procedures described in Operation and Maintenance Manual. Comply with Division 01 Section requirements.
- B. Enlist services of qualified personnel, including each sub-trade and factory trained specialists for each major piece of equipment, to attend training sessions and provide operation and maintenance instructions.
- C. Submit training agenda, schedule, and list of representatives for review 30 days prior to training sessions. Confirm attendance by written notification to all participants.
- D. Prepare checklist of all equipment and systems requiring instruction and maintenance for verification and agreement by the Owner's Representative of satisfactory startup and instruction. Checklist shall include a statement of completion by the Contractor, date and topic(s) covered in each training session, and an attendance list of all participants at each training session. Submit a copy of checklist for review 30 days prior to training sessions. Include copy of the completed checklist in Operation and Maintenance Manual.
- E. Refer to individual Division 23 Sections for additional instruction/training requirements.
- F. All HVAC systems shall be properly functioning prior to instruction period.

### PART 2 - PRODUCT (Not Applicable)

## PART 3 - EXECUTION

### 3.1 HVAC EQUIPMENT AND SYSTEMS STARTUP

- A. Provide the services of a factory-authorized service representative to test and inspect unit installation, provide startup service, and demonstrate and train Owner's maintenance personnel.
- B. Include certification of factory-authorized representative status as part of equipment submittal from manufacturer. Include copies of any installation and startup instructions, manufacturer's checklists, and other forms used in startup as part of the equipment submittal.
- C. Include written startup reports with test data for equipment in Operation and Maintenance Manual.
- D. All construction debris, including electrical wiring debris shall be removed from units prior to equipment startup. Areas surrounding and served by equipment being started must be free of construction debris, sheetrock dust, and any materials that may adversely affect the equipment.

#### 3.2 FINAL CLEANING

- A. Refer to Division 01 general requirements for final cleaning.
- B. At time of final cleanup, clean all fixtures and equipment, and leave in condition for use intended. Vacuum cabinet interiors of control panels, air handling units, etc. to remove all construction debris including electrical wiring debris.

# SECTION 23 05 43 - VIBRATION CONTROL FOR HVAC

# PART 1 - GENERAL

# 1.1 SECTION INCLUDES

- A. Vibration isolation requirements.
- B. Support Bases.
- C. Hangers.
- D. Isolation Pads.
- E. Flexible Duct Connectors.

## 1.2 RELATED REQUIREMENTS

A. Section 03 30 00 – Cast-in-Place Concrete.

# 1.3 REFERENCE STANDARDS

A. ASHRAE (HVACA) – ASHRAE Handbook – HVAC Applications.

## 1.4 SUBMITTALS

- A. See Section 23 05 00 Common Work Results for HVAC for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for products, including materials, fabrication details, dimensions, and finishes.
  - 1. Vibration Isolators: Include rated load capacities and deflections; include information on color coding or other identification methods for spring element load capacities.
- C. Shop Drawings Vibration Isolation Systems:
  - 1. Include dimensioned plan views and sections indicating proposed arrangement of vibration isolators; indicate equipment weights and static deflections.

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VIBRATION CONTROL FOR HVAC

- 2. Vibration-Isolated Equipment Support Bases: Include base weights, including concrete fill where applicable; indicate equipment mounting provisions.
- D. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

## PART 2 - PRODUCTS

# 2.1 VIBRATION ISOLATION REQUIREMENTS

- A. Design and provide vibration isolation systems to reduce vibration transmission to supporting structure from vibration-producing HVAC equipment and/or HVAC connections to vibration-isolated equipment.
- B. Comply with applicable general recommendations of ASHRAE (HVACA), where not in conflict with other specified requirements:
- C. General Requirements:
  - 1. Select vibration isolators to provide required static deflection.
  - 2. Select vibration isolators for uniform deflection based on distributed operating weight of actual installed equipment.
  - 3. Select vibration-isolated equipment support bases and associated vibration isolators to provide minimum 2 inches of operating clearance beneath base unless otherwise indicated.
- D. Each piece of rotating equipment must meet a reasonable criterion for maximum vibration levels at each bearing, while in operation. The criteria for varying operating speeds are given as follows:
  - 1. Peak vibration velocities shall not exceed 0.06 in./sec. If it is discovered that the operating vibration velocities exceed this criterion, the equipment shall be repaired or replaced at no expense to the Owner.

### 2.2 MANUFACTURERS

- A. Basis of Design Product: Subject to compliance with requirements, provide products indicated in this Section or comparable products of one of the following:
  - 1. Mason Industries, Inc.
  - 2. Amber Booth Co.

- 3. Kinetics Noise Control, Inc.
- 4. Vibration Eliminator Co., Inc.
- 5. Vibration Mountings & Controls, Inc.
- B. SUPPORT BASES
- C. B-1 Hanger Rods
  - 1. Base shall consist of four (4) vertical steel hanger rods attached to structure above. Hanger rods shall be sufficient to carry a five (5) times overload without yielding or failure. Unless otherwise specified, hangers H-1 shall be located on all four hanger rods in series with the supported load. Rods shall attach to fan at the support "ears" provided. The fan manufacturer shall supply the fan with these "ears" attached.
    - a. Coordination of the location of the ears and the method of attachment is the responsibility of the vibration isolator manufacturer or its representative.
  - 2. Steel cross-bracing rods shall be provided to base framework above, where vertical hangers are longer than 12 inches to prevent excess motion during startup and operation. Cross-bracing requires isolators if vertical hanger isolators or thrust restraint isolators are mechanically short-circuited. Cross-bracing rods should be threaded to allow adjustment of tension at one end.

## 2.3 HANGERS

- A. H-1 Resilient Hanger
  - 1. Hangers shall consist of a neoprene-in-shear or fiberglass isolator encased in a welded steel bracket. Hangers shall have an operating static deflection of 0.35 inches.
  - 2. Schedule H-1: Mason HD.

## 2.4 ISOLATION PADS

- A. IP-1 Isolation Pad
  - 1. Neoprene and cork sandwich pads shall consist of two (2) layers of ¼-inch-thick neoprene, sandwiching a layer of cork 2-inches-thick. Pads shall be sized to limit surface pressure to 45 psi.
  - 2. Schedule IP-1: Mason Industries NK.

# 2.5 FLEXIBLE DUCT CONNECTORS

- A. Acceptable Manufacturers:
  - 1. Ductmate Industries, Inc.
  - 2. Duro Dyne Corporation.
  - 3. Lambro Industries, Inc.
  - 4. Ventfabrics.
- B. F-1 Flexible Duct Connectors: Fabric crimped into metal edging strip.
  - 1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz. per sq. yd.
  - 2. Net Fabric Width: Approximately 2-inches-wide.
  - 3. Metal: 3 inches wide, 24 gauge, 0.0239-inch-thick galvanized steel.

#### PART 3 - EXECUTION

- 3.1 GENERAL
  - A. Install in accordance with manufacturer's written instructions. Vibration isolators must not cause any change in position of equipment or piping, resulting in piping stresses or misalignment.

#### 3.2 ELECTRICAL CONDUIT ISOLATION

- A. Use flexible electrical conduit to isolate all electrical connections to vibration isolated equipment.
- B. Recommended minimum flex conduit length is 6 feet.

# PART 4 - SCHEDULES

# 4.1 VIBRATION ISOLATION SCHEDULE

Equipment	Mounting	Isolator	Static	Base	Seismic	Flex
	_		Deflection		Snubbers	Connector
Fan Coils	Hung	H-1	0.35 inch	B-1	N/A	F-1
ERV Units	Concrete pad	IP-1	N/A	N/A	N/A	F-1
Condensing Unit	Concrete pad	IP-1	N/A	N/A	N/A	N/A

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## SECTION 23 05 93 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

## PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

A. Testing, adjustment, and balancing of air systems.

## 1.2 RELATED REQUIREMENTS

A. Section 23 08 00 – Commissioning of HVAC.

#### 1.3 REFERENCE STANDARDS

- A. AABC (NSTSB) AABC National Standards for Total System Balance, 7<sup>th</sup> Edition.
- B. ASHRAE Std 111 Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems.
- C. NEBB (TAB) Procedural Standards for Testing Adjusting and Balancing of Environmental Systems.
- D. SMACNA (TAB) HVAC Systems Testing, Adjusting and Balancing.
- E. Washington State Energy Code Commercial Provisions, latest adopted version.

#### 1.4 SUBMITTALS

- A. See Section 23 05 00 Common Work Results for HVAC for submittal procedures.
- B. Installer Qualifications: Submit name of adjusting and balancing agency and TAB supervisor for approval within 30 days after award of Contract.
- C. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
  - 1. Include at least the following in the plan:

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- a. List of all airflow, water flow, sound level, system capacity, and efficiency measurements to be performed and a description of specific test procedures, parameters, and formulas to be used.
- b. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted, and balanced with the data cells to be gathered for each.
- c. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
- d. Final test report forms to be used.
- e. Procedures for formal deficiency reports, including scope, frequency, and distribution.
- D. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
  - 1. Revise TAB plan to reflect actual procedures and submit as part of final report.
  - 2. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect and for inclusion in operating and maintenance manuals.
  - 3. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
  - 4. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
  - 5. Units of Measure: Report data in both I-P (inch-pound) and SI (metric) units.
- PART 2 PRODUCTS (Not Applicable)
- PART 3 EXECUTION
- 3.1 GENERAL REQUIREMENTS
  - A. Perform total system balance in accordance with one of the following:
    - 1. AABC (NSTSB), AABC National Standards for Total System Balance.
    - 2. ASHRAE Std 111, Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems.
    - 3. SMACNA (TAB).
  - B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.
  - C. TAB Agency Qualifications:
- 1. Company specializing in the testing, adjusting, and balancing of systems specified in this section independent of the installing contractors or equipment suppliers for this project.
- 2. Having minimum of five years documented experience of projects of similar scope and complexity.
- 3. Certified by one of the following:
  - a. AABC, Associated Air Balance Council: www.aabc.com; upon completion submit AABC National Performance Guaranty.
  - b. NEBB, National Environmental Balancing Bureau: www.nebb.org.
  - c. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: www.tabbcertified.org.
- D. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.
- E. Pre-Qualified TAB Agencies:
  - 1. Neudorfer Engineers.
  - 2. AirTest Inc.
  - 3. United Test & Balance.
  - 4. TAC Systems.
  - 5. Hardin and Sons.
  - 6. Or approved equal.

### 3.2 EXAMINATION

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
  - 1. Systems are started and operating in a safe and normal condition.
  - 2. Temperature control systems are installed complete and operable.
  - 3. Final filters are clean and in place. If required, install temporary media in addition to final filters.
  - 4. Duct systems are clean of debris.
  - 5. Fans are rotating correctly.
  - 6. Air coil fins are cleaned and combed.
  - 7. Access doors are closed, and duct end caps are in place.
  - 8. Air outlets are installed and connected.

### 3.3 ADJUSTMENT TOLERANCES

A. Air Handling Systems: Adjust to within ±5% of design for supply systems and ±10% of design for return and exhaust systems.

B. Air Outlets and Inlets: Adjust total to within +10% and -5% of design to space. Adjust outlets and inlets in space to within ±10% of design.

#### 3.4 RECORDING AND ADJUSTING

- A. Field Logs: Maintain written logs including:
  - 1. Running log of events and issues.
  - 2. Discrepancies, deficient or uncompleted work by others.
  - 3. Contract interpretation requests.
  - 4. Lists of completed tests.
- B. Ensure recorded data represents actual measured or observed conditions.
- C. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- D. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- E. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

#### 3.5 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.
- B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross-sectional area of duct.
- C. Measure air quantities at air inlets and outlets.
- D. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50% loading of filters.
- E. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.
- F. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.

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#### 3.6 SCOPE

- A. Test, adjust, and balance the following:
  - 1. Air Inlets and Outlets.
  - 2. Fan Coil Units.
  - 3. ERV Units.

### SECTION 23 07 13 - DUCT INSULATION

PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Duct insulation.
- B. Duct liner.
- C. Jacketing and accessories.

### 1.2 REFERENCE STANDARDS

- A. ASTM C518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- B. ASTM C553 Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
- C. ASTM C612 Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
- D. ASTM C916 Standard Specification for Adhesives for Duct Thermal Insulation.
- E. ASTM C1071 Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material).
- F. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
- G. ASTM E96/E96M Standard Test Methods for Water Vapor Transmission of Materials.
- H. ASTM G21 Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
- I. SMACNA (DCS) HVAC Duct Construction Standards Metal and Flexible.
- J. UL 723 Standard for Test for Surface Burning Characteristics of Building Materials.

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#### 1.3 SUBMITTALS

- A. See Section 230500 Common Work Results for HVAC, for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.
- B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

### PART 2 - PRODUCTS

#### 2.1 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

#### 2.2 GLASS FIBER, FLEXIBLE

- A. Manufacturer:
  - 1. CertainTeed Corporation.
  - 2. Johns Manville.
  - 3. Knauf Insulation.
  - 4. Owens Corning Corporation.
- B. Insulation: ASTM C553; flexible, noncombustible blanket.
  - 1. K value: 0.36 at 75°F, when tested in accordance with ASTM C518.
- C. Vapor Barrier Jacket:
  - 1. Kraft paper with glass fiber yarn and bonded to aluminized film.
  - 2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.

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2

- 3. Secure with pressure-sensitive tape.
- D. Vapor Barrier Tape:
  - 1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film with pressuresensitive rubber-based adhesive.

# 2.3 GLASS FIBER, RIGID

- A. Manufacturer:
  - 1. CertainTeed Corporation.
  - 2. Johns Manville.
  - 3. Knauf Insulation.
  - 4. Owens Corning Corporation.
- B. Insulation: ASTM C612; rigid, noncombustible blanket.
  - 1. K Value: 0.24 at 75 degrees F, when tested in accordance with ASTM C518.
  - 2. Maximum Density: 8.0 pcf.
- C. Vapor Barrier Jacket:
  - 1. Kraft paper with glass fiber yarn and bonded to aluminized film.
  - 2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
  - 3. Secure with pressure-sensitive tape.
- D. Vapor Barrier Tape:
  - 1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film with pressuresensitive rubber-based adhesive.

### 2.4 JACKETING AND ACCESSORIES

- A. Aluminum Jacket: ASTM B209/B209M.
  - 1. Thickness: 0.016-inch sheet.
  - 2. Finish: Embossed.
  - 3. Joining: Longitudinal slip joints and 2-inch laps.
  - 4. Fittings: 0.016-inch-thick die-shaped fitting covers with factory-attached protective liner.
  - 5. Metal Jacket Bands: <sup>3</sup>/<sub>8</sub>-inch wide; 0.015-inch-thick aluminum.

### 2.5 DUCT LINER

#### A. Manufacturers:

- 1. CertainTeed Corporation.
- 2. Johns Manville.
- 3. Knauf Insulation.
- 4. Owens Corning Corporation.
- B. Glass Fiber Insulation: Non-corrosive, incombustible glass fiber complying with ASTM C1071; flexible blanket, rigid board, and preformed round liner board; impregnated surface and edges coated with poly vinyl acetate polymer, acrylic polymer, or black composite.
  - 1. Fungal Resistance: No growth when tested according to ASTM G21.
  - 2. Apparent Thermal Conductivity: Maximum of 0.31 at 75°F.
  - 3. Rated Velocity on Coated Air Side for Air Erosion: 5,000 fpm, minimum.
- C. Adhesive: Waterproof, fire-retardant type, ASTM C916.
- D. Liner Fasteners: Galvanized steel, self-adhesive pad with integral head.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Test ductwork for design pressure prior to applying insulation materials.
- B. Verify that surfaces are clean, foreign material removed, and dry.

### 3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards.
- C. External Duct Insulation Application:
  - 1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
  - 2. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.

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- 3. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
- 4. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.
- D. Duct Liner Application:
  - 1. Adhere insulation with adhesive for 90% coverage.
  - 2. Secure insulation with mechanical liner fasteners. Refer to SMACNA (DCS) for spacing.
  - 3. Seal and smooth joints. Seal and coat transverse joints.
  - 4. Seal liner surface penetrations with adhesive.
  - 5. Duct dimensions indicated are net inside dimensions required for airflow. Increase duct size to allow for insulation thickness.
  - 6. For ductwork installed outdoors, provide weatherproof jacket around ductwork. Jacketing to be installed per manufacturer's installation instructions.

Duct Type	Location/Situation	Installed R-Value	Other Requirements
Supply, Return <sup>1</sup>	Outside of Building, Climate Zone 4C	R-8	Weatherproof Jacket
Supply, Return <sup>2</sup>	Unconditioned Space <sup>3</sup>	R-6	
Supply	Conditioned Space <sup>4</sup>	R-3.3	
Supply	Conditioned Space <sup>5</sup>	None	
Supply, Return <sup>6</sup>	Conditioned Space <sup>7</sup>	None	
Return, Exhaust	Conditioned Space <sup>8</sup> Climate Zone 4C	R-8	
Outside Air	Between Exterior and Automatic Shutoff Damper <sup>9</sup>	R-16	See Energy Code For Requirements
Outside Air	Between Automatic Shutoff Damper and HVAC Unit Climate Zone 4C	R-8	
Outside Air	Between Automatic Shutoff Damper and HVAC Unit Climate Zone 5B	R-12	
Outside Air	Between Exterior and Individual Supply Units with Less Than 2800 Cfm Supply	R-7	

# 3.3 DUCT AND PLENUM INSULATION SCHEDULE:

### Notes:

<sup>1</sup> Including return air upstream of an energy recovery media.

<sup>2</sup> Including return air upstream of an energy recovery media.

- <sup>5</sup> Ductwork exposed to view within a zone that serves that zone.
- <sup>6</sup> Including return air upstream of an energy recovery media.
- $^{7}$  Conveying air greater than 55°F and less than 105°F.
- <sup>8</sup> Downstream of an energy recovery media, upstream of an automatic shutoff damper.

<sup>&</sup>lt;sup>3</sup> Not within conditioned space: in attic, in enclosed ceiling space, in walls, in garage, in crawl spaces, in concrete, underground.

<sup>&</sup>lt;sup>4</sup> Conveying supply air less than 55°F or greater than 105°F.

<sup>&</sup>lt;sup>9</sup> Extend building envelope air and vapor control continuously from the building exterior to the automatic shutoff damper.

# SECTION 23 09 13 – INSTRUMENTATION AND CONTROL DEVICES FOR HVAC

### PART 1 - GENERAL

- 1.1 SECTION INCLUDES
  - A. Thermostats:

#### 1.2 REFERENCE STANDARDS

- A. The following codes and standards are referenced in this Section and form a part of this specification to the extent referenced. References and standards listed herein are to be the latest edition available, unless specifically stated otherwise.
  - 1. ASHRAE 135 BACnet<sup>™</sup> A Data Communication Protocol for Building Automation and Control Networks, 2012 edition.
  - 2. RS/EIA/TIA-485 Electrical Characteristics of Generators and Receivers for Use in Balanced Digital Multipoint Systems.
  - 3. IEEE 802.3 IEEE Standard for Ethernet.
  - IEEE 802.11 IEEE Standard for Information Technology--Telecommunications and Information Exchange between Systems – Local and Metropolitan Area Networks – Specific Requirements – Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications.

#### 1.3 SUBMITTALS

- A. See Section 23 05 00 Common Work Results for HVAC for submittal procedures.
- B. Product Data: Provide description and engineering data for each control system component. Include sizing as requested. Provide data for each system component and software module.
- C. Shop Drawings: Indicate complete operating data, system drawings, wiring diagrams, and written detailed operational description of sequences. Submit schedule of valves indicating size, flow, and pressure drop for each valve. For automatic dampers indicate arrangement, velocities, and static pressure drops for each system.
- D. Operation and Maintenance Data: Include inspection period, cleaning methods, recommended cleaning materials, and calibration tolerances.

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- E. Project Record Documents: Record actual locations of control components, including panels, thermostats, and sensors. Accurately record actual location of control components, including panels, thermostats, and sensors.
  - 1. Revise shop drawings to reflect actual installation and operating sequences.
- F. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

# PART 2 - PRODUCTS

# 2.1 BUILDING AUTOMATION SYSTEM – GENERAL DESCRIPTION

- A. Provide an extension of the existing Building Automation System (BAS) to integrate and control all mechanical equipment associated with this project. All new building controllers, and equipment/plant controllers, shall be integrated into the existing BAS.
  - 1. There is an existing BAS is a Delta system.
  - 2. The Building Automation System shall be as indicated on the drawings and described in these specifications. System must be fully integrated and coordinated with mechanical equipment DDC controllers furnished and installed in the equipment manufacturer's factory as specified in those sections. The intent of the BAS is to integrate all mechanical equipment into one system for global monitoring, control, and alarming associated with the building. It is the BAS manufacturer's responsibility to provide all the design, engineering, and field coordination required to ensure all equipment sequence of operations are met as specified and the designated BAS operators have the capability of managing the building mechanical system to ensure occupant comfort while maintaining energy efficiency.
  - 3. The BAS shall meet open standard protocol communication standards (as defined in System Communications Section) to ensure the system maintains "interoperability" to avoid proprietary arrangements that will make it difficult for the Owner to consider other BAS manufacturers in future projects.
  - 4. Direct Digital Control (DDC) technology shall be used to provide the functions necessary for control of mechanical systems and terminal devices on this project.
  - 5. The BAS shall accommodate simultaneous multiple user operation. Access to the control system data should be limited only by the security permissions of the operator role. Multiple users shall have access to all valid system data. An operator shall be able to log onto any workstation on the control system and have access to all appropriate data.
- B. BAS Approved Control System Manufacturer
  - 1. Delta as installed by Delta Connects.

### 2.2 BAS – SYSTEM COMMUNICATION

- A. System Communications
  - 1. Each workstation, building controller, and equipment/plant controller communication interface shall utilize the BACnet<sup>™</sup> protocol with an Ethernet (IEEE 802.3 and IEEE 802.11) or RS485 (TIA/EIA-485) physical interface and an appropriate data link technology as defined in ASHRAE 135 (e.g., BACnet IP, BACnet IPv6, BACnet MS/TP).
  - 2. All system controllers shall be BTL listed as a BACnet Building Controller (B-BC) as defined in ASHRAE 135.
  - 3. All documented status and control points, schedule, alarm, and data-log services or objects shall be available as standard object types as defined in ASHRAE 135.
  - 4. Each System Controller shall communicate with a network of Custom Application and Application Specific Controllers utilizing one or more of the interfaces documented within Field Bus Communications below.
  - 5. For minimally managed IP networks, BACnet communication shall support BACnet Secure Connect (BACnet/SC), a secure and encrypted datalink layer specifically designed for those networks.
- B. Field Bus Communications
  - 1. BACnet™
    - a. All equipment and plant controllers shall be BTL listed as a BACnet Application Specific Controller (B-ASC) or a BACnet Advanced Application Controller (B-AAC) as defined in ASHRAE Standard 135.
    - b. All communication shall conform to ASHRAE 135.
    - c. System Controller shall function as a BACnet router to each unit controller providing a globally unique BACnet Device ID for all BACnet controllers within the system.
    - d. BACnet MS/TP
      - 1) Communication between System Controller and equipment/plant controllers shall utilize BACnet MS/TP as defined in ASHRAE 135.
- C. Variable Refrigerant Flow (VRF) Communications
  - 1. The VRF system shall communicate with the BAS using one of the following communications methods.
    - a. The VRF system and the BAS shall utilize ASHRAE 135 (BACnet) protocol revision 12 or greater.
    - b. Recognizing that VRF manufacturers utilize proprietary protocols to pass information between VRF equipment components. A gateway device is an accepted method to convert proprietary data to BACnet data. BACnet data shall conform to BACnet protocol revision 12 or greater.

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INSTRUMENTATION AND CONTROL DEVICES FOR HVAC

- c. When a device is capable of data exchange with the BACnet protocol across non-IP network segments, the BACnet protocol shall be used to exchange data. If a device does not support the BACnet protocol an alternative protocol may be used. Data exchanged using the alternative protocol shall be converted to the BACnet protocol to allow integration to the BAS.
- 2. To promote BAS interoperability, each instance of the following VRF system components shall be visible to the BAS network as a virtual BACnet device.
  - a. Indoor equipment.
  - b. Outdoor equipment.
  - c. Refrigerant manifold devices.
  - d. Outdoor air ventilation systems.
- 3. Virtual BACnet device functionality shall conform to BACnet protocol revision 12 or greater and meet the minimum functionality defined by BACnet device profile B-ASC.

#### 2.3 BAS – OPERATOR INTERFACE

- A. Provide Building Operator Web Interface
  - 1. Existing operator interface should be reused.

### 2.4 BAS – BUILDING/SYSTEM CONTROLLERS

- A. There shall be one or more independent, standalone microprocessor-based System Controllers to manage the global strategies described in "Controller Software" section.
  - 1. The controller shall provide a USB communications port for connection to a PC.
  - 2. The operating system of the Controller shall manage the input and output communications signals to allow distributed controllers to share real and virtual point information and allow central monitoring and alarms.
  - 3. All System Controllers shall have a real-time clock and shall be able to accept a BACnet time synchronization command for automatic time synchronization.
  - 4. Data shall be shared between networked System Controllers.
  - 5. Serviceability The System Controller shall have a display on the main board that indicates the current operating mode of the controller.
  - 6. Controls manufacturer shall provide secure remote access to the Building Automation System (BAS). Secure remote access shall not require IP ports to be "exposed" (i.e., portforwarded or external public IP addresses) to the Internet. Controls manufacturer shall update secure remote access software as necessary to follow cyber security best practices and respond to cyber security events.

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### 2.5 BAS – CONTROLLER SOFTWARE

- A. Manufacturer shall provide standard applications to deliver HVAC system control. Standard applications include Time of Day Scheduling with Optimal Start/Stop, VAV Air Systems Control, Chiller Plant Control, Historical Trend Logs and Trim and Respond. Manufacturer shall provide system optimization strategies for functions such as fan pressure optimization and ventilation optimization.
- B. Furnish the following applications software for building and energy management. All software applications shall reside and run in the system controllers. Editing of applications shall occur at the building operator interface.
  - 1. Trend Logs
    - a. The system shall harvest trend logs for defined key measurements for each controlled HVAC device and HVAC application. Trend logs shall be captured for a minimum of 5 key operating points for each piece of HVAC equipment and HVAC application and stored for no less than 1 year at 15-minute intervals. Data Logs shall be capable of being configured on an interval or change of value basis.

### 2.6 TEMPERATURE AND CO2 SENSORS

- A. Basis of Design: Network sensors as manufactured by Delta Controls. A universal input and temperature sensor with humidity, CO2, and motion options. Option with no local display shall be provided.
  - 1. Features:
    - a. Native BACnet firmware.
    - b. Multiple button and slider layout options. Custom button design available through Partner Applications Services (PAS).
    - c. Support for custom button and screen interactions through GCL+ programming.
    - d. Support for local scheduling, trending, and alarming.
    - e. USB Service port, software enabled or disabled. Service tool not required.
    - f. Smartphone and tablet integration and setup using NFC technology.
    - g. 2-piece design with tamper set screw lock.
  - 2. Input: Universal Input (12-bit), software configurable for: 0 to 5 VDC, 0 to 10 VDC, 10 kOhm Thermistor Dry Contact. Quantity: One.
  - 3. Temperature: Digital Temperature Sensor, plus or minus 0.36 degrees F.
  - 4. CO2 Sensor: Dual Beam, Self-Calibrating NDIR Detection.
    - a. Range: 0 to 2000 ppm.
    - b. Accuracy at 77 degrees F:

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- 1) Plus or minus 50 ppm plus 2 percent of value.
- c. Temperature Dependence: 1 ppm per degree F (2 ppm per degree C) typical.
- d. Pressure Dependence: 0.13 percent of reading per mm Hg.
- e. Stability: 20 ppm per year (typical)
- 5. Connectors: Screw-type terminal connectors
- 6. Wiring Class: mClass 2 / SELV.
- 7. Power:
  - a. 24 VAC/DC.
  - b. 4 VA / 1.2 W.
- 8. Communications:
  - a. RS-485 port.
  - b. BACnet MS/TP (up to 76800 bps).
- 9. USB Service Port: Used as virtual Com port to connect the BACnet network to a workstation.
- 10. Near Field Communication (NFC): Passive 2-way short range.
- 11. Ambient:
  - a. Temperature: 32 top 131 degrees F (0 to 55 degrees C).
  - b. Relative Humidity, Non-Condensing: 10 to 90 percent.
- 12. IP Rating: IP20.
- 13. Compliance.
  - a. CE.
  - b. FCC Class B.
  - c. UL 916 Listed.

#### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Check and verify location of thermostats with plans and room details before installation. Locate 60 inches above floor. Align with lighting switches and humidistats. See Section 26 27 26.
- C. Provide conduit and electrical wiring in accordance with Section 26 05 83. Electrical material and installation shall be in accordance with appropriate requirements of Division 26.

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# SECTION 23 31 00 - HVAC DUCTS AND CASINGS

### PART 1 - GENERAL

### 1.1 SECTION INCLUDES

- A. Metal ductwork.
- B. Manufactured ductwork and fittings.

# 1.2 REFERENCE STANDARDS

- A. ASTM A653/A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- B. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
- C. NFPA 90A Standard for the Installation of Air-Conditioning and Ventilating Systems.
- D. SMACNA (DCS) HVAC Duct Construction Standards Metal and Flexible.

### 1.3 SUBMITTALS

A. None

### PART 2 - PRODUCTS

### 2.1 DUCT ASSEMBLIES

- A. Regulatory Requirements: Construct ductwork to comply with NFPA 90A standards.
- B. Ducts: Galvanized steel, unless otherwise indicated.
- C. Low Pressure Supply (Heating Systems): 1-inch wg pressure class, galvanized steel.
- D. Low Pressure Supply (System with Cooling Coils): 1-inch wg pressure class, galvanized steel.

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#### HVAC DUCTS AND CASINGS

- E. Return and Relief: 1-inch wg pressure class, galvanized steel.
- F. General Exhaust: 1-inch wg pressure class, galvanized steel.

### 2.2 MATERIALS

- A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.
- B. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
  - 1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
  - 2. VOC Content: Not more than 250 g/L, excluding water.
  - 3. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.
- C. Gasket Tape: Provide butyl rubber gasket tape for a flexible seal between transfer duct connector (TDC), transverse duct flange (TDF), applied flange connections, and angle rings connections.
- D. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

### 2.3 DUCTWORK FABRICATION

- A. Fabricate and support in accordance with SMACNA (DCS) and as indicated.
- B. Construct tees, bends, and elbows with radius of not less than 1.5 times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide air foil turning vanes of perforated metal with glass fiber insulation.
- C. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- D. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).

# 2.4 MANUFACTURED DUCTWORK AND FITTINGS

1. Spiral Ducts: Round spiral lockseam duct with galvanized steel outer wall.

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- a. Manufacture in accordance with SMACNA (DCS).
- 2. Round Ducts: Round lockseam duct with galvanized steel outer wall.
  - a. Manufacture in accordance with SMACNA (DCS).

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install, support, and seal ducts in accordance with SMACNA (DCS).
- B. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- C. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.
- D. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

### KIRKLAND CITY HALL – VIRTUAL SERVICE CENTER CONTRACT DOCUMENTS

SECTION 23 34 33 - AIR CURTAINS

PART 1 - GENERAL

- 1.1 SECTION INCLUDES
  - A. Air curtains.

# 1.2 RELATED SECTIONS

- A. Section 05 50 00 Metal Fabrications: Concealed steel support members.
- B. Section 06 10 00 Rough Carpentry.
- C. Section 05 41 00 Structural Metal Studs.
- D. Section 07 62 00 Sheet Metal Flashing.
- E. Section 07 92 00 Joint Sealants.
- F. Section 08 10 00 Metal Doors and Frames.
- G. Section 08 33 00 Overhead Coiling Doors.
- H. Section 08 42 00 Entrance Doors.

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I. Section 26 05 00 – Equipment Wiring: Connections to building power distribution.

### 1.3 REFERENCE STANDARDS

- A. AHRI 410-2001 Standard for Forced-Circulation Air-cooling and Air-Heating Coils.
- B. AMCA 211 Certified Ratings Program Product Rating Manual for Fan Air Performance: Certified.
- C. ASTM A240/A240M -10 Standard Specification for Chromium and Chromium.
- D. ASTM A591/A591M Standard Specification for Steel Sheet, Electrolytic Zinc-Coated, for Light Coating Weight Applications.
- E. ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- F. ASTM A879/A879M -06 Standard Specification for Steel Sheet, Zinc Coated by the Electrolytic Process for Application Requiring Designation of the Coating Mass on Each Surface.
- G. ETL.
- H. UL 507 UL Standard for Safety Electric Fans Intertek Testing Services Listed for US and Canada.
- I. NFPA 70 NEC National Electric Code.
- J. UL 2021(US) and CSA 22.2 (Canada) Standards
- K. U.S. Green Building Council, LEED Building Design and Construction (BD+C) Version 4.0 Rating System. (LEED v4.0).

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#### 1.4 SUBMITTALS

- A. Submit under provisions of Section 23 05 00 Common Work Results for HVAC.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.
- C. Shop Drawings: Include plans, elevations, sections, and details, indicating dimensions, tolerances, materials, fasteners, hardware, finish, piping, electrical wiring diagrams, options, and accessories.
- D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, two samples, minimum size 6.25 inches (160 mm) square, representing actual product, color, and patterns.
- F. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- G. Operation and Maintenance Manual: Submit manufacturer's operation and maintenance manual, including operation, maintenance, adjustment, and cleaning instructions, troubleshooting guide, parts list, and electrical wiring diagrams.

### 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Minimum ten years documented experience producing the products specified in this Section
- B. Installer Qualifications: Minimum five years documented experience installing products specified in this Section.

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- C. Standards Compliance and Certification:
  - 1. Meets NEC and CEC tested by ETL.
  - 2. Certified to conform to UL 2021(US) and CSA 22.2 (Canada) Standards.
  - 3. UL/CUL listed.
  - 4. Electrical components UL/CUL listed.

# 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store in a dry, heated storage area until installation of products.
- C. Protect materials and finish from damage during handling and installation.

### 1.7 SEQUENCING

- A. Ensure that locating templates and other information required for installation of products of this section are furnished to affected trades in time to prevent interruption of construction progress.
- B. Coordinate the installation of wiring and control switches for air curtains with the openings and the hardware provided for such openings.
- C. Install after doors, walls, ceilings, and other adjacent surfaces are finished and painted.

### 1.8 WARRANTY

A. Standard five-year limited parts warranty for unheated units against defects in workmanship and material.

SECTION 23 34 33

B. Standard 18-month limited parts warranty for heated units against defects in workmanship and materials.

# PART 2 - PRODUCTS

# 2.1 MANUFACTURER

A. Acceptable Manufacturer: Mars Air Systems, Berner, Powered Aire or approved equal.

#### 2.2 AIR CURTAIN ASSEMBLIES

- A. Motor Fan Assembly: Design for easy removal, assembly, repair, and maintenance.
  - 1. Motor: Totally enclosed air over (TEAO) cooled motor with sealed lifetime pre-lubricated ball bearings, motor starter, and thermal overload protection.
    - a. Wired for single speed operation.
    - b. Provide wash-down type motors, NEC IP-54 for the locations indicated.
    - c. Provide explosion-proof type motors, NEC Class 1, Division 1, Group D for the locations indicated.
    - d. Meets NEC. ETL Listed to conform to UL 507 (US) Standards. AMCA 211 Certified.
  - 2. Fans: Forward curved centrifugal type, double width, and double inlet design, directly driven to an electric motor.
    - a. Provide resilient isolation dampening mountings between motor frame and motor mounting pan.
    - b. Factory balanced blower wheel assembly statically and dynamically.
- B. Housing: Self-contained one-piece type for units up to 72 inches in length with sufficient strength for mounting from pre-punched mounting holes at both ends to ceiling without intermediate support. Units longer than 72-inches shall be two units tandem mounted next to each other.

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- 1. Size:
  - a. Unheated: 26 inches deep by 15<sup>1</sup>/<sub>2</sub>inches high by width of unit.
- 2. Mounting:
  - a. Unheated Inside Mount.
- 3. Material:
  - a. Provide T5052 20-gauge aluminum conforming to ASTM B209 and 20-gauge electro or hot-dipped galvanized steel sheet housing conforming to ASTM A591 and/or ASTM A653.
  - b. Provide Type 304 stainless steel housing with brushed finish. ASTM A240/A240M.
- 4. Air Inlet Grille and/or Filters: Provide air inlet grille and/or filters specified.
- 5. Discharge: Provide integral discharge nozzle specified.
- 6. Finish and Color: Provide with no VOC, corrosion-resistant polyurethane powder-coated finish for sheet metal housings.
- C. Environmental Air Curtains: Internal mounted models for heights up to 12 feet for environmental separation and temperature control and up to 10 feet for flying insect control.
  - 1. Discharge Nozzle: Adjustable air foil vanes with a ±40-degree sweep front to back.
  - 2. Air Speed at Floor: Minimum of 400 fpm at 3 feet from the floor.
  - 3. Air Inlet Grille and Filters:
    - a. Location: Bottom/
      - 1) Filter: Cleanable polyester filter, 1 inch.
    - b. Type: Fixed air intake grille
      - 1) Filter: Aluminum mesh, <sup>1</sup>/<sub>4</sub>-inch, washable.
    - c. Type: Filter Only as follows:
      - 1) Filter: Flat bank 1 inch, disposable.
      - 2) Filter: Aluminum mesh, <sup>1</sup>/<sub>4</sub>- inch, washable.

# 2.3 COMPONENTS

- A. Door-Activated Limit Switch(es): Provide, field installed 250-Volts, 20 amps limit switch to control air curtain(s) as follows: automatic on/off control, activates air curtain when door is opened and turns off when door is closed. Provide limit switch for direct control one 1 HP or up to two ½ HP single phase motors without a separate control panel. Provide a separate control panel for three-phase motors and/or units exceeding 1 HP, 250 volts, or 20 amps controlled by a limit switch.
  - 1. Type: Combination plunger/roller switch for swing and sliding doors.
    - a. Provide limit switches with NEMA 4X (10 amps) ratings in locations indicated.
    - b. indicated.
  - 2. Operation for Unheated Units: Automatic on/off control, on when door is opened, off when door is closed.
- B. Provide mounting hardware as required for the opening.

### PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that required utilities are in correct location and are of correct capacities for specified products.
- B. Verify openings to receive air curtains are plumb, level, square, accurately aligned, correctly located, and in tolerance.
- C. Examine surfaces to receive air curtains. If surface preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

#### 3.2 INSTALLATION

- A. Install air curtains in accordance with approved shop drawings and manufacturer's printed installation instructions.
- B. Install air curtains plumb, level, square, true to line, and weathertight, without warp or rack.
- C. Anchor air curtains securely in place to supports.
- D. Coordinate with sheet metal flashing as specified in Division 07.
- E. Install joint sealants as specified in Division 07.
- F. Coordinate with electrical power as specified in Division 26.
- G. Install door limit switches and adjust for correct operation.

#### 3.3 FIELD QUALITY CONTROL

- A. Adjust air curtains to function properly.
- B. Adjust air foil vanes located within the discharge nozzle as required for prevailing conditions at each opening.
- C. Check heated air curtain performance on a calm day by measuring air temperature 6 inches off the floor. Optimal reading is halfway between the temperature inside and outside the building.

### 3.4 CLEANING

- A. Clean air curtains promptly after installation in accordance with 'manufacturer's instructions.
- B. Repair minor damages to finish in accordance with manufacturer's instructions and as approved by Architect.
- C. Remove and replace damaged components that cannot be successfully repaired as determined by Architect.

# 3.5 PROTECTION

A. Protect materials and finish from damage until substantial completion.

# SECTION 23 34 39 - HIGH-VOLUME, LOW-SPEED PROPELLER FANS

### PART 1 - GENERAL

- 1.1 SECTION INCLUDES
  - A. High-volume, low-speed propeller fans.

#### 1.2 REFERENCE STANDARDS

- A. NEMA 250 Enclosures for Electrical Equipment (1000 Volts Maximum).
- B. UL 507 Electric Fans.

#### 1.3 SUBMITTALS

- A. See Section 23 05 00 Common Work Results for HVAC for submittal procedures.
- B. Product Data: Provide data on fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels at rated capacity, and electrical characteristics and connection requirements.

# PART 2 - PRODUCTS

- 2.1 GENERAL REQUIREMENTS
  - A. UL Compliance: UL listed and labeled, designed, manufactured, and tested in accordance with UL 507.
  - B. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

# 2.2 HIGH-VOLUME, LOW-SPEED PROPELLER FANS

#### A. Manufacturers:

- 1. Big Ass Fans, Inc.
- 2. Hunter Fan International.
- 3. Greenheck.
- B. Shafts and Bearings:
  - 1. Fan Shaft:
    - a. Ground and polished steel with anti-corrosive coating.
    - b. First critical speed at least 25% over maximum cataloged operating speed.
  - 2. Bearings:
    - a. Permanently sealed or pillow block type.
    - b. Minimum  $L_{10}$  life in excess of 100,000 hours (equivalent to  $L_{50}$  average life of 500,000 hours), at maximum cataloged operating speed.
    - c. 100% factory tested.
- C. Disconnect Switches:
  - 1. Factory mounted and wired.
  - 2. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
  - 3. Finish for Painted Steel Enclosures: Provide manufacturer's standard unless otherwise indicated.
  - 4. Positive electrical shutoff.
  - 5. Wired from fan motor to junction box installed within motor compartment.

# PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Secure fan with stainless steel lag screws to structure.

# SECTION 23 37 00 - AIR OUTLETS AND INLETS

# PART 1 - GENERAL

### 1.1 SECTION INCLUDES

- A. Diffusers:
  - 1. Wall-mounted supply diffusers
- B. Registers/grilles:
  - 1. Ceiling-mounted, egg crate exhaust and return register/grilles.
  - 2. Wall-mounted return grilles
- C. Duct-mounted supply registers/louvers.
- 1.2 REFERENCE STANDARDS

# 1.3 SUBMITTALS

- A. See Section 23 05 00 Common Work Results for HVAC, for submittal procedures.
- B. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

# PART 2 - PRODUCTS

# 2.1 MANUFACTURERS

- A. Carnes, a division of Carnes Company Inc.
- B. Hart & Cooley, Inc.
- C. Krueger-HVAC.

#### SECTION 23 37 00

AIR OUTLETS AND INLETS

- D. Price Industries.
- E. Titus, a brand of Air Distribution Technologies.
- F. Tuttle and Bailey.

### 2.2 WALL-MOUNTED SUPPLY DIFFUSERS

- A. Aluminum supply grilles shall be the sizes shown on the plans and air terminal schedule. The deflection blades shall be available parallel to the long dimension of the grille or register. Construction shall be of aluminum with a 1¼-inch wide border on all sides. Sizes 24 x 24 inches and below shall have roll-formed borders with a minimum thickness of 0.032 inch. Screw holes shall be countersunk for a neat appearance.
- B. Blades shall be spaced on <sup>3</sup>/<sub>4</sub>-inch centers. Blades shall have friction pivots on both sides to allow individual blade adjustment without loosening or rattling or be inserted through the frame and held tight with steel friction wire interlocked to the frame on both ends of each side. Plastic blade pivots are not acceptable.
- C. Optional opposed blade volume damper shall be constructed of heavy gauge steel or aluminum. Damper must be operable from the face of the grille.
- D. The manufacturer shall provide published performance data for the grille. The grille shall be tested in accordance with ANSI/ASHRAE Standard 70-1991.

### 2.3 DUCT-MOUNTED SUPPLY REGISTERS/LOUVERS

A. Type: Duct-mounted, rectangular register for round-spiral duct with adjustable pivot-ended blades, end caps, built-in volume damper, and dual cover flanges to lay flush on duct surface regardless of diameter. Performance to match manufacturer's catalog data.

### 2.4 CEILING EGG CRATE EXHAUST AND RETURN GRILLES

- A. Type: Egg crate style face consisting of  $\frac{1}{2}$ -inch by  $\frac{1}{2}$ -inch by  $\frac{1}{2}$ -inch grid core.
- B. Fabrication: Grid core consists of aluminum with mill aluminum finish.
- C. Color: To be selected by Architect from manufacturer's standard range.
- D. Frame: 1<sup>1</sup>/<sub>4</sub>-inch margin with countersunk screw mounting for surface mounting.

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#### AIR OUTLETS AND INLETS

E. Frame: Channel lay-in frame for suspended grid ceilings.

#### 2.5 WALL-MOUNTED RETURN GRILLES

- A. Steel return grilles shall be the sizes shown on the plans and air terminal schedule. The fixed deflection blades shall be available parallel to the long or short dimension of the grille. Construction shall be of steel with a 1¼-inch wide border on all sides. Screw holes shall be countersunk for a neat appearance. Corners shall be welded with full penetration resistance welds.
- B. Blades shall be firmly held in place by mullions from behind the grille and fixed to the grille by welding in place. Blade deflection angle shall be available at 35°.
- C. The manufacturer shall provide published performance data for the grille. The grille shall be tested in accordance with ANSI/ASHRAE Standard 70-1991.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Check location of outlets and inlets and make necessary adjustments in position to comply with architectural features, symmetry, and lighting arrangement.
- C. Provide balancing dampers on duct takeoff to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.
- D. Install louver assembly in accordance with manufacturer's instructions.
- E. Coordinate with installation of flashings by others.
- F. Install louvers level and plumb.
- G. Set sill members and sill flashing in continuous bead of sealant.
- H. Align louver assembly to ensure moisture shed from flashings and diversion of moisture to exterior.
- I. Secure louver frames in openings with concealed fasteners.

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AIR OUTLETS AND INLETS

J. Coordinate with installation of mechanical ductwork.

# SECTION 23 72 26 - OUTDOOR ENERGY RECOVERY VENTILATORS

### PART 1 - GENERAL

- 1.1 SECTION INCLUDES
  - A. Energy recovery ventilators.
- 1.2 REFERENCE STANDARDS
  - A. AHRI 1060 (I-P) Performance Rating of Air-to-Air Exchangers for Energy Recovery Ventilation Equipment.
  - B. ASHRAE Std 52.2 Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.
  - C. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
  - D. NFPA 70 National Electrical Code.
  - E. UL 723 Standard for Test for Surface Burning Characteristics of Building Materials.

### 1.3 SUBMITTALS

- A. See Section 23 05 00 Common Work Results for HVAC, for submittal procedures.
- B. Product Data: Manufacturer's installation instruction, product data, and engineering calculations.
- C. Shop Drawings: Show design and assembly of energy recovery unit and installation and connection details.

# PART 2 - PRODUCTS

#### 2.1 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

#### 2.2 MANUFACTURERS

- A. Energy Recovery Ventilators:
  - 1. Greenheck Fan Corporation
  - 2. Oxygen8
  - 3. RenewAire.
  - 4. Ruskin Company.

#### 2.3 GENERAL

A. Air-to-air energy recovery ventilators shall be fully assembled at the factory and consist of a fixedplate crossflow heat exchanger with no moving parts, an insulated double wall painted 20-gauge steel cabinet, outdoor air hood with bird screen, motorized supply air damper, backdraft outside air damper, filter assemblies for both intake and exhaust air, enthalpy core, supply air blower assembly, motorized exhaust air damper, exhaust air hood, exhaust air blower assembly, and electrical control box with all specified components and internal accessories factory installed and tested and prepared for single-point high voltage connection. The entire unit, except for fieldinstalled components, shall be assembled and test operated at the factory.

### 2.4 CABINET

- A. Materials: Formed double wall insulated metal cabinet, fabricated to permit access to internal components for maintenance.
- B. Outside casing: 20-gauge, painted components as supplied by the factory shall have polyester urethane paint on 20-gauge G90 galvanized steel.
- C. Access doors shall be hinged with airtight closed cell foam gaskets. Door pressure taps, with captive plugs, shall be provided for cross-core pressure measurement allowing for accurate airflow measurement.
- D. Unit shall have factory-installed duct flanges on all duct openings.

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- E. Cabinet Insulation: Unit walls and doors shall be insulated with 1-inch, 4-pound density, foil/scrim faced, high density fiberglass board insulation, providing a cleanable surface and eliminating the possibility of exposing the fresh air to glass fibers, and with a minimum R-value of 4.3 (hr.-ft.<sup>2</sup>-°F/BTU).
- F. Enthalpy Core: Energy recovery core shall be of the total enthalpy type, capable of transferring both sensible and latent energy between airstreams. Latent energy transfer shall be accomplished by direct water vapor transfer from one airstream to the other, without exposing transfer media in succeeding cycles directly to the exhaust air and then to the fresh air. No condensate drains shall be allowed. The energy recovery core shall be designed and constructed to permit cleaning and removal for servicing. The energy recovery core shall have a ten-year warranty. Performance criteria are to be as specified in AHRI 1060.
- G. Control Center/Connections: Energy recovery ventilator (ERV) shall have an electrical control center where all high and low voltage connections are made. Control center shall be constructed to permit single-point high voltage power supply connections to the non-fused disconnect.
- H. Passive Frost Control: The ERV core shall perform without condensing or frosting under normal operating conditions (defined as outside temperatures above -10°F and inside relative humidity below 40%). Occasional more extreme conditions shall not affect the usual function, performance, or durability of the core. No condensate drains will be allowed.
- I. Motorized and Backdraft Isolation Damper(s): Shall be of an AMCA Class I low leakage type and shall be factory installed.

### 2.5 BLOWER SECTION

- A. Blower Section Construction, Supply Air, and Exhaust Air: Blower assemblies consist of a motor in the voltage as indicated on the drawings, and a direct driven backward-inclined blower.
- B. Blower Assemblies: Shall be statically and dynamically balanced and designed for continuous operation at maximum rated fan speed and horsepower.

# 2.6 MOTORS

A. Blower motors shall be Premium Efficiency, EISA compliant for energy efficiency. The blower motors shall be totally enclosed (TEFC) and shall be supplied with factory-installed motor starters.

### 2.7 FILTERS

A. Exhaust and Fresh Air Streams: Provide filtration as indicated on the equipment schedule.

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#### 2.8 POWER AND CONTROLS

- A. Provide single-point field connection to power supply.
- B. Provide with factory installed controller with the ability to meet the points list and sequence of operation on the drawings.
- C. Provide non-fused main disconnect integral to control panel.
- D. Install wiring in accordance with NFPA 70.

# PART 3 - EXECUTION

#### 3.1 EXAMINATION

A. Verify that structure is ready for installation of unit, that openings in deck for ductwork, if required, are correctly sized and located, and that mechanical and electrical utilities supplying unit are of correct capacities and are accessible.

#### 3.2 INSTALLATION

- A. Provide openings for suitable ductwork connection.
- B. Secure to housekeeping pad per manufacturer's installation requirements.
- C. Install per manufacturer's installation instructions.

#### 3.3 CLEANING

A. Clean filters, air plenums, and interior and exposed-to-view surfaces prior to Substantial Completion.

# SECTION 23 81 29 - VARIABLE REFRIGERANT VOLUME HVAC SYSTEM

# PART 1 - GENERAL

# 1.1 SECTION INCLUDES

- A. Variable refrigerant volume HVAC system includes:
  - 1. Outdoor/Condensing unit(s):
    - a. Indoor/evaporator units.
    - b. Branch selector units.
    - c. Refrigerant piping.
    - d. Control panels.
    - e. Control wiring.

# 1.2 RELATED REQUIREMENTS

A. Section 23 05 00 – Common Work Results for HVAC.

# 1.3 SUBMITTALS

- A. See Section 23 05 00 Common Work Results for HVAC for submittal procedures.
- B. Pre-Bid Submittals: For proposed substitute systems/products, as defined in PART 2, and alternate systems/products, as defined above, proposer shall submit all data described in this article, under the terms given for substitutions stated in PART 2.
- C. Product Data: Submit manufacturer's standard data sheets showing the following for each item of equipment, marked to correlate to equipment item markings indicated in Contract Documents:
  - 1. Control Panels: Complete description of options, control points, zones/groups.
- D. Shop Drawings: Installation drawings custom-made for this project; include as-designed HVAC layouts, locations of equipment items, refrigerant piping sizes and locations, condensate piping sizes and locations, remote sensing devices, control components, electrical connections, control wiring connections. Include:
  - 1. Detailed piping diagrams, with branch balancing devices.
  - 2. Condensate piping routing, size, and pump connections.

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- 3. Detailed power wiring diagrams.
- 4. Detailed control wiring diagrams.
- 5. Locations of required access through fixed construction.
- 6. Drawings required by manufacturer.
- E. Design Data:
  - 1. Provide design calculations showing that system will achieve performance specified.
  - 2. Provide design data required by ASHRAE Std 90.1 I-P.
- F. Sustainable Design Documentation: Submit manufacturer's product data on refrigerant used, showing compliance with specified requirements.
- G. Operating and Maintenance Data:
  - 1. Manufacturer's complete standard instructions for each unit of equipment and control panel.
  - 2. Custom-prepared system operation, troubleshooting, and maintenance instructions and recommendations.
  - 3. Identification of replaceable parts and local source of supply.
- H. Warranty: Executed warranty, made out in Owner's name.
- I. Project Record Documents: Record the following:
  - 1. As-installed routing of refrigerant piping and condensate piping.
  - 2. Locations of access panels.
  - 3. Locations of control panels.

# 1.4 QUALITY ASSURANCE

- A. MANUFACTURER QUALIFICATIONS:
  - 1. A National Recognized Testing Laboratory (NRTL) shall test the units, in accordance with ANSI/UL 1995 Heating and Cooling Equipment and bear the Listed Mark.
  - 2. All wiring shall be in accordance with the National Electric Code (NEC).
  - 3. The system will be produced in an ISO 9001 and ISO 14001 facility, which are standards set by the International Standard Organization (ISO). The system shall be factory tested for safety and function.
  - 4. The condensing unit will be factory charged with R410A.

# 1.5 DELIVERY, STORAGE AND HANDLING

A. Unit shall be stored and handled according to the manufacturer's recommendations.

#### 1.6 WARRANTY

A. Manufacturer shall warrant original owner of the building for a period of 1 year.

# PART 2 - PRODUCTS

# 2.1 MANUFACTURERS

A. Daikin, Mitsubishi, LG, Samsung, or approved equal.

# 2.2 HVAC SYSTEM DESIGN

- A. System Description:
  - 1. The variable capacity heat pump air conditioning system shall be a Variable Refrigerant Flow Series system as specified.
  - 2. The system shall consist of multiple evaporators using PID control, joints and headers, a two-pipe refrigeration distribution system and condenser unit.
  - 3. The condenser shall be a direct expansion (DX), air-cooled heat pump, multi-zone airconditioning system with variable speed inverter driven compressors using R-410A refrigerant.
  - 4. The condensing unit may connect an indoor evaporator capacity up to 200% of the condensing unit capacity. All zones are each capable of operating separately with individual temperature control.
  - 5. Operation of the system shall permit either cooling or heating of all the indoor units simultaneously. Each indoor unit or group of indoor units shall be able to provide set temperature independently via a local remote controller, an Intelligent Manager, an Intelligent Controller, or a BMS interface.

# B. System Features

- 1. Voltage Platform Heat pump condensing units shall be available with a 460V/3ph/60Hz power supply.
- 2. System shall be capable of connecting to multiple fan coils paired with Daikin Communicating gas furnaces allowing for options of gas or heat pump heating to optimize operational costs.

- 3. The system shall be able to switch between heat pump heating and gas furnace heating at a field selectable change-over temperature which can be configured via condensing unit field settings.
- 4. Each system shall be able to enlarge from single to dual module or dual to triple module without the need for installed main pipe size changes. The manufacturer shall provide predefined pipe sizes and design rules ensuring reliable system operation and offering design flexibility in phased installation applications.
- 5. Stable Operation: System shall provide stable inverter operation at varied ambient conditions.
- 6. Auto Changeover: System shall, below the field-selected outdoor ambient temperature, provide signal to initiate auxiliary or back up heat.
- 7. Independent Control: Each indoor unit shall use a dedicated electronic expansion valve with 2,000 positions for independent control.
- 8. VFD Inverter Control and Variable Refrigerant Temperature: Each condensing unit shall use high-efficiency, variable speed all "inverter" compressor(s) coupled with inverter fan motors to optimize part load performance. The system capacity and refrigerant temperatures shall be modulated automatically to set suction and condensing pressures while varying the refrigerant volume for the needs of the cooling or heating loads. The control will be automatic and customizable depending on load and weather conditions.
  - a. Indoor shall use PID to control superheat to deliver a comfortable room temperature condition and optimize efficiency.
- 9. Configurator Software: Each system shall be available with configurator software package to allow for remote configuration of operational settings and for assessment of operational data and error codes.
  - a. If this software is not provided by an alternate manufacturer, for each individual outdoor unit, the contractor shall do the settings manually and keep detailed records for future maintenance purposes.
- 10. Independent Control: Each indoor unit shall use a dedicated electronic expansion valve for independent control.
- 11. Flexible Design:
  - a. Systems shall be capable of up to 500 feet equivalent of linear piping between the condensing unit and furthest located indoor unit.
  - b. Systems shall be capable of up to 3,000 feet total "one-way" piping in the piping network.
  - c. Systems shall be capable of 98 feet vertical separation between indoor units.
  - d. Condensing units shall be supported with a fan motor ESP up to 0.32-inch w.g. as standard to allow connection of discharge ductwork and to prevent discharge air short circuiting.
- 12. Oil Return: Each system shall be furnished with a centrifugal oil separator and active oil recovery cycle.
- 13. Simple Wiring: Systems shall use 16/18 AWG, two-wire, stranded, non-shielded and non-polarized daisy chain control wiring.

- 14. Outside Air: Systems shall provide outside air capability.
- 15. Each condensing unit shall include a multi-functional digital display that can provide system operation status such as operating refrigerant temperatures, pressures, outdoor electronic expansion valve opening, and compressor operation time.
- 16. Each condensing unit shall include a service window that can provide easy access to system field settings and operation status without completely removing the condensing unit panel.
- 17. Advanced Diagnostics: Systems shall include a self-diagnostic, auto-check function to detect a malfunction and display the type and location.
- 18. Advanced Controls: Each system shall have at least one remote controller capable of controlling up to 16 indoor units.
- 19. Each system shall be capable of integrating with open protocol BACnet and LONWorks building management systems.
- 20. The condensing unit shall have configurable settings for intermittent fan operation to help minimize snow accumulation on fan blades when the system is off.
- 21. Cooling Operation:
  - a. The operating range in cooling will be 23°F DB ~ 122°F DB.
  - b. Cooling mode indoor room temperature range will be 57-77°FWB.
  - c. Cooling operation may be extended down to 10°F DB.
- 22. Heating Operation:
  - a. The operating range in heating will be -4°F WB 60°F WB (-20°CWB 15.5°CWB).
  - b. Heating mode indoor room temperature range will be 59°FDB 80°F DB (15°CDB 26.7°CDB).
- C. Electrical:
  - 1. The power supply to the condensing unit shall be as indicated on the schedule sheet.
- D. Wiring:
  - 1. The control voltage between the indoor and condensing unit shall be 16VDC non-shielded, stranded two-conductor cable.
  - 2. The control wiring shall be a two-wire multiplex transmission system, making it possible to connect multiple indoor units to one condensing unit with one (1) two-cable wire, thus simplifying the wiring installation.
- E. Refrigerant Piping:
  - 1. The system shall be capable of refrigerant piping up to 5,400 feet actual from the condensing unit to the furthest indoor unit, a total combined liquid line length of 3,000 feet of piping between the condensing.
  - 2. Refrigerant Line Kits: Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed; factory-insulated with flared fittings at both ends.

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- 3. Provide three-pipe refrigerant system, including high/low pressure dedicated hot gas, liquid and suction lines; two-pipe systems utilizing lower temperature mixed liquid/gas refrigerant to perform heat recovery are not permitted due to reduced heating capabilities.
- 4. Refrigerant Flow Balancing: Provide refrigerant piping joints and headers specifically designed to ensure proper refrigerant balance and flow for optimum system capacity and performance; T-style joints are prohibited.
- 5. Insulate each refrigerant line individually between the condensing and indoor units and provide weatherproof jacketing for exterior piping.

# 2.3 OUTDOOR/CONDENSING UNIT

- A. General:
  - 1. The condensing unit is designed specifically for use with VRF series components.
  - 2. The condensing unit shall be factory assembled and pre-wired with all necessary electronic and refrigerant controls.
  - 3. The refrigeration circuit of the condensing unit shall consist of Daikin inverter scroll compressors, motors, fans, condenser coil, electronic expansion valves, solenoid valves, four-way valve, distribution headers, capillaries, filters, shutoff valves, oil separators, service ports and refrigerant accumulator.
  - 4. Liquid and suction lines must be individually insulated between the condensing and indoor units.
  - 5. The condensing unit can be wired and piped with access from the left, right, rear, or bottom.
  - 6. The connection ratio of indoor units to condensing unit shall be permitted up to 200% of nominal capacity.
  - 7. Each condensing system shall be able to support the connection of up to 64 indoor units, dependent on the model of the condensing unit.
  - 8. The sound pressure level standard shall be rated at 3 feet from the front of the unit. The condensing unit shall be capable of operating automatically at further reduced noise during nighttime or via an external input.
  - 9. The system will automatically restart operation after a power failure and will not cause any settings to be lost, thus eliminating the need for reprogramming.
  - 10. The condensing unit shall be modular in design and should allow for side-by-side installation with minimum spacing.
  - 11. The following safety devices shall be included on the condensing unit: high pressure sensor and switch, low pressure switch, control circuit fuses, crankcase heaters, fusible plug, overload relay, inverter overload protector, thermal protectors for compressor and fan motors, and over-current protection for the inverter and anti-recycling timers.
  - 12. To ensure the liquid refrigerant does not flash when supplying to the various indoor units, the circuit shall be provided with a sub-cooling feature.
  - 13. Oil recovery cycle shall be automatic, occurring 2 hours after start of operation and then every 8 hours of operation.
  - 14. The condensing unit shall be capable of heating operation at −4°F wet bulb ambient temperature without additional low ambient controls or an auxiliary heat source.

# B. Unit Cabinet:

- 1. The condensing unit shall be completely weatherproof and corrosion-resistant. The unit shall be constructed from rust-proofed galvanized steel panels coated with a baked enamel finish.
- C. Fan:
  - 1. The condensing unit shall consist of one or more propeller type, direct drive fan motors that have multiple speed operation via a DC (digitally commutating) inverter.
  - 2. The condensing unit fan motor shall have multiple speed operation of the DC (digitally commutating) inverter type, and be of high external static pressure and shall be factory set as standard at 0.12-inch w.g. A field setting switch to a maximum 0.32-inch w.g. pressure is available to accommodate field applied duct for indoor mounting of condensing units.
  - 3. The fan motor shall have inherent protection and permanently lubricated bearings and be mounted.
  - 4. The fan motor shall be provided with a fan guard to prevent contact with moving parts.
- D. Sound:
  - 1. Nominal sound pressure levels shall be as located on the schedule.
- E. Condenser Coil:
  - 1. The condenser coil shall be manufactured from copper tubes expanded into aluminum fins to form a mechanical bond.
  - 2. The heat exchanger coil shall be of a waffle louver fin and rifled bore tube design to ensure high efficiency performance.
  - 3. The heat exchanger on the condensing units shall be manufactured from Hi-X seamless copper tube with N-shape internal grooves mechanically bonded on to aluminum fins to an e-Pass Design.
  - 4. The fins shall be coated with an anti-corrosion hydrophilic blue coating as standard from factory with a salt spray test rating of 1,000 hours per ASTM test standards.
  - 5. The condensing unit shall be factory equipped with condenser coil guards on all sides.
- F. Compressor:
  - 1. The inverter scroll compressors shall be variable speed (PVM inverter)-controlled, which can change the speed to follow the variations in total cooling and heating load as determined by the suction gas pressure as measured in the condensing unit.
    - a. In addition, samplings of evaporator and condenser temperatures shall be made so that the high/low pressures detected are read every 20 seconds and calculated. With each reading, the compressor capacity (INV frequency) shall be controlled to eliminate deviation from target value.

- 1) Non-inverter-driven compressors, which may cause starting motor current to exceed the nominal motor current (RLA) and require larger wire sizing, shall not be allowed.
- 2. The inverter driven compressors in the condensing unit shall be of highly efficient reluctance DC (digitally commutating), hermetically sealed scroll "G-type" or "J-type."
- 3. The capacity control range shall be as low as 10% to 100%.
- 4. The compressor's motor shall have a cooling system using discharge gas, to avoid sudden changes in temperature resulting in significant stresses on winding and bearings.
- 5. Each compressor shall be equipped with a crankcase heater, high-pressure safety switch, and internal thermal overload protector.
- 6. Oil separators shall be standard with the equipment together with an intelligent oil management system.
- 7. The compressor shall be mounted on vibration dampening rubber grommets to minimize the transmission of vibration, eliminating the standard need for external spring isolation.
- 8. If compressor failure, the remaining compressors shall continue to operate and provide heating or cooling as required at a proportionally reduced capacity. The microprocessor and associated controls shall be manually activated to specifically address this condition for single module and manifolded systems.
- 9. In the case of multiple condenser modules, conjoined operation hours of the compressors shall be balanced by the Duty Cycling Function, ensuring sequential starting of each module at each start/stop cycle, completion of oil return, completion of defrost, or every 8 hours. When connected to a central control system, sequential start is activated for all systems.

# 2.4 INDOOR/EVAPORATOR UNITS

- A. General: Indoor units shall be a built-in ceiling concealed fan coil unit, operable with refrigerant R-410A, equipped with an electronic expansion valve, direct-drive DC (ECM) type fan with auto CFM adjustment at commissioning, for installation into the ceiling cavity. It is constructed of a galvanized steel casing.
  - 1. Indoor unit and refrigerant pipes will be charged with dehydrated air prior to shipment from the factory.
  - 2. Both refrigerant lines shall be insulated from the outdoor unit.
  - 3. The indoor units shall be equipped with a condensate pan and condensate pump. The condensate pump shall provide up to 18-inches of lift from the center of the drain outlet and has a built-in safety shutoff and alarm.
- B. Unit Cabinet:
  - 1. The cabinet shall be located into the ceiling and ducted to the supply and return openings.
  - 2. The cabinet shall be constructed with sound absorbing foamed polystyrene and polyethylene insulation.

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# C. Fan:

- 1. The fan shall be direct-drive DC (ECM) type fan, statically and dynamically balanced impeller with three fan speeds available.
- 2. The unit shall be equipment with automatically adjusting external static pressure logic selectable during commissioning.
- 3. The airflow rate shall be available in three settings.
- 4. The fan motor shall be thermally protected.
- 5. The fan motor shall be equipped as standard with adjustable external static pressure (ESP) settings.
- 6. Fan motor external static pressure range for nominal airflow:
- D. Coil:
  - 1. Coils shall be of the direct expansion type constructed from copper tubes expanded into aluminum fins to form a mechanical bond.
  - 2. The coil shall be of a waffle louver fin and high heat exchange, rifled bore tube design to ensure highly efficient performance.
  - 3. The coil shall be a three-row cross fin copper evaporator coil with 15 fpi design, completely factory tested.
  - 4. The refrigerant connections shall be flared connections and the condensate will be 1<sup>1</sup>/<sub>4</sub>-inch outside diameter PVC.
  - 5. A condensate pan shall be located under the coil.
  - 6. A condensate pump with an 18<sup>3</sup>/<sub>8</sub>-inch lift shall be located below the coil in the condensate pan with a built-in safety alarm.
  - 7. A thermistor will be located on the liquid and gas line.
- E. Control:
  - 1. The unit shall have controls provided by the manufacturer to perform input functions necessary to operate the system.
  - 2. The unit shall be compatible with interfacing with a BMS system via optional LONWorks or BACnet gateways.
- F. Accessories:
  - 1. MERV 13 Filter kit. Can be configured for right or left access. Filters replaceable without tools.

# PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install refrigerant piping in accordance with equipment manufacturer's instructions.
- C. Perform wiring in accordance with NFPA 70, National Electric Code (NEC).
- D. Coordinate with installers of systems and equipment connecting to this system.

#### 3.2 SYSTEM STARTUP

- A. Prepare and start equipment and system in accordance with manufacturer's instructions and recommendations.
- B. Adjust equipment for proper operation within manufacturer's published tolerances.

# SECTION 23 82 00 - CONVECTION HEATING AND COOLING UNITS

#### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

A. Electric duct heaters.

#### 1.2 SUBMITTALS

- A. See Section 23 05 00 Common Work Results for HVAC for submittal procedures.
- B. Product Data: Provide typical catalog of information including arrangements.

#### PART 2 - PRODUCTS

#### 2.1 ELECTRIC DUCT HEATERS

- A. Manufacturers:
  - 1. Greenheck Fan Corporation.
  - 2. INDEECO.
  - 3. Markel Products; a division of TPI Corporation.
  - 4. Marley Electric Heating, a division of Marley Engineered Products.
  - 5. Nailor Industries, Inc.
  - 6. RenewAire, LLC.
  - 7. Provide products listed, classified, and labeled by Underwriters Laboratories Inc. (UL) or Intertek (ETL) as suitable for the purpose indicated.
- B. Assembly: Terminal control box with hinged access cover, heating element, casing, and controls.
- C. Open Coil: Nickel chromium heating element, stainless steel or nickel-plated terminals supported in ceramic bracket bushings.
- D. Frame: Heavy gauge galvanized or corrosion resistant steel.

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- E. Standard Built-In Components:
  - 1. Interlock disconnect switch.
  - 2. Contactors.
  - 3. Fused transformers.
  - 4. Airflow switch.
  - 5. Circuit fuses.
  - 6. Load and control terminal blocks.
- F. Over-Temperature Protection: Provide thermal cutouts for primary and secondary overtemperature protection.

#### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install in accordance with manufacturer's recommendations.
- B. Install equipment exposed to finished areas after walls and ceilings are finished and painted.
- C. Do not damage equipment or finishes.
  - 1. Units with Electric Heating Elements:
    - a. Install as indicated including electrical devices furnished by manufacturer but not factory installed.
    - b. Install wiring in accordance with the manufacturer's wiring diagram submittal and Section 26 05 83.

#### 3.2 CLEANING

- A. See Section 01 74 19 Construction Waste Management and Disposal for additional requirements.
- B. After construction and painting is completed, clean exposed surfaces of units.
- C. Vacuum clean coils and inside of units.
- D. Touch-up marred or scratched surfaces of factory-finished cabinets using finish materials furnished by the manufacturer.

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CONVECTION HEATING AND COOLING UNITS E. Install new filters.

#### 3.3 PROTECTION

A. Provide finished cabinet units with protective covers during the balance of construction.

# SECTION 260500 - COMMON WORK RESULTS FOR ELECTRICAL

#### PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS
  - Α. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- This section includes general electrical requirements for all Division 26 work and is Α. supplemental and in addition to the requirements of Division 1. See Division 01 for sequence of work.
- It is the intention of this Division of the Specifications and the Contract Drawings to describe and Β. provide for the furnishing, installing, testing and placing in satisfactory and fully operational condition all equipment, materials, devices and necessary appurtenances to provide a complete electrical system. Provide all materials, appliances and apparatus not specifically mentioned herein or shown on the drawings, but which are necessary to make a complete, fully operational installation of all electrical systems shown on the contract drawings or described herein. Connect equipment and devices furnished and installed under other Divisions of this specification (or the Owner) under this Division.
- C. Workmanship shall be of the best quality and competent and experienced electricians shall be employed and shall be under the supervision of a competent and experienced foreman.
- The drawings and specifications are complimentary and what is called for (or shown) in either is D. required to be provided as if called for in both. Where conflicting information occurs within the drawings and specifications or between the drawings and specifications, the more expensive alternative shall be used as a basis for bidding and construction.
- E. Branch Circuit Wiring: Where the drawings identify circuit numbers for items requiring electrical power, but do not indicate the manner of the wiring between the item and its source, the manner of the wiring shall be devised by the contractor utilizing the following provisions: 1.
  - Wire sizes:
    - Derate wiring for thermal restrictions imposed by the National Electrical Code. a.
    - If wire sizes are not otherwise indicated, wire sizes shall limit the voltage drop for b. circuits serving general purpose receptacles(180VA per strap) to less than 3%. based on the receptacle in the circuit that is farthest from the source being utilized with a load of 14 amps at 80% power factor. The following wire sizes and circuit lengths comply with this requirement:

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- 1) #10 up to 125 feet
- 2) #8 up to 190 feet
- c. Wire sizes for other loads shall limit the voltage drop to less than 3% based on the load indicated on the panel schedule.
- 2. Multiwire circuits: Multiwire circuits shall not be used unless specifically indicated or noted on the drawings. Provide a dedicated neutral conductor for each single pole circuit breaker.
- 3. Do not combine wiring of different source panels in the same raceway system, unless the panels are interconnected with sub feed or through feed lugs with no intervening disconnecting means.
- 4. Outlet and junction boxes: Arrange wiring extensions from junction boxes to outlet boxes to restrict the number of wires in an outlet box as required by NEC Article 314.
- 5. Single tubular raceways extending into panels or switchboards shall not contain more than 20 wires.

# 1.3 WORK IN OTHER DIVISIONS

- A. Refer to Division 27 for Communications and Division 28 for Electronic Safety and Security. System elements of those Divisions require conformance and integration with the work of Division 26.
- B. See all other specifications for other work which includes but is not limited to:
  - Conveying Systems
  - **Cutting and Patching**
  - Door Hardware
  - **Fire Protection**
  - Mechanical Systems and Control Wiring
  - Painting, Refinishing and Finishes

#### 1.4 CODES, PERMITS, INSPECTION FEES

- A. The following codes and standards are referenced in the Division 26 specifications. Perform all work and provide materials and equipment in accordance with the latest referenced codes and standards of the following organizations:
  - 1. American National Standards Institute (ANSI)
  - 2. National Electrical Manufacturer's Association (NEMA)
  - 3. National Fire Protection Association (NFPA)
  - 4. Underwriter's Laboratories (UL)
  - 5. National Electrical Contractor's Association (NECA)
- B. Install the electrical systems based on the following:

NFPA 70	National Electrical Code as adopted and
	amended by the Local Jurisdiction.
IBC	International Building Code as adopted and
	amended by the Local Jurisdiction.

- C. The referenced codes establish a minimum level of requirements. Where provision of the various codes conflict with each other, the more stringent provision shall govern. If any conflict occurs between referenced codes and this specification, the codes are to govern. Compliance with code requirements shall not be construed as relieving the Contractor from complying with any requirements of the drawings or specifications which may be in excess of requirements of the governing codes and rules and not contrary to same.
- D. Obtain and pay for all licenses, permits and inspections required by laws, ordinances and rules governing work specified herein. Arrange for inspection of work by the inspectors and give the inspectors all necessary assistance in their work of inspection.

#### 1.5 COORDINATION

- A. Coordination during the bidding and pricing aspects of the contract includes determining where the work of other Divisions relies on the work of this Division for electricity and including the electrical system to match the requirements.
- B. Coordinate work with that of the other Contractors and/or other trades doing work on the project. Examine all drawings and specifications of other trades for construction details and coordination. Make every reasonable effort to provide timely notice of work affecting other trades to prevent conflicts or interference as to space requirements, dimensions, openings, block-outs, sleeving or other matters which will cause delays or necessitate work-around methods.
- C. Obtain submittals and shop drawings of all equipment with electrical connections furnished under other divisions of the specification and by the Owner. Provide all wiring in accordance with specific equipment requirements. Immediately advise the Architect of any changes which may affect the contract price.
- D. Special attention is called to the following items. Coordinate all conflicts prior to installation:
  - 1. Door swings such that switches will be located on the "strike" side of the door.
  - 2. Location of grilles, pipes, sprinkler heads, ducts and other mechanical equipment so that all electrical outlets, lighting fixtures and other electrical outlets and equipment are clear from and in proper relation to these items.
  - 3. Location of cabinets, counters and doors so that electrical outlets, lighting fixtures and equipment are clear from and in proper relation to these items.
  - 4. Recessing and concealing electrical materials in CMU walls, concrete construction and precast construction.

- 5. At each switchboard, panelboard and motor control center location the Contractor shall monitor the work of all trades to assure that the space and clearance requirements of code are met.
- 6. Review specifications for other Divisions of the work to determine where other Divisions are requiring electrical connections. Verify electrical provisions shown on contract drawings by examining shop drawing submittals of other Divisions prior to submission to the owner. Do not proceed with ordering of supporting electrical equipment, such as circuit breakers, until electrical characteristics are verified. Proceed with rough-in only after verification of shop drawings.
- E. Digital format copies of bid drawings will be furnished to the successful bidder. Augment bid documents with additional information to ensure coordination between trades. Provide digital format electrical systems drawings showing all ceiling devices, fixtures, raceways and cable tray locations and routing to mechanical contractor to be used for coordination drawings provided by mechanical contractor. Include dimensions and elevations of devices, fixtures, raceway and cable tray.
- F. Furnish, install and place in satisfactory condition all raceways, boxes, conductors and connections and all other materials required for the electrical systems shown or noted in the contract documents to be complete, fully operational and fully tested upon completion of the project. Raceways, boxes and ground connections are shown diagrammatically only and indicate the general character and approximate location. The layout does not necessarily show the total number of raceways or boxes for the circuits required, nor are the locations of indicated runs intended to show the actual routing of the raceways.

Where routings of major raceways and telecommunication pathways are indicated on plan sheets, the routing information supplements the information on diagrams. If no routing information is shown, route the systems in a manner that will coordinate with new and existing infrastructure and the work of other trades.

- G. The horsepower of motors and apparatus wattage's shown on the drawings are estimated requirements of equipment furnished under other Divisions of this contract. Provide overload elements to suit actual equipment nameplate current. Where connections to variable speed drives furnished under other sections of this specification are shown, obtain the drive input current and verify the indicated drive circuit is compatible. Advise Architect of any equipment changes or substitutions affecting electrical systems.
- H. Consult the architectural drawings for the exact height and location of all electrical equipment not specified herein or shown on the drawings. Make any minor changes (less than 6'-6" horizontal) in the location of the raceways, outlets, boxes, devices, wiring, etc., from those shown on the drawings without extra charge, where coordination requires or if so directed by the Architect before rough-in.
- I. Provide inserts or sleeves for outlet boxes, conductors, cables and/or raceways as required. Coordinate the installation thereof with other trades.

J. The Contractor will not be paid for relocation of work, cuttings, patching and finishing required for work requiring reinstallation due to lack of coordination prior to installation.

#### 1.6 WARRANTY

A. Refer to General Conditions of the Contract.

# 1.7 CORRECTION OF WORK

A. Within one year after the date of Substantial Completion of the work, the Contractor shall correct any work found to be not in conformance with the Contract Documents promptly after written notice from the owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. This obligation shall survive acceptance of the work under this Contract and termination of the Contract. The Owner shall give such notice promptly after discovery of the condition.

#### 1.8 ITEMIZED SCHEDULE OF COSTS

- A. Complete the Schedule of Values included at the end of this section. This schedule shall be adhered to for the electrical contractor to facilitate analysis and approval of the monthly progress billings. Refer to the Supplementary Conditions of General Contract and Division 1 General Requirements for details, and conform thereto.
- B. Comply with the requirements of Division 1.
- C. Material pricing shall be based on competitive market conditions and include contractor net discounting. "List" or "book" pricing of material will not be accepted. Upon request, demonstrate that pricing is competitive by furnishing quotes from competing vendors or distributors.
- D. Labor units shall be based on standard publications such as NECA or RS Means, using standard (not "change order") construction production. Where the change order requires additional work that is not normally part of the construction process, separately itemize the work and identify specific inefficiencies.
- E. Labor pricing shall include an average of the journeyman and apprentice labor classification rates used to perform the work.

# 1.9 SUBMITTALS AND SHOP DRAWINGS

- A. Submittals and Shop Drawings: Schedule so as not to delay construction schedule and no later than 60 days after award of contract, submit common brochure(s) with index and divider tabs by specification section, containing all required catalog cuts. Allow two weeks for review for each submittal and resubmittal. Incomplete submittals and shop drawings which do not comply with these requirements will be returned for correction, revision and resubmittal. Provide submittals for each product proposed for the project. See General Conditions for format, quantity, etc.
- B. Submit in a three ring binder with hardboard covers. Submittals shall show:
  - 1. Indicate listing by UL or other approved testing agency.
  - 2. Highlight with yellow or blue marker adequate information to demonstrate materials being submitted fully comply with contract documents.
  - 3. Review and check all material prior to submittal and stamp "Reviewed and Approved".
- C. Shop drawings shall show:
  - 1. Ratings of items and systems.
  - 2. How the components of an item or system are assembled, interconnected, function together and how they will be installed on the project.
  - 3. System layout floor plans with complete device layout, point-to-point wiring connection between all components of the system, wire sizes and color coding.
  - 4. Riser diagrams showing vertical wiring between components.
  - 5. Line diagrams and or logical/control schematics including interface to other systems as applicable. Provide point to point wiring diagrams, indicate terminal identification at item of equipment. Typical diagrams may be used when accompanied by wire schedules that are specific to each product.
  - 6. Coordinate with other division shop drawings and submittals. Identify interface points and indicate method of connection.
  - 7. Electrical rooms: Submit 1/2" = 1'0" detail plans and wall elevations of each room showing actual size of equipment in place. Identify coordinating elements such as structural beams or mechanical systems. Submittals shall show coordination among all suppliers of equipment, including power components, fire alarm, racks, nurse call, public address, security, etc. Submit room layouts at same time as material submittals, and prior to installation of any equipment.
  - 8. List of all Division 23 equipment noting actual rating of equipment that will be installed. For discrepancies between the requirements of the proposed equipment and the equipment provisions indicated on the drawings, indicate the contractor's proposed no cost change to the electrical system to accommodate the submitted equipment.
- D. Release of Drawing Data files
  - 1. Contractor may request to utilize the project drawing data files for assistance in producing shop drawings. Request shall be made by signing owner/design team's requested documentation for release of the data files.
- E. The Contractor agrees:
  - 1. Submittals and shop drawings processed by the Architect are not change orders.

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- 2. The purpose of submittals and shop drawings by the Contractor is to demonstrate to the Engineer that the Contractor understands the design concept.
- 3. Submittals demonstrate equipment and material Contractor intends to furnish and install and indicate detailing fabrication and installation methods Contractor intends to use.
- 4. To accept all responsibility for assuring that all materials furnished under this Division of the specifications meet, in full, all requirements of the contract documents.
- 5. To pay for Engineers review cost of submittal review beyond one resubmittal.
- F. The Engineer's review is only for general conformance with the design concept of the project and general compliance with the information given in the contract documents. Corrections or comments made during this review do not relieve contractor from compliance with the requirements of the drawings and specifications. Contractor is responsible for: Dimensions which shall be confirmed and correlated at the job site; fabrication process and techniques of construction; coordination of his work with that of all other trades; performing his work in a safe and satisfactory manner.
- G. Submittals and shop drawings are required per the individual sections and the submittals schedule at the end of this Section.

# 1.10 PROJECT CLOSE-OUT

- A. Coordinate with close-out provisions in Division 01 General Requirements.
- B. Request For Final Punchlist
  - To request a final electrical punch list, forward a letter to the Architect. stating; "The electrical work on this project is complete, all punch list items to date are complete, items a. - n. in the Punchlist Procure paragraph in Section 260500 - Common Work Results For Electrical are complete and the project is ready for final punch list observation."
  - 2. Project Punchlist Procedure: Perform the following procedures for project closeout of electrical portions of work.
    - a. Perform testing, tests and documentation per Section 260126 Maintenance Testing of Electrical Systems.
    - b. Provide engraved nameplates on electrical equipment.
    - c. Refinish electrical equipment finishes which are damaged.
    - d. Clean light fixtures per Section 260500 Common Work Results For Electrical.
    - e. Color code junction boxes per Section 260533 Raceways and Boxes For Electrical Systems.
    - f. Provide spare fuses and cabinet per Section 262813 Fuses.
    - g. Insert word processed (typed) Panel Schedules in all new and existing panelboards with actual "as-built" circuit descriptions.
    - h. Number all circuit breakers.
    - i. Obtain final electrical permit inspection. Include copies in O & M manual.
    - j. Provide written warranty in O & M per the General Conditions of the Contract.
    - k. Furnish Record Drawings per this section. Obtain signature on Job Completion Form.

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- I. Furnish O & M Manuals per this section. Obtain signature on Job Completion Form.
- m. Give instruction periods to owner's personnel per this section. Obtain signature on Job Completion Form.
- n. To request final acceptance of project, fill out Job Completion Form in this section and forward to Architect. Note: If inspectors have not signed form, a copy of signed-off permits will suffice.
- o. Include with Job Completion Form, a copy of the final punch list with the word "DONE", and the date and Contractor's initials after each item on the list.

# 1.11 ELECTRICAL EQUIPMENT OPERATION AND MAINTENANCE (O&M) MANUALS

- A. Provide O&M manuals required in Division 01 General Requirements for all equipment furnished under Division 26 - Electrical of the specifications. Submit a preliminary copy, complete except for the bound cover, 60 days prior to completion of the project for checking and review. Deliver final bound corrected copies as noted in Division 1 - General Requirements 20 days prior to scheduled instruction periods. Obtain a receipt for the manuals and forward a copy of the receipt to the Engineer with the Job Completion Form.
- B. The information included must be the exact equipment installed. Where sheets show the equipment installed and other equipment, the installed equipment shall be neatly and clearly identified on such sheets.
- C. These O&M manuals shall contain all the information needed to operate and maintain all systems and equipment provided in the project. Present and arrange information in a logical manner for efficient use by the Owner's operating personnel. The information provided shall include but not be limited to the following:
  - 1. Equipment manufacturer, make, model number, size, nameplate data, etc.
  - 2. Description of system configuration and operation including component identification and interrelations. A master control schematic drawing(s) may be required for this purpose.
  - 3. Dimensional and performance data for specific unit provided as appropriate.
  - 4. Manufacturer's recommended operation instructions.
  - 5. Manufacturer's recommended lubrication and servicing data including frequency.
  - 6. Complete parts list including reordering information, recommended spares and anticipated useful life (if appropriate). Parts lists shall give full ordering information assigned by the original parts manufacturer. Relabeled and/or renumbered parts information as reassigned by equipment supplier not acceptable. Include the parts list and part diagram that was included with the product's packaging, note that a "catalog cut" will not meet this criterion.
  - 7. Shop drawings.
  - 8. Wiring diagrams.
  - 9. Signal equipment submittals shall contain step-by-step circuit description information designed to acquaint maintenance personnel with equipment operation in each mode of operation.

- 10. A complete list of local (nearest) manufacturer representative and distributor contacts for each type of equipment and manufacturer. Include name, company, address, phone, fax, e-mail address, and web site.
- D. Furnish complete wiring diagrams for each system for the specific system installed under the contract. "Typical" line diagrams will not be acceptable unless revised to indicate the exact field installation.
- E. Group the information contained in the manuals in an orderly arrangement by specification index. Provide a typewritten index and divider sheets between categories with identifying tabs. Bind the completed manuals with hard board covers not exceeding 5" thick. (Provide two or more volumes if required.) Signal and communication systems shall be in separate volumes. Imprint the covers with the name of the job, Owner, Architect, Electrical Engineer, Contractor and year of completion. Imprint the back edge with the name of the job, Owner and year of completion. Hard board covers and literature contained may be held together with screw post binding.

#### 1.12 INSTRUCTION PERIODS

- A. After substantial completion of the work and 20 days after the O&M manuals have been delivered to the owner and after all tests and final inspection of the work by the Authority(s) Having Jurisdiction; demonstrate the electrical systems and instruct the Owner's designated operating and maintenance personnel in the operation and maintenance of the various electrical systems. The Contractor shall arrange scheduled instruction periods with the Owner. The Contractor's representatives shall be superintendents or foremen knowledgeable in each system and suppliers representatives when so specified. When more than one training session is specified, the second session shall be 30 to 90 days after the first as agreed to by the Owner.
- B. Include in each instruction session an overview of the system, presentation of information in maintenance manuals with appropriate references to drawings. Conduct tours of the building areas with explanations of maintenance requirements, access methods, servicing and maintenance procedures, equipment cleaning procedures and adjustment locations.

C.	Include the following scheduled instruction periods:	1 <sup>st</sup> Session
	1. Lighting Control & Dimming System	4 hours

- D. Factory trained suppliers representatives shall provide instruction for lighting control/dimming, power generation & transfer switches, paralleling low voltage switchgear, static uninterruptible power supply and transient voltage suppression system(s).
- E. Provide one professionally produced digital recording of each training session on USB 3.0 flash driver. Furnish two (2) copies to the owner.

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#### 1.13 RECORD DRAWINGS

- A. Record drawings shall be kept on: the contract drawings, shop drawings indicating field wiring, vendor diagrams indicating field wiring, and similar documents.
- B. Continually record the actual electrical system(s) installation on a set of prints kept readily available at the project during construction. These prints shall be used for this purpose alone.
  - 1. Mark record prints with red erasable pencil. Mark the set to show the actual installation where the installation varies substantially from the work as originally shown.
  - 2. Accurately locate with exact dimensions all underground and underslab raceways and stub-outs.
  - 3. Note changes of directions and locations, by dimensions and elevations, as utilities are actually installed.
  - 4. Include addenda items and revisions made during construction.
  - 5. Erase conditions not constructed or "X-out" and annotate "not constructed" to clearly convey the actual "as constructed" condition.
  - 6. Organize record drawings sheets in manageable sets, bind and print suitable titles, dates and other identification on the cover of each set.
  - 7. Where "typical" wiring diagrams were used during submittals the record drawings shall indicate exact point to point wiring with exact terminal number designations.
- C. Transmit the record drawing set to the Architect at the completion of the work. Final payment to the contractor will not be authorized until these prints have been submitted to and accepted by the Architect.
- D. Transfer the changes marked up on the record prints into AutoCAD drawing files at the completion of the work. The version of AutoCAD shall not be earlier than the most recent version available at the date the project bids were received. AutoCAD files shall not include the stamp of the engineer of record. Provide two (2) sets of prints, one set of fixed line reproducible drawings and one set of AutoCAD drawing files on CD Rom. Transmit drawings, AutoCAD drawing files and the record drawing mark-ups to the Architect. Final payment to the contractor will not be authorized until these documents have been submitted to and accepted by the Architect.

# 1.14 FINAL ACCEPTANCE REQUEST

A. Submit to the Architect a Division 26 Job Completion Form (form attached in this section) properly filled out prior to the time final acceptance of the electrical work is requested.

#### 1.15 ABBREVIATIONS AND DEFINITIONS

A. When the following abbreviations and definitions are used in relation to the work for Division 26 they shall have the following meanings:

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Item	<u>Meaning</u>
AHJ	Authority Having Jurisdiction.
Boxes	Outlet, Junction or Pull Boxes.
Code	All applicable codes currently enforced at project location.
Compression	Compressed using a leveraged powered (hydraulic or equivalent) crimping tool.
Connection	All materials and labor required for equipment to be fully operational.
Exterior Location	Outside of or penetrating the outer surfaces of the building weather protective membrane.
Fully Operational	Tested, approved, and operating to the satisfaction of the AHJ, manufacturer and contract documents.
Furnish	Deliver to the jobsite
Install	To enter permanently into the project and make fully operational.
Kcml	Thousand circular mils (formerly MCM).
Mfr.	Manufacturer.
NEC	National Electrical Code, National Fire Protection Association, Publication #70.
NIC	Not in Contract.
Noted	Shown or specified in the contract documents.
Provide	Furnish and install.
Required	As required by code, AHJ, contract documents, or manufacturer for the particular installation to be fully operational.
Shown	As indicated on the drawings or details.
Wiring	Raceway, conductors and connections.

#### PART 2 - PRODUCTS

#### 2.1 GENERAL

- A. All materials and equipment installed shall have been tested and listed by Underwriters Laboratories or other approved testing organization and shall be so labeled unless otherwise permitted by the Authority Having Jurisdiction (Inspector).
- B. All materials to be new, free from defects and not less than quality herein specified. Materials shall be designated to insure satisfactory operation and operational life in the environmental conditions which will prevail where they are being installed.
- C. Each type of materials furnished shall be of the same make, be standard products of manufacturers regularly engaged in production of such materials and be the manufacturer's latest standard design.

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# 2.2 SUBSTITUTION OF MATERIALS

#### A. No Substitute:

Where a specified product is indicated "no substitute", it is the intent of this specification to require new materials to be compatible with the existing installation or as specifically requested by the owner. To this end certain materials and systems no substitution will be allowed.

B. Prior to Bid Opening:

Acceptance of products other than those specified will be issued by addendum to the bid documents only after the following requirements are met and the proposed listed material is determined to meet or exceed the requirements:

- 1. Requests for listing to be original material, clearly indicating the product fully complies with contract documents and be neatly marked with yellow felt tip marker to clearly define and describe the product for which listing is requested.
- 2. Include certified laboratory test report for lighting fixtures.
- 3. Samples shall be submitted if requested.
- 4. Requests shall be received 10 days prior to bid opening.
- 5. Requests containing insufficient information to confirm compliance with contract documents will not be considered.
- C. After Award of Contract:

Substitution of products will be considered after award of contract only under the following conditions:

- 1. The Contractor shall have placed orders for specified materials promptly after contract is awarded and the specified products can not be delivered to the project to meet the Owner's construction schedule.
- 2. The reason for the unavailability is beyond the Contractor's control, i.e., due to strikes, bankruptcy, discontinuance of manufacturer, acts of God.
- 3. The specified product is no longer manufactured.
- 4. There is compelling economic advantage to the Owner.
- D. In all cases, should a substituted material result in requiring electrical system or building modifications; the Contractor alone shall pay all costs to provide these modifications including all costs to the Engineer and Architect for redesign, and updating of record drawings required to accommodate the required modifications.

#### 2.3 NAMEPLATES

A. Provide nameplates per Section 260553 - Identification for Electrical Systems.

#### PART 3 - EXECUTION

#### 3.1 GENERAL

- A. All work shall be done in accordance with NECA construction standards.
- B. Adhere to industry standards of care for safety, including:
  - 1. Occupational Safety and Health Act.
  - 2. Accident Prevention Manual for Industrial Operations, National Safety Council.
  - 3. ANSI/NFPA 70E, Electrical Safety Requirements for Employee Workplaces.
  - 4. American National Standards for Personnel Protection: Lockout/Tagout.
  - 5. Applicable state and local safety operating procedures.

# 3.2 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, and handle products according to the manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft. Handle all equipment carefully to prevent damage, breakage, denting, and scoring of finishes. Do not install damaged equipment.
- B. Store products subject to damage by the elements above ground, undercover in a weather tight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instruction.

#### 3.3 CUTTING BUILDING CONSTRUCTION

- A. Obtain permission from the Architect and coordinate with other trades prior to cutting. Locate cuttings so they will not weaken structural components. Cut carefully and only the minimum amount necessary. Cut concrete with diamond core drills or concrete saws except where space limitations prevent the use of such tools.
- B. All construction materials damaged or cut into during the installation of this work must be repaired or replaced with materials of like kind and quality as original materials by skilled labor experienced in that particular building trade.

#### 3.4 PENETRATION OF BUILDING ELEMENTS

#### A. General:

- 1. Penetrations of building elements by electrical systems shall not compromise the performance and integrity of the building element (structural, fire, smoke, waterproof, etc.)
- B. Fire and smoke rated elements:
  - 1. Electrical penetrations of fire and smoke rated floor and wall assemblies shall maintain fire-resistance or smoke barrier rating of the assembly. Firestopping materials and installation requirements are specified in Division 7 section "Firestopping".

#### 3.5 PAINTING

A. Items furnished under this Division that are scratched or marred in shipment or installation shall be refinished with touchup paint selected to match installed equipment finish.

#### 3.6 EQUIPMENT CONNECTION

- A. For equipment furnished under this or other Divisions of the specifications, or by owner, provide all electrical connections necessary to serve such equipment and provide required control connections to all equipment so that the equipment is fully operational upon completion of the project. Investigate existing equipment to be relocated and provide new connections as required.
- B. Contract Coordination: Investigate vendor equipment proposed for installation and address and integrate the following into the construction process:
  - 1. Special equipment requirements identified in shop drawings or submittals.
  - 2. Equipment requirements for distribution system performance, for example, an external disconnect switch or fused disconnect switch to provide compliance with a governing code, a short circuit current rating, or a listing.
- C. Obtain rough-in requirements for equipment furnished under other divisions of this specification prior to roughing-in.

#### 3.7 HOUSEKEEPING PADS

A. Provide steel reinforced concrete housekeeping pad under each floor mounted switchboard, transformer, motor control center, generator and/or other free standing electrical equipment.

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B. When housekeeping pad is poured on previously poured concrete or is for engine or motor driven equipment, the pad shall be reinforced (4# rebar, 12" o.c., both ways) and the rebar shall be tied to the existing floor via #4 rebar epoxy grouted into the existing concrete on 18" centers or other acceptable means. The existing slab shall be thoroughly cleaned and prepared for the pad just before the pour.

#### 3.8 CLEAN UP

- A. Contractor shall continually remove debris, cuttings, crates, cartons, etc., created by his work. Such clean up shall be done daily and at sufficient frequency to eliminate hazard to the public, other workmen, the building or the Owner's employees. Before acceptance of the installation, Contractor shall carefully clean cabinets, panels, lighting fixtures, wiring devices, cover plates, etc., to remove dirt, cuttings, paint, plaster, mortar, concrete, etc. Blemishes to finished surfaces of apparatus shall be removed and new finish equal to the original applied.
  - 1. Wipe surfaces of electrical equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
  - 2. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent, high pressure sodium, metal halide, and mercury vapor fixtures to comply with requirements for new fixtures.

#### 3.9 TESTING AND DEMONSTRATION

- A. Demonstrate that all electrical equipment operates as specified and in accordance with manufacturer's instructions. Perform tests in the presence of the Architect, Owner or Engineer. Provide all instruments, manufacturer's operating instructions and personnel required to conduct the tests. Repair or replace any electrical equipment that fails to operate as specified and or in accordance with manufacturer's requirements.
- B. Contractor shall remove and replace covers of electrical equipment, open manholes and remove/replace ceiling tiles to permit engineer to observe equipment and wiring provided. For manholes: Furnish OSHA safety compliant equipment and personnel, including ventilation, safety harness, ladder and flashlight.

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# **DIVISION 26 ELECTRICAL JOB COMPLETION FORM**

PROJ	ECT	NAME:				
LOCA		:				
DATE:						
A.		Electrical Inspectors Final Acceptance (Copy of certificate attached.)				
_	-	Name		Agency	Date	
В.		Fire Marshal's Final Acceptance of Fire Alarm System (Copy of certificate attached.)				
	-	Name		Agency	Date	
C.		The following	systems have be	en demonstrated to Own	er's representative.	
	1.	Power Distrib	oution System			
			-	Owner's Rep.	Date	
	2.	Lighting Cont System	rol & Dimming			
				Owner's Rep	Date	
	3.	Power Gener and Transfer	ation Equipment			
				Owner's Rep	Date	
	4.	Paralleling Lo Switchgear	ow-Voltage			
		U		Owner's Rep	Date	
	5.	Static Uninte Supply	rruptible Power	·		
				Owner's Rep	Date	
	6.	Transient Vo Suppression	ltage System(s)	·		
				Owner's Rep	Date	
D.		Record Draw Attached	ings Transmitted prev	iously to		
			-	-	Date	
Ε.		O & M Manuals				
-		Attached	i ransmitted prev			
г.		I EST				
		Attochod	Tronomittad area	iouchy to		
		Allached	rransmitted prev		Data	
					Date	

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# G. The work is complete in accordance with contract documents and authorized changes except for

and the architect/engineer's representative is requested to meet with					
	at		on		
Supervisor of Electrical Work		Time		Date	
Contractors Rep. Signature				Date	

# **Division 26 Schedule of Values**

Description of Work	Amount
Material and Labor Allowance	
Branch Circuit (lighting, receptacles, misc.) Rough-in - Material and Labor	
Branch Circuit Conductors and Terminations - Material and Labor	
Panelboards, Disconnects - Material	
Panelboards, Disconnects - Labor	
Lighting - Material	
Lighting Exterior (installation & checkout) - Labor	
Lighting Interior (installation, trimout) - Labor	
Devices (switches, receptacles, equip. connections) - Labor & Materials	
Mechanical Power Connections (starter & disconnects) - Labor	
Low Voltage Lighting Controls - Labor & Materials	
Testing, Demonstration (AHJ approvals)	
Training	
Close Out (Record Drawings, O&M, etc.) - Materials & Labor	
TOTAL DIVISION 26	

#### **DIVISION 26 SUBMITTAL LIST**

SECTION	DESCRIPTION	SUBMIT RECEIV E DATE	STATUS
260519	LOW VOLTAGE ELECTRICAL POWER		
	CONDUCTORS AND CABLES		
260519.14	MANUFACTURED WIRING SYSTEM		
260529	HANGERS AND SUPPORTS FOR ELECTRICAL		
	SYSTEMS		
260533	RACEWAYS AND BOXES FOR ELECTRICAL		
	SYSTEMS		
260533.10	FLUSH FLOOR OUTLETS		
260553	IDENTIFICATION FOR ELECTRICAL SYSTEMS		
260923	LIGHTING CONTROL DEVICES		
260943	NETWORK LIGHTING CONTROLS		
262726	WIRING DEVICES		
262813	FUSES		
262816	ENCLOSED SWITCHES AND CIRCUIT BREAKERS		
265100	INTERIOR LIGHTING		
265600	EXTERIOR LIGHTING		

# END OF SECTION

# SECTION 260510 - EXISTING SYSTEMS

#### PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS
  - A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 and Division 02 Specification Sections, apply to this Section.

#### 1.2 RELATED WORK

A. Same as in Section 260500 - Common Work Results For Electrical.

#### 1.3 INDICATED EXISTING SYSTEMS

- A. The electrical drawings show portions of the existing electrical systems which are to remain, be removed or be modified. The existing information is derived from record drawings and other data obtained from or with the permission of the owner. Where indicated, concealed systems are also derived from record drawings and the Engineer's best judgment of the configuration.
- B. The Contractor shall inspect the existing installation prior to bidding and shall judge the work required. Inspection shall include areas within and adjacent to the work of any discipline or trade performing work for the contract.

#### 1.4 POWER OUTAGES

- A. The facility will continue its normal operation during construction; the Contractor shall schedule electrical system(s) outages with the Owner. Electrical system(s) outages to Owner occupied areas shall not be permitted from 7:00 a.m. to 6:00 p.m. on any day of the week.
- A. This facility will be in operation 24 hours a day seven days a week during the construction work; therefore it is required that the Contractor fully schedule electrical system(s) outages with the Owner. Contractor shall work closely with Owner to assure the Owner fully understands the extent of each outage. Owner maintains the right to limit the extent and length of any given outage. Assume all outages to Electrical system(s) in Owner occupied areas will require premium time and that temporary electrical work may be required to limit the duration of outages.
- B. Cutovers must make alternative arrangements to deliver power to the load at all times

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- C. Submit a written request for a power outage at least one week in advance identifying the areas and systems that will be affected, time and duration of the power outage. The Contractor shall receive written authorization to proceed with the outage and shall re-notify the Owner verbally at least one hour prior to the outage and also notify the Owner when the outage is completed.
- D. Temporary generator(s) will be required for any work that takes the existing generator system out of service or off-line from any portion of the emergency power distribution. Temporary generation shall include automated controls and wiring to interface with the existing system.
- E. Unscheduled Outages: In the event that the Contractor's work causes or contributes to an electrical system(s) outage (or other system fault), the Contractor is responsible for immediately correcting the problem. Included (as examples) shall be any premium time required to stay on the job site until problem is corrected and air freight for parts not locally available. Any damage resulting from performance of work under this contract shall be repaired to assure continuing facility operation and integrity, at no increase in contract cost.

# PART 2 - PRODUCTS

# 2.1 EXISTING MATERIALS

A. All materials which are a part of the building shall remain the property of the Owner.

#### 2.2 EXISTING MATERIALS TO BE REINSTALLED

A. Existing materials and equipment (except interior, undamaged raceways) that are removed as a part of the work or stored in surplus shall not be reinstalled as a part of the new systems unless specifically noted or authorized in writing by the Owner. Forward a copy of the authorization to the Engineer. The requirements of the specifications (i.e., condition, installation, testing, etc.) shall apply as if the materials were new, furnished by the Contractor.

#### 2.3 EXISTING MATERIALS NOT TO BE REINSTALLED

- A. In coordination with the Architect, these materials shall be made available for his inspection and decision as to whether the Owner will retain possession. Items selected for retention shall be turned over to the Owner. These items shall be delivered to a location on the premises selected by the Owner. Take reasonable care to avoid damage to this material. If the Contractor fails to conform to this requirement, he shall purchase and turn over to the Owner replacement material of like kind and quantity.
- B. All material not selected for retention by the Owner and debris shall be legally disposed of by the Contractor.

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# PART 3 - EXECUTION

#### 3.1 EXISTING CONDITIONS

- A. Examine the structure, building, and conditions under which electrical work is to be installed for conditions detrimental to proper and timely completion of electrical work. Do not proceed with work until deficiencies or detrimental conditions have been corrected. Report deficiencies or detrimental conditions of existing electrical work which might be unsuitable to connect with or receive other work. Failure to so report shall constitute acceptance of other work as being fit and proper for the reception of electrical work.
- B. Field trace all existing circuitry affected by the project to determine:
  - 1. Source of supply or information collection point within the project area
  - 2. Load or termination within the project area
  - 3. Load or termination outside the project area, but supplied from or connected to equipment within the project area
  - 4. Loads supplied from and located outside of the project area, but have circuitry within the project area.

#### 3.2 REMOVAL

- A. All removal work required under this contract is not shown on the electrical drawings. Refer to work of other divisions for contract work that may affect existing electrical systems. Coordinate work between trades prior to bid.
- B. Switchboards, panelboards, signaling and communication systems, other electrical equipment free standing or surface mounted, raceway (exposed) and conductors; which are not presently in service or will not be in service as a result of this contract shall be removed.
- C. Contractor shall remove all floor, wall or ceiling mounted outlet devices in the "Removal" or "Demolition Area" indicated on the drawing, even if the equipment/or device is not individually shown on the project drawings. Unused flush mounted devices, outlet and other boxes in finished areas shall be removed from wall and the remaining hole patched to match adjacent wall surfaces.
- D. Unused raceways and wire shall be removed back to source if accessible, otherwise cut flush at ceiling, floor or wall and fill with grout.
- E. If Contractor questions whether a particular device is to be removed notify the Architect noting type and location of device. If so directed the Contractor shall maintain the existing device in service without any change in contract price.

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F. Contractor shall divert all electrical demolition materials including, but not limited to copper and aluminum cabling, fixture ballasts and lamps, enclosures, raceways and bus ducts, to either a local recycling station or to the on-site recycling station as provided by the General Contractor or Owner.

#### 3.3 EXISTING SYSTEMS MAINTAINED

- A. Maintain existing systems not identified for demolition. Maintaining existing systems includes relocating the systems to coordinate with work of this contract, when work of this contract cannot be done while the existing system is in its present location.
- B. Any existing wiring serving devices to remain in service and which may be affected by work performed under this contract shall be rerouted to maintain circuit continuity. Contractor shall assume the risk of maintaining existing systems, except relocation of wiring of #2 AWG and above shall be considered an additional cost if not shown to be relocated. If such wiring is found the Contractor shall notify Architect Owner of wiring location, reason it must be removed and cost of relocation and receive the Owner's approval before proceeding with the work.
- C. Examine drawings of all disciplines to determine where work of other trades will or is likely to require relocation of existing systems. Remove and relocate electrical equipment in the way of work of other trades. Exact relocation requirement of existing systems to remain to be based on detailed coordination with other trades. Contractor to provide proposed locations of relocated devices to Owner for approval prior to commencement of work.
- D. Relocation of any system shall be permanent.
- E. Re-route existing circuits that are affected as a result of this contract that serve devices to remain in service.
  - 1. Power Circuits (Including removal or relocation of existing panelboards).
    - a. Prior to demolition work trace out and identify each branch circuit and feeder circuit that serves loads in occupied areas.
    - b. Provide temporary wiring, schedule outage and reconnect loads to temporary wiring.
    - c. Provide new wiring in new location.
    - d. Schedule outage, disconnect temporary wiring, and connect loads to new wiring. Remove temporary wiring.
    - e. Outage for each circuit shall not be more than 20 minutes.
  - 2. Signal and Communication Systems
    - a. Prior to demolition trace out and identify device and systems being served.
    - b. Provide temporary wiring to maintain operation of system throughout facility.
    - c. Schedule outage and connect to temporary wiring and test system.
    - d. Provide new wiring on new location.
- e. Schedule outage, disconnect temporary wiring, and reconnect to new wiring. Remove temporary wiring.
- f. Outage for each system shall not be more than 20 minutes.

## 3.4 TEMPORARY ELECTRICAL SYSTEMS

- A. Provide temporary lighting, exit lighting, and fire notification in areas of construction that will have ongoing or intermittent public access. Temporary lighting shall comply with IES standards and other provisions of these specifications. Selected light fixtures must have battery backup to allow for egress at all times. Indicate path to nearest exit with exit signs. All temporary systems shall be removed after they are no longer in operation.
- B. Removing, temporary installation, and reinstalling in ceilings of light fixtures, speakers, detectors, exit signs and other electrical equipment is not shown on the drawings. The Contractor shall investigate the ceiling demolition work and include appropriate temporary work in the bid. The sequence of work shall be (1) Remove and store fixtures, detectors and speakers along with removal of ceiling, (2) Provide temporary support for wired fixtures and devices to be reinstalled in new ceiling at approximately the same location. Use chains for lighting fixture support. (3) Clean and reinstall in the new or replaced ceilings. Provide new lamps when so noted. Provide temporary relocation of exit signs to original location when exit is reactivated.

## 3.5 WORK OUTSIDE OF REMODEL AREAS

- A. Provide new wiring systems in concealed ceiling spaces, unless the structure is open to the floor below.
- B. For work outside of the project area assume that removal and replacement of ceiling tiles is required in all finished areas. Spaces above existing ceilings are highly congested.
- C. Route wiring around obstructions and provide pull boxes per code. Carefully remove, store or temporarily hang and re-install in undamaged condition all electrical equipment, lighting fixtures and ceiling tiles where access to perform work is required. Clean prior to re-installation. Provide new lamps when so noted.

## 3.6 NEW DEVICES IN REMODEL AREAS

- A. Provide flush mounting for devices in existing walls. Fish conduit in wall. Where existing boxes are indicated to be reused, extend box as necessary and provide new devices and plates.
- B. Contractor is cautioned that the existing building contains clay tile and concrete walls. New devices may require cutting and patching, and it shall be the responsibility of the contractor to

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provide all cutting and patching required for the installation of the Division 26 work. Contractor shall investigate existing areas prior to bid and shall include all costs of such work in the bid.

C. This facility has wiring embedded in raceways in concrete slabs. Provide new concealed wiring to last outlet or pull box before homerun to panel.

END OF SECTION

## SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

#### PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS
  - A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUBMITTALS

- A. Product Data: For each type of product.
- B. Field quality-control reports.

#### PART 2 - PRODUCTS

## 2.1 CONDUCTORS AND CABLES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Alcan Products Corporation; Alcan Cable Division.
  - 2. Alpha Wire.
  - 3. Belden Inc.
  - 4. Encore Wire Corporation.
  - 5. General Cable Technologies Corporation.
  - 6. Southwire Incorporated.
- B. Copper Conductors: Comply with NEMA WC 70/ICEA S-95-658.
- C. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type THW-2, Type THHN-THWN, Type XHHW-2.

#### 2.2 CONNECTORS AND SPLICES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. AFC Cable Systems, Inc.
  - 2. Gardner Bender.

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- 3. Hubbell Power Systems, Inc.
- 4. Ideal Industries, Inc.
- 5. Ilsco; a branch of Bardes Corporation.
- 6. NSi Industries LLC.
- 7. O-Z/Gedney; a brand of the EGS Electrical Group.
- 8. 3M; Electrical Markets Division.
- 9. Tyco Electronics.
- B. Description: UL listed, factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.
- C. For #14 through #10 AWG wire sizes, provide insulated spring wire connectors or insulated compression connectors.
- D. For #8 AWG wire, use solderless pressure connectors with insulating sleeves.
- E. For #6 and larger: Compression connectors using compression dies designed for the exact connector being terminated. Provide insulting sleeves manufactured specifically for the connector being used. Mechanical termination integral to overcurrent protective devices are also acceptable.

## 2.3 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.

## PART 3 - EXECUTION

## 3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger, except VFC cable, which shall be extra flexible stranded.

# 3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Exposed Feeders and Branch Circuits: Type THHN-THWN, single conductors in raceway.

- B. Feeders and Branch Circuits Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN-THWN, single conductors in raceway.
- C. Feeders and Branch Circuits Concealed in below grade concrete walls, below Slabs-on-Grade, and Underground: Type XHHW-2, single conductors in raceway.
- D. Feeder and Branch Circuits exposed above roofing: XHHW-2.
- E. Variable Frequency Controller Output Circuits: Type XHHW-2 in metal conduit.

## 3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
- B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.
- C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."
- G. Complete cable tray systems installation according to Section 260536 "Cable Trays for Electrical Systems" prior to installing conductors and cables.

## 3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torquetightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
  - 1. Use oxide inhibitor in each splice, termination, and tap for aluminum conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

## 3.5 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."
- B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

## 3.6 PENETRATIONS

- A. Penetrate fire barriers, smoke barriers, vapor barriers, roofing materials and other rated architectural elements in a manner that preserves the rating of the architectural element.
- B. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 078413 "Penetration Firestopping."

#### 3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Perform the following tests and inspections:
  - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
  - 2. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner. Correct deficiencies determined during the scan.
    - a. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each splice 11 months after date of Substantial Completion.
    - b. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
    - c. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken and observations after remedial action.

- D. Test and Inspection Reports: Prepare a written report to record the following:
  - 1. Procedures used.
  - 2. Results that comply with requirements.
  - 3. Results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- E. Cables will be considered defective if they do not pass tests and inspections.

END OF SECTION

## SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

## PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control reports.
- C. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

## PART 2 - PRODUCTS

#### 2.1 GENERAL

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

## 2.2 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
  - 1. Solid Conductors: ASTM B 3.
  - 2. Stranded Conductors: ASTM B 8.
  - 3. Tinned Conductors: ASTM B 33.

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## 2.3 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.
  - 1. Pipe Connectors: Clamp type, sized for pipe.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- D. Bus-bar Connectors: Mechanical type, cast silicon bronze, solder less compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

## PART 3 - EXECUTION

## 3.1 APPLICATIONS

- A. Provide grounding and bonding required by NFPA 70, as adopted by the local authority having jurisdiction. Detailed aspects of code requirements for grounding and bonding may not be indicated within the contract documents, however, all aspects of code compliance are the responsibility of the contractor.
- B. Conductors: Install solid conductor for No.10 AWG and smaller, and stranded conductors for larger unless otherwise indicated.
- C. Isolated Grounding Conductors: Green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.
- D. Conductor Terminations and Connections:
  - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
  - 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
  - 3. Connections to Ground Rods at Test Wells: Bolted connectors.
  - 4. Connections to Structural Steel: Welded connectors.

## 3.2 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

#### 3.3 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
  - 1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
  - 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
  - 3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

#### 3.4 LABELING

A. Comply with requirements in Division 26 Section "Identification for Electrical Systems" Article for instruction signs. The label or its text shall be green.

#### 3.5 SIZE OF GROUND WIRE

- A. As required by National Electric Code. Where ground wire is exposed to physical damage protect with rigid non-ferrous conduit as permitted by applicable code.
- 3.6 GROUND CONNECTION OF PIPING
  - A. Metal internal piping shall be grounded.

## 3.7 CONNECTION TO THE POWER GROUND BUS

- A. Furnish and install connections in accordance with the codes; including but not limited to:
  - 1. Raceway system
  - 2. Switchboard
  - 3. Service neutral

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- 4. "Separately derived system" (transformer or emergency power supply)
- 5. Electrically operated equipment and devices.
- B. No device or equipment shall be connected for electrical service which has a neutral conductor connected to a grounding conductor or to the frame within the device or equipment.

## 3.8 METHOD OF CONNECTIONS

A. Make all ground connections and ground cable splices by thermal welding or copper compression set type connectors U.L. listed for grounding purposes. Grounding lugs, where provided as standard manufacturer's items on equipment furnished, may be used.

## 3.9 EXPANSION FITTINGS

A. In conduit runs requiring an expansion fitting, a bonding jumper shall be installed around the fitting to maintain continuous ground continuity. Jumper shall allow for maximum movement of the fitting.

## 3.10 GROUND CABLE CROSSING EXPANSION JOINTS

A. Ground cables crossing expansion joints or similar separations in structures or paved areas shall be protected from damage by means of suitable approved devices or methods of installation which will provide the necessary slack in the cable across the joint to permit movement. Stranded or other approved flexible copper run or jumper shall be used across such separations.

## 3.11 GROUNDING FOR FEEDERS

A. Provide a grounding bushing with ground conductor sized in accordance with NEC table 250.122 to the grounding bus in the panelboard and switchboards.

# END OF SECTION

## SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 260548 "Seismic Controls For Electrical Systems" for products and installation requirements necessary for compliance with seismic criteria.

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Hangers and supports for electrical equipment and systems.
  - 2. Concrete bases (housekeeping pads) for electrical equipment.

#### 1.3 REFERENCES

- A. ASTM A325: American Society for Testing and Materials Standard Specification for Structural Bolts.
- B. ASTM A603: American Society for Testing and Materials Standard Specification for Zinc-Coated Steel Structural Wire Rope.
- C. IBC: International Building Code. as adopted and amended by local jurisdiction.
- D. ICC: International Code Council.
- E. MFMA-3: Metal Framing Manufacturers Association's Metal Framing Standards Publication.
- F. MSS SP-58: Manufacturers Standardization Society of the Valve and Fittings Industry Standard for Pipe Hangers and Supports Materials, Design, and Manufacture.
- G. NECA 1: National Electrical Contractors Association Standard Practices for Good Workmanship in Electrical Contracting.

## 1.4 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. IMC: Intermediate metal conduit.
- C. RMC: Rigid metal conduit.

## 1.5 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design supports for raceways, including comprehensive engineering analysis by a qualified professional engineer, registered in the same state as the project, using appropriate performance requirements and design criteria. Refer to: Section 260548 "Seismic Controls for Electrical Systems".
  - 1. Design supports for raceways capable of supporting combined weight of supported systems and its contents plus 25% spare space capacity.
  - 2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- B. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

## 1.6 SUBMITTALS

- A. Product Data: For the following:
  - 1. Steel slotted support systems.
- B. Shop Drawings: Show fabrication and installation details.
  - 1. Trapeze hangers. Include Product Data for components.
  - 2. Steel slotted channel systems. Include Product Data for components.
  - 3. Equipment supports.
- C. Seismic Data: Signed and sealed by a qualified professional engineer and associated structural calculations. Coordinate with submittal requirements of Section 260548 "Seismic Controls for Electrical Systems".

# 1.7 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

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HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Section "Roof Accessories."

# PART 2 - PRODUCTS

# 2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Allied Tube & Conduit.
    - b. Cooper B-Line, Inc.; a division of Cooper Industries.
    - c. ERICO International Corporation.
    - d. GS Metals Corp.
    - e. Thomas & Betts Corporation.
    - f. Unistrut; Tyco International, Ltd.
    - g. Wesanco, Inc.
  - 2. Finishes:
    - a. Plated Coatings: Zinc Plated. Fitting and accessories zinc plated
    - b. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-3. Fitting and accessories hot-dip galvanized or stainless steel where hot-dip galvanized is not available.
    - c. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4. . Fitting and accessories PVC coated or stainless steel where PVC coated is not available
    - d. High Performance Coatings: Manufacturer's standard epoxy or acrylic coating applied according to MFMA-4.
  - 3. Channel Dimensions: Selected for applicable load criteria.
- B. Aluminum Slotted Support Systems: Structural-grade, factory-formed, aluminum channels and angles. Comply with MFMA-3, factory-fabricated components
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Allied Tube & Conduit.
    - b. Cooper B-Line, Inc.; a division of Cooper Industries.
    - c. GS Metals Corp.
    - d. ERICO International Corporation.
    - e. Thomas & Betts Corporation.
    - f. Unistrut; Tyco International, Ltd.
  - 2. Fittings and Accessories: Products of channel and angle manufacturer and designed for use with those items.
  - 3. Fitting and Accessory Materials: Same as channels and angles
  - 4. Rated Strength: Selected to suit structural loading and applicable seismic forces.

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- C. Raceway and Cable Supports: As described in NECA 1.
- D. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- E. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.
- F. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- G. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
  - 1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
    - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - 1) Hilti Inc.
      - 2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
      - 3) MKT Fastening, LLC.
      - 4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.
  - 2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
    - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - 1) Cooper B-Line, Inc.; a division of Cooper Industries.
      - 2) Empire Tool and Manufacturing Co., Inc.
      - 3) Hilti Inc.
      - 4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
      - 5) MKT Fastening, LLC.
  - 3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
  - 4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
  - 5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
  - 6. Toggle Bolts: All-steel springhead type.
  - 7. Hanger Rods: Threaded steel.

## 2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Division 05 Section "Metal Fabrications" for steel shapes and plates.

## PART 3 - EXECUTION

#### 3.1 SUPPORT INSTALLATION -GENERAL

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 50% of load.
- C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
  - 1. To Wood: Fasten with lag screws or through bolts.
  - 2. To New Concrete: Bolt to concrete inserts or use expansion anchor fasteners.
  - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
  - 4. To Existing Concrete: Expansion anchor fasteners.
  - 5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
  - 6. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
  - 7. To Light Steel: Sheet metal screws.
  - 8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.
- D. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

## 3.2 HANGERS AND SUPPORTS FOR RACEWAYS

- A. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as scheduled in NECA 1, where Table 1 lists maximum spacings less than stated in NFPA 70. Minimum rod size shall be 3/8 inch in diameter.
- B. Suspended ceiling systems: Do not attach raceways to ceiling suspension system hangers.
- C. Raceways 3/4" (20mm) and smaller serving equipment located within ceiling cavity or mounted on or supported by the ceiling grid system may be supported by dedicated #12 ga. galvanized, soft annealed mild steel wire hangers. Two raceways maximum per hanger. Attach raceways to wires with clips manufactured for the purpose.
- D. Raceways 1" and larger: Provide lay-in pipe hangers on 1/4" (6mm) or larger all threaded rods attached to metal ceiling inserts or to structural members at not greater than spacing noted above and within 12" (300mm) of each change in direction.
- E. Multiple Raceways or Cables: When more than two raceways will use the same routing, group together on a channel trapeze support system supported by threaded rods attached to metal ceiling inserts or structural members. Size supports for multiple raceways for 25% future capacity. Trapeze shall be sized in accordance with SMACNA Guidelines with conduit weight taken to be as listed for same size pipe filled of water.
  - 1. Secure raceways and cables to these supports with two-bolt conduit clamps.
- F. Raceway Support Methods: In addition to methods described in NECA 1, EMT may be supported by openings through structure members, as permitted in NFPA 70.

## 3.3 VERTICAL CABLE SUPPORTS

A. Provide cable support for vertical cable runs as required by NFPA 70.

# 3.4 SUPPORT FOR LIGHT FIXTURES

- A. Provide support system designed by registered engineer for all light fixtures over 50 pounds.
- B. Recessed mounted type fixtures less than 20 pounds installed in lay-in ceiling: Provide four support clips, Caddy #515 or similar, (one each corner) which lock light fixture to ceiling tees after light fixture is installed. In addition, provide for each light fixture two #14 earthquake chains or #12 wires secured located at diagonally opposite fixture corners and attached to structural members above suspended ceiling.
- C. Recessed mounted type fixtures less than 50 pounds installed in lay-in ceiling: Provide four support clips, Caddy #515 or similar , (one each corner) which lock light fixture to ceiling tees

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HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS after light fixture is installed. In addition, provide for each light fixture four #14 earthquake chains or #12 wires (one in each corner) installed taut and secured to structural members above suspended ceiling.

- D. Recessed mounted type fixtures installed in plaster or gypsum ceiling. Provide support chains or wires similar to lay-in ceiling requirements except also provide plaster frame compatible with light fixture. Attach support wires/chains to plaster frame.
- E. Surface mounted type fixtures less than 50 pounds installed on suspended ceilings: Provide metal carrying channels above suspended ceiling spanning between ceiling support channels. Attached fixture through ceiling to carrying channels. In addition, provide for each light fixture four #14 earthquake chains or #12 wires installed taut from metal carrying channels to structural members above suspended ceiling.
- F. Surface mounted type fixtures less than 20 pounds installed on suspended ceilings: Provide support frame above suspended ceiling. Attached fixture through ceiling to support frame. In addition, provide for each light fixture two #14 earthquake chains or #12 wires secured located at diagonally opposite fixture corners of plaster frame secured to structural members above suspended ceiling.
- G. Surface mounted type fixtures less than 50 pounds designed to be supported from fixture junction box:
  - 1. Provide hanger bars between structural members. Attach junction box directly to hanger bars.
  - 2. Attach heavy formed steel straps to the outlet box by means of threaded stems with locknuts, or directly to the outlet box where the light fixture is specifically so designed. Support junction box from structure with 1/4" threaded rod.
- H. Pendant mounted type fixtures less than 50 pounds:
  - 1. For fixtures with rigid pendants, provide swivel ball aligners at canopy.
  - 2. Where mounted below suspended ceiling, support fixture from structural members above ceiling by means of minimum 1/4" threaded stems with locknuts.

# 3.5 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Comply with installation requirements in Division 05 Section "Metal Fabrications" for sitefabricated metal supports.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- C. Field Welding: Comply with AWS D1.1/D1.1M.

# 3.6 COATINGS

- A. Touchup: Clean field cuts, field welds and abraded areas of PVC, Epoxy and Acrylic coated products. Re-coat exposed areas immediately after erecting hangers and supports. Follow manufacturer's instructions for repair of coated products.
- B. Hot Dip Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION

# SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 DEFINITIONS

- A. AASHTO American Association of State Highway and Transportation Officials
- B. ARC: Aluminum rigid conduit.
- C. EMT: Electrical metallic tubing.
- D. EPDM: Ethylene-propylene-diene terpolymer rubber.
- E. FMC: Flexible metal conduit
- F. GRC: Galvanized rigid steel conduit.
- G. IMC: Intermediate metal conduit.
- H. LFMC: Liquid tight flexible metal conduit.
- I. LFNC: Liquidtight flexible nonmetallic conduit.
- J. NBR: Acrylonitrile-butadiene rubber.
- K. RNC: Rigid nonmetallic conduit.
- L. SCTE Society of Cable Telecommunications Engineers

## 1.3 SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, cabinets, and handholes.

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- B. Shop Drawings: Include plans, elevations, sections, and attachment details, and attachments to other work for the following:
  - 1. Custom enclosures and cabinets.
  - 2. For handholes and boxes for underground wiring with any dimension in excess of 30 inches, include the following:
    - a. Duct entry provisions, including locations and duct sizes.
    - b. Frame and cover design.
    - c. Grounding details.
    - d. Dimensioned locations of cable rack inserts, and pulling-in and lifting irons.
    - e. Joint details.
- C. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with work of other trades, using input from installers of items involved:
  - 1. Structural members in paths of conduit groups with common supports.
  - 2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

## PART 2 - PRODUCTS

- 2.1 GENERAL
  - A. Listing and Labeling: Products shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
  - B. Comply with NFPA 70 requirements.
  - C. Minimum Raceway Size: 3/4" except for switch legs, fixture whips, door controls, between devices within a wall, and devices between two adjacent walls.

# 2.2 METAL CONDUITS, TUBING, AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following
  - 1. AFC Cable Systems, Inc.
  - 2. Alflex Inc.
  - 3. Allied Tube & Conduit; a Tyco International Ltd. Co.
  - 4. Anamet Electrical, Inc.; Anaconda Metal Hose.
  - 5. Electri-Flex Company.
  - 6. Eaton
  - 7. Maverick Tube Corporation.
  - 8. O-Z/Gedney Emerson
  - 9. Western Tube and Conduit Corporation.
  - 10. Wheatland Tube Company; a division of John Maneely Company.

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- B. Conduit
  - 1. GRC: Comply with ANSI C80.1 and UL 6. Hot dipped zinc galvanized.
  - 2. ARC: Comply with ANSI C80.5 and UL 6A.
  - 3. IMC: Comply with ANSI C80.6 and UL 1242.
  - 4. FMC: Comply with UL 1; zinc-coated steel or aluminum.
  - 5. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.
  - 6. Fittings: Comply with NEMA FB 1 and ÚL 514B.
    - a. Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
    - b. Material: Match conduit material.
    - c. Type: Threaded, compression or split.
  - 7. Joint Compound: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.
- C. EMT: Comply with ANSI C80.3 and UL 797.
  - 1. Couplings: Compression. Steel. May be constructed integral with tubing.
  - 2. Indentor, Tap On, and Die Cast fittings are not acceptable.
- D. Deflection/Expansion Fittings: Comply with UL 651, rated for environmental conditions where installed, and including flexible internal or external bonding jumper.

## 2.3 NONMETALLIC CONDUIT AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following
  - 1. AFC Cable Systems, Inc.
  - 2. Anamet Electrical, Inc.
  - 3. Arnco Corporation.
  - 4. Carlon
  - 5. CANTEX Inc.
  - 6. CertainTeed Corp.
  - 7. Condux International, Inc.
  - 8. ElecSYS, Inc.
  - 9. Electri-Flex Company.
  - 10. Lamson & Sessions; Carlon Electrical Products.
  - 11. Manhattan/CDT/Cole-Flex.
  - 12. RACO; a Hubbell company.
  - 13. Thomas & Betts Corporation.
- B. RNC
  - 1. Complying with NEMA TC 2 and UL 651. Type EPC-40-PVC.
  - 2. Fittings: Comply with NEMA TC 3; match to conduit or tubing type and material. Couplings may be constructed integral to raceway.
- C. LFNC: Comply with UL 1660. Fittings shall comply with UL 514B

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- D. Solvent cements and adhesive primers shall have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- E. Solvent cements and adhesive primers shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

## 2.4 METAL WIREWAYS AND AUXILIARY GUTTERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following
  - 1. Eaton-Cooper B-Line, Inc.
  - 2. Hoffman; a Pentair company.
  - 3. Husky
  - 4. Schneider Electric.
- B. Construction:
  - 1. Sheet metal: sized and shaped as indicated,
  - 2. Indoors: NEMA 250, Type 1, hinged cover.
  - 3. Outdoors and unheated spaces: NEMA 250 Type 3R, Flanged and gasketed cover.
  - 4. Stainless steel Type 4X in kitchens, sterilization rooms, laundry, washdown, and similar environments. Flanged and gasketed cover.
- C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, holddown straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- D. Finish: Manufacturer's standard enamel finish.

## 2.5 SURFACE RACEWAYS

- A. Surface Metal Raceways: Galvanized steel with snap-on covers complying with UL 5. Manufacturer's standard enamel finish and color.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following
  - 1. Thomas & Betts Corporation.
  - 2. Walker Systems, Inc.; Wiremold Company (The).
  - 3. Wiremold Company (The); Electrical Sales Division.

# 2.6 BOXES, CABINETS, ENCLOSURES

- A. Suitable and listed for the environment in which they are installed per UL 50 and NEMA 250.
  - 1. Indoors: NEMA 250, Type 1.
  - 2. Outdoors: NEMA 250 Type 3R, Flanged and gasketed cover.
  - 3. Stainless steel Type 4X in kitchens, sterilization rooms, laundry, washdown, and similar environments. Flanged and gasketed cover.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following
  - 1. Eaton.
  - 2. EGS/Appleton Electric.
  - 3. Erickson Electrical Equipment Company.
  - 4. Pentair Hoffman.
  - 5. Hubbell Incorporated; Killark Electric Manufacturing Co. Division.
  - 6. O-Z/Gedney; a unit of General Signal.
  - 7. RACO; a Hubbell Company.
  - 8. Robroy Industries, Inc.; Enclosure Division.
  - 9. Scott Fetzer Co; Adalet Division.
  - 10. Spring City Electrical Manufacturing Company.
  - 11. Thomas & Betts Corporation.
  - 12. Walker Systems, Inc.; Wiremold Company (The).
  - 13. Woodhead, Daniel Company; Woodhead Industries, Inc. Subsidiary.
- C. Sheet Steel Gage (Any Direction)
  - 1. Less than 24": 14 USS gauge.
  - 2. Greater than 24": 12 USS gauge.
- D. Outlet and Device Boxes
  - 1. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
  - 2. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, galvanized ferrous alloy for use with IMC and RMC, aluminum for use with ARC, Type FD.
  - 3. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.
  - 4. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb (23 kg). Outlet boxes designed for attachment of luminaires weighing more than 50 lb (23 kg) shall be listed and marked for the maximum allowable weight.
  - 5. Wall Device Box Dimensions: Minimum depth 2-1/8 inches. Gangable boxes are permitted.
  - 6. Floor Boxes
    - a. Fully adjustable, Sheet Metal or Cast Metal
    - b. Barrier to isolate power and communication outlets
    - c. Coverplate: Flush with floor with free swinging hinged door to access outlets. Finish: As selected by Architect.
  - 7. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

- E. Pull and Junction Boxes
  - 1. Small Sheet: NEMA OS 1.
  - 2. Cast-Metal: Comply with NEMA FB 1 and UL 1773, galvanized cast iron with gasketed cover.
  - 3. Access Cover as follows, unless otherwise indicated:
    - a. Screw Cover:
      - 1) Both cover dimensions less than 30 inches
      - 2) In line pulls with one cover dimension less than 16 inches
    - b. Either cover dimension greater than 30 inches: One or more hinged cover(s) with Latch.
- F. Cabinets and Enclosures
  - 1. Finished inside and out with manufacturer's standard enamel.
  - 2. Access Door:
    - a. Hinged with key latch to match panelboards.
    - b. Three point latch when dual doors are in use or when hinged side exceeds 47 inches.
    - c. Gasketed
  - 3. Metal barriers to separate wiring of different systems and voltage.
  - 4. Labeled with appropriate safety warnings
  - 5. Accessory feet where required for freestanding equipment.
  - 6. Interior Panels: Steel; all sides finished with manufacturer's standard enamel. Removeable. Hardware and accessories suitable for supporting equipment.
  - 7. Provisions for seismic anchoring and deflection per Section 260548 Seismic Controls for Electrical Systems.
  - 8. Lugs for grounding conductor(s) bonded to enclosure.

# 2.7 PENETRATIONS

- A. Sleeves and seals associated with penetrations shall preserve the fire, thermal, water, or other rating of the penetrated element. Refer to Division 7 for Penetration Firestopping products.
- B. Wall Sleeves
  - 1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
  - 2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
  - 3. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.
- C. Compressive Seals:
  - 1. Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway.

- 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Eaton/Crouse Hinds Link Seal.
  - b. Emerson/OZ Gedney
- 3. Sleeve or body casting: Cast iron, cast in place or core drill.
- 4. Sealing Elements EPDM rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
- 5. Pressure Plates: Glass Reinforced Nylon or PVC coated stainless steel
- 6. Connecting Bolts and Nuts: 316 type Stainless steel of length required to secure pressure plates to sealing elements.
- 7. Completed assembly suitable rated at 20 psig or 40 feet of head.
- D. Raceway Seal Fittings
  - 1. General
    - a. For use with GRC or IMC. Sealant fill, wire fill provisions and orientation to match application, location and containment requirement.
    - b. Sealing system, may be removed for replacement of wire without affecting integrity of raceway system.
    - c. Sealant or sealing material furnished by fitting manufacturer to match application and be compatible with wire insulation type and thermal rating.
  - 2. Foam Sealant: High expansion, two part urethane foam, 120 lb compressive strength and capable of withholding 22 feet of water head pressure. Complies with UL 94 fire rating HBF. American Polywater FST or equal.
  - 3. Sealing Bushings: Slotted PVC coated steel discs; neoprene sealing ring; stainless steel socket head cap screws and washers. Custom holes drilled to accommodate cables. Stainless steel socket head screws. Hot dipped galvanized malleable or ductile iron locking collars. Seals against gas or fluid pressure of 50 psig. O-Z Gedney CSB series.
  - 4. In Line Epoxy Cement Fill Fittings: For control of gasses and vapors, rated for 40% fill, liquid epoxy sealant, Emerson EY or EYAX series or equal.
  - 5. Comply with UL 1203 for explosion proof and dust ignition proof environments.

# PART 3 - EXECUTION

## 3.1 GENERAL

- A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits.
- B. Comply with NFPA 70.
- C. Comply with requirements in Division 26 Sections "Hangers and Supports for Electrical Systems" and "Seismic Controls for Electrical Systems" for hangers and supports.

D. Determine optimal raceway routes that result in coordination with all building systems. Determine pull box quantities, sizes and locations.

## 3.2 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
  - 1. Exposed Conduit: GRC.
  - 2. Concealed Conduit, Aboveground: GRC, IMC, EMT.
  - 3. Underground Conduit: RNČ, Type EPC-80-PVC, Type EPC-40-PVC.
  - 4. Boxes and Enclosures, Aboveground: NEMA 250, Type 4X, 4, or 3R
  - 5. Handholes and Boxes, Underground: Provide boxes suitable for the load rating and the application.
- B. Indoors
  - 1. Exposed, Not Subject to Physical Damage: EMT.
  - 2. Exposed and Subject to Damage: GRC.
    - a. Raceway locations include the following (any height):
      - 1) Loading dock.
      - 2) Gymnasiums
    - b. Raceway locations include the following, when below 8 feet above floor:
      - 1) Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
      - 2) Mechanical rooms.
  - 3. Concealed in Ceilings and Interior Walls and Partitions: EMT.
  - 4. Damp or Wet Locations: GRC.
  - 5. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4X stainless steel in institutional and commercial kitchens, trash compactor areas, at sump pumps, and similar damp, wet or corrosive locations.
- C. In Slabs: Where approved by the Structure Engineer, PVC Schedule 40.
- D. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in fire pump rooms, damp locations, and wet locations.
- E. Raceway Fittings: Compatible with raceways and suitable for use and location.
  - 1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
  - 2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
  - 3. EMT: Use compression fittings. Comply with NEMA FB 2.10. Cast metal fittings are not acceptable

- 4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.
- F. Install nonferrous conduit or tubing for circuits operating above 60 Hz. Where aluminum raceways are installed for such circuits and pass through concrete, install in nonmetallic sleeve.

## 3.3 INSTALLATION

- A. Install raceways parallel or perpendicular to structural building lines. Conceal conduit and EMT within finished walls, ceilings, and floors except as follows:
  - 1. In rooms without a dropped ceiling.
  - 2. In non-public spaces such as mechanical, electrical, communication rooms.
  - 3. Parking garages.
  - 4. Unless otherwise indicated.
- B. Do not route:
  - 1. Parallel horizontal runs of raceways within 6 inches (150 mm) or directly above flues, steam, or hot-water piping.
  - 2. Nonmetallic conduit where ambient temperature exceeds 120 deg F (49 deg C)
  - 3. Aluminum conduits or fittings in contact with concrete or earth.
- C. Complete raceway installation before starting conductor installation.
- D. Anchors and Supports:
  - 1. Positively attach raceways, boxes, and enclosures to structure, do not attach to supports for mechanical or other non-electrical systems.
  - 2. Support raceways within 12 inches (300 mm) of enclosures to which attached.
  - 3. Set boxes, enclosures, and cabinets plumb.
- E. Raceway Terminations:
  - 1. Cut conduit perpendicular to the length. For conduits 2-inch (53-mm) trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.
  - 2. Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors.
  - 3. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch (35mm) trade size and insulated throat metal bushings on 1-1/2-inch (41-mm) trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
  - 4. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
  - 5. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

- 6. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- F. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap, plug or compressive seal underground raceways designated as spare at point of below grade entry into building or at first pulling access point.
- G. Raceways Embedded in Slabs:
  - 1. Only use in floors and slabs that are not-fire rated, or where manufacturer obtains approval of authority having jurisdiction by submitting appropriate documentation.
  - 2. Run conduits, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum10-foot (3-m) intervals. Crossovers of raceways shall not exceed minimum cover requirements.
  - 3. Arrange raceways to keep a minimum of 1.5 inches (50 mm) of concrete cover in all directions. Tie to rebar at intervals which will preserve minimum cover and prevent flotation.
  - 4. Do not embed threadless fittings in concrete.
  - 5. Change from nonmetallic to metallic raceway before rising above floor.
- H. Stub-ups:
  - 1. Above Recessed Ceilings: Use a raceway bushing or insulated fitting to terminate stubups not terminated in hubs or in an enclosure.
  - 2. Through slab, comply with either:
    - a. Arrange stub-ups so curved portions of bends are not visible above finished slab.
    - b. Terminate conduit at threaded GRC coupling with top of coupling 1/8" below top of slab.
- I. Outlet and Device Boxes:
  - 1. Mount outlet boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install wall outlet boxes with height measured to center of box unless otherwise indicated.
  - 2. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a rain-tight connection between box and cover plate or supported equipment and box.
  - 3. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel. Do not compromise wall ratings for fire and sound separation.
  - 4. Locate boxes so that cover or plate will not span different building finishes.
  - 5. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
  - 6. Box construction and size to match device requirements. Where device is furnished under this or other Divisions of this specification obtain requirements prior to roughing in.
  - 7. Set floor boxes level and adjust to match finished floor surface.

- 8. Provide cast outlet boxes in exterior, wet, or cast in concrete locations.
- J. Surface Raceways:
  - 1. Install surface raceways only where indicated.
  - 2. Install surface raceway with a minimum 2-inch radius control at bend points.
  - 3. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.
- K. Movement:
  - 1. General
    - a. Select raceway elements to accommodate the expected movement. Set initial position of raceway movement element as appropriate to accommodate ultimate worst case movement.
    - b. Install raceway supports to allow for expansion movement.
    - c. Provide bonding jumper for fittings without a continuous ground path.
  - 2. Raceway thermal performance:
    - a. Install in each run of aboveground metallic raceway that is located where environmental temperature change may exceed 100 deg F (55 deg C) and that has straight-run length that exceeds 100 feet (30 m).
    - b. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F (0.0115 mm per meter of length of straight run per deg C) of temperature change for metal conduits.
  - 3. Structural and Architectural Elements: Install expansion fittings or flexible raceways at all locations where raceways cross building or structure expansion joints. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation.
  - 4. Where piston fittings are used provide slack conductor in adjacent pull boxes or equipment to alleviate stress on conductor terminations during expansion joint movement.
- L. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for recessed and semi-recessed luminaires, equipment subject to vibration, noise transmission, transformers and motors.

# 3.4 UNDERGROUND RACEWAY SYSTEMS

- A. Refer to Division 31 Section "Earth Moving." For trenching and backfill. Excavate trench bottom to provide firm and uniform support.
- B. Direct-Buried Conduit:
  - 1. Trade size minimum: 1 inch, except <sup>3</sup>/<sub>4</sub> inch may be used for runs shorter than 30 feet.
  - 2. Comply with manufacturer's written instructions for solvent welding RNC and fittings.
  - 3. After installing conduit, backfill and compact soil. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and

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contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction.

- 4. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor. Cover exterior of conduit from 3 inches above grade to 12 inches below grade with a bitumastic tape or coating.
  - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete for a minimum of 12 inches on each side of the coupling.
  - b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.
- 5. Underground Warning Tape: Comply with requirements in Division 26 Section "Identification for Electrical Systems."
- 6. Raceways routed under slab on grade shall be kept a minimum of six inches below the underside of the slab.
- C. Handholes and Boxes
  - 1. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.
  - 2. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.
  - 3. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade. Provide offset risers to match slope of cover to slope of finished grade.
  - 4. Install handholes with bottom below frost line.
  - 5. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

# 3.5 SEALS

- A. Select seals as appropriate for the element (ie: liquids, gasses, dust, and/or vapor) the seal is isolating.
- B. Follow manufacturer's instructions when installing sealants and seal fittings.
- C. Location:
  - 1. Seal fitting shall be accessible.
  - 2. Locate seal fittings so no fittings or boxes are between the seal and the element requiring isolation.

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- 3. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish like that of adjacent plates or surfaces.
- D. Transition to RMC or IMC where required by code or seal fitting application.
- E. Seal the following points:
  - 1. Where raceways pass from warm to cold locations:
    - a. Boundaries of refrigerated spaces
    - b. Boundaries between heated and unheated spaces.
  - 2. Raceway connections to continually wet environments such as sumps and wells.
  - 3. To limit transmittance of hazardous liquids, gasses, dust, and/or vapors.
  - 4. Where raceways 2" and larger rise from below grade to terminate at stand or slab mounted exterior utilization equipment.

## 3.6 PENETRATIONS

1.

- A. Penetrate fire barriers, smoke barriers, vapor barriers, acoustic barriers, waterproofing, roofing materials, floors, walls, foundations, and other rated architectural and structural elements and assemblies in a manner that preserves the integrity of the rating and the intended performance.
  - 1. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Division 07 requirements for penetration firestopping.
  - 2. Roof penetrations shall be made in accordance with the recommendations of the roofing system supplier and shall not compromise the roofing warranty.
- B. Penetration of below grade walls and slab on grade:
  - Comply with either of the following:
    - a. Cast raceways into wall or slab.
    - b. Provide sleeve and compression seal between sleeve and raceway. The compression seal manufacturer shall have documentation indicating that the sleeve is compatible with the seal.
  - 2. Seal interior of raceways:
    - a. Seal Bushings: Utilize at all penetrations where other seals are not specified. Provide a pull box for sealing bushing(s) at point of entry when end use equipment is located away from wall or elevated above slab.
    - b. Foam Sealant:
      - 1) For phase conductor sizes #2 AWG and smaller.
      - 2) For feeder (not service) phase conductor sizes larger than #2AWG, where no portion of the raceway entering the building or equipment travels below grade at a height that is above the point of entry or the point of raceway termination at the equipment
      - 3) Apply foam sealant at raceway entry point into first interior and exterior pull point.
      - 4) Apply foam sealant at all raceways entering handholes and manholes.
    - c. Below slab raceways are not required to be sealed when the following conditions are met:

- a) The raceway travels below slab from one interior building point to another, and the slab entrance and exit points are at same height.
- b) The raceway horizontal travel distance is less than 20 feet or the raceway is less than 2" in diameter and the horizontal travel distance is less than 100 feet.

# 3.7 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.
  - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
  - 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

# END OF SECTION

## SECTION 260533.10 - FLUSH FLOOR OUTLETS

## PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: List of legends and description of materials and process used for pre-marking wall plates.
- C. Operation and Maintenance Data: For wiring devices, include all manufacturers' packing label warnings and instruction manuals including labeling conditions.

#### 1.3 COORDINATION

A. Provide receptacles to match plug configurations for Owner furnished equipment.

## PART 2 - PRODUCTS

## 2.1 GENERAL

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

#### 2.2 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide one of the following for each device type:
  - 1. Cooper Wiring Devices; a division of Cooper Industries, Inc. (Cooper).
  - 2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
  - 3. Leviton Mfg. Company Inc. (Leviton).
  - 4. Lew

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#### FLUSH FLOOR OUTLETS

- 5. Pass & Seymour/Legrand; Wiring Devices & Accessories (Pass & Seymour).
- 6. Thomas & Betts
- 7. Walker
- 8. Watt Stopper (The);
- B. Source Limitations: Obtain each type of wiring device and associated wall plate through one source from a single manufacturer.

# 2.3 ROUND RECESSED BOX ASSEMBLY - SINGLE SERVICE

- A. Above Grade: Formed steel, concrete tight, shallow construction.
- B. On Grade: Cast Iron, threaded hubs, shallow construction.
- C. Covers
  - 1. Power duplex receptacle: Forged brass, duplex flap. Hubbell S-3925.
  - 2. Telephone and communications outlet.
    - a. Single: Forged brass cover with 2-1/8" and 3/4" threaded openings.
    - b. Duplex: Forged brass duplex flap.
  - 3. Special Purpose Outlet: Forged brass cover with 2-1/8" and 3/4" threaded openings. Provide accessories to suit device configuration.
- D. Carpet Flanges
  - 1. Poly carbonate.
  - 2. Brass 6.25" diameter
  - 3. Brass 5.25" diameter
  - 4. Aluminum

## 2.4 RECTANGULAR RECESSED BOX ASSEMBLY - SINGLE OR MULTIPLE SERVICE

- A. Above Grade: Formed steel, concrete tight, shallow construction.
  - 1. Single gang.
  - 2. Two gang cast iron (formed steel not available).
  - 3. Three gang cast iron (formed steel not available).
- B. On Grade: cast iron, threaded hubs, shallow construction.
  - 1. Single gang.
  - 2. Two gang.
  - 3. Three gang.
- C. COVERS
  - 1. Power-duplex receptacle: Forged brass, duplex flap.
  - 2. Telephone and communications outlet:
    - a. Single: Forged brass cover with 2-1/8" and 3/4" threaded openings.

- b. Duplex: Forged brass duplex flap.
- 3. Special Purpose Outlet: Forged brass cover with 2-1/8" and 3/4" threaded openings. Provide accessories to suit device configuration.
- D. Carpet Flanges

1.

- Single gang:
  - a. Polycarbonate
  - b. Aluminum
  - c. Brass
- 2. Two Gang
  - a. Polycarbonate
  - b. Aluminum
  - c. Brass
- 3. Three Gang:
  - a. Polycarbonate
  - b. Aluminum
  - c. Brass

## 2.5 COMBINATION FLUSH FLOOR BOX

- A. Multi-Service flush outlet box suitable for poured concrete construction with adjustment after pour. Capacity for power, telephone and special systems, as shown on drawings. Duplex receptacle per Section 262726 - Wiring Devices, provide communication device activation for telephone, data and special systems wiring. Devices shall be installed within the box side wall and be capable of be in use with the coverplate door closed.
- B. Flush coverplate with wire access door or opening. Color as selected by Architect.
- C. Recessed coverplate suitable for carpet installation with wire access door or opening. Color as selected by Architect.
- D. Multi-Service flush box suitable for up to (2) duplex devices.
  - 1. Cover gray
  - 2. Cover brown
  - 3. Cover Ivory
  - 4. Cover beige
  - 5. Cover black
- E. Multi-Service flush box suitable for up to (4) duplex devices.
  - 1. Stamped steel, or cast iron
    - a. Cover gray
    - b. Cover brown
    - c. Cover ivory
    - d. Cover beige
    - e. Cover black
f. Cover - Buffed finish, die-cast aluminum

#### PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. Coordinate with Architect for exact location of all floor outlets prior to rough-in.
- B. Install cast iron floor boxes on grade above moisture barrier. Do not penetrate moisture barrie).
- C. Install stamped steel (concrete tight) floor boxes for above grade installations.
- D. Adjust top surface to level and flush with finished floor.

# 3.2 RECEPTACLES

A. Conform with Section 262726 - Wiring Devices.

## 3.3 CARPET FLANGES

A. Install carpet flanges after installation of final floor covering.

END OF SECTION

# SECTION 260548 - SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 RELATED SECTIONS

- A. Section 260529 "Hangers and Supports for Electrical Systems" for commonly used electrical supports and installation requirements.
- B. Refer to Product specification paragraphs of individual Division 26 Sections

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of seismic-restraint component used.
    - a. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by any of the following:
      - 1) an evaluation service member of ICC-ES
      - 2) an agency acceptable to authorities having jurisdiction.
    - b. Annotate to indicate application of each product submitted and compliance with requirements.
  - 2. Coordinate submittal information with Section 260529 "Hangers and Supports for Electrical Systems" and organize the submittals of that section and this section making it clear which products will be associated with systems requiring seismic restraint.
- B. Delegated-Design Submittal: For support and anchoring of electrical products.
  - 1. Engineer of Record: Professional Structural Engineer with appropriate seismic certification shall provide design calculations and details for seismic restraints complying with performance requirements and design criteria described herein and as established by the authority having jurisdiction. Submit detailed designs of equipment support,

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anchoring and mounting with associated design calculations signed and sealed by the qualified professional engineer responsible for their preparation.

- a. Submittal review by the Engineer of Record for Division 26 will not include a review of structural engineering.
- b. Submit documentation as requested by the authority having jurisdiction to the authority having jurisdiction, obtain approval and comply with all review comments.
- 2. Comply with ASCE/SEI 7 requirements for non-structural components and submit the following items. Format shall be suitable for acceptance by the authority having jurisdiction.
  - a. Component seismic qualifications and special certifications. Refer to specification sections for additional requirements.
  - b. Design calculations accounting for seismic demand on non-structural components.
  - c. Details of component anchoring for each of the products in the Division 26 specification sections, unless exempted by ASCE 7. Details shall demonstrate attachment compatibility with building structure and equipment.
  - d. Details of component supports and seismic restraints for each of the products in the Division 26 specification sections, unless exempted by ASCE 7. Details shall demonstrate attachment compatibility with building structure and equipment.
  - e. Details allowing for seismic movement:
    - Flexible raceway, cabling, and busway connections to the top of switchgear, switchboards, and other floor mounted equipment which is anchored at its base as a free cantilever and/or supports restraining free cantilever movement.
    - 2) Raceways, cabling, and busway transitioning across multiple floors or across expansion joints.
    - 3) Service entrances to building where soil movement is expected between the building and soil supported systems.
    - 4) Where raceways connect to components mounted on seismic isolation systems.
- 3. Seismic Restraint Details:
  - a. As appropriate to the product item, seismic restraints include anchors, supports, bracing, isolation or other means to force the product to withstand the seismic performance criteria and to not adversely affect itself or other systems with the limits of movement established by the design.
  - b. Design Analysis: To support selection and arrangement of seismic restraints. Include calculations of combined tensile and shear loads.
  - c. Details: Indicate fabrication and arrangement. Detail attachments of restraints to the restrained items and to the structure. Show attachment locations, methods, and spacings. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events. Indicate association with vibration isolation devices. Cross reference seismic restraint and supporting elements to tabulated product data.

- C. Coordination Drawings: Show coordination of seismic restraint for electrical components with other systems and equipment in the vicinity, including other supports and seismic restraints. Electrical components include:
  - 1. Non-seismically restrained systems that may affect seismically restrained systems
  - 2. Raceways
  - 3. Control and monitoring panels
  - 4. Panelboards.
  - 5. Switchboards.
  - 6. Transformers.

# PART 2 - PRODUCTS

# 2.1 PERFORMANCE REQUIREMENTS

- A. Electrical products in Divisions 26 and as reference by other Divisions to this Section; their associated product supports, attachments, anchors, braces, seismic restraints; and integrated assemblies thereof; shall be designed and constructed per the performance requirements specified herein.
- B. Seismic Criteria:
  - 1. Refer to the International Building Code(IBC) as adopted and amended by the local authority having jurisdiction the project site to determine seismic force criteria. Refer to ASCE 7 for seismic design requirements for nonstructural components.
  - 2. Refer to the Structural Drawings for the earthquake design data required by IBC 1603.1.5 applicable to the project site and building.
  - 3. Determine seismic criteria applicable to equipment at specific locations within the building, for example: ground floor versus roof top seismic acceleration.
- C. Electrical products shall have an ASCE/SEI 7 Component Importance Factor, Ip, assigned as follows:
  - 1. As specified in individual sections of the product specifications for special certifications per ASCE/SEI 7 paragraph 13.2.2.
  - 2. An Ip of 1.5 is assigned to Emergency and Life Safety System products and connecting wire and raceway. Refer to drawings for emergency and life safety system components which include, but not limited to:
    - a. Fire Pump, Transfer Switch, Controller, and associated systems
    - b. Generators and generator supporting systems
    - c. Transfer Switches, switchgear, switchboards, panelboards, transformers, and other active electrical equipment supporting loads per Articles 700 and 701 of the NEC.
    - d. Egress and Exit Lighting
    - e. Fire Alarm System Control and Notification Panels
  - 3. Unless building code requirements determine otherwise, the Component Importance Factor of electrical systems not defined above is 1.0.

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SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

- D. Building Interface: Review building architectural, structural, and mechanical systems and design and construct non-compromising means of attachment and anchoring.
- E. Seismic restraint products shall be approved for the application by an evaluation service member of ICC-ES. Seismic-restraint devices shall have horizontal and vertical load testing and analysis.

#### 2.2 SPECIAL CERTIFICATIONS

- A. Provide special certifications per ASCE/SEI 7 paragraph 13.2.2 for electrical products(components) with an Ip greater than 1.0 when located in Seismic Design Categories C through F. Testing shall be in accordance with the following:
  - 1. ICC ES 156 Seismic Certification By Shake Table Testing of Non-Structural Components.
- B. Product certifications may be made by certifying products to levels that exceed the Performance Requirements.

## 2.3 RESTRAINT CHANNEL BRACINGS

A. Description: MFMA-4, shop- or field-fabricated bracing assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end, with other matching components, and with corrosion-resistant coating; rated in tension, compression, and torsion forces.

#### 2.4 RESTRAINT CABLES

A. Restraint Cables: ASTM A 603 galvanized-steel cables. End connections made of steel assemblies with thimbles, brackets, swivel, and bolts designed for restraining cable service; with a minimum of two clamping bolts for cable engagement.

#### 2.5 SEISMIC-RESTRAINT ACCESSORIES

- A. Hanger-Rod Stiffener: Steel tube, angle, or steel slotted-support-system sleeve clamped or bolted to hanger rod.
- B. Hinged and Swivel Brace Attachments: Multifunctional steel connectors for attaching hangers to rigid channel bracings or restraint cables.
- C. Bushings for Floor-Mounted Equipment Anchor Bolts: Neoprene bushings designed for rigid equipment mountings and matched to type and size of anchor bolts and studs.

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- D. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings and matched to type and size of attachment devices used.
- E. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.

#### 2.6 MECHANICAL ANCHOR BOLTS

A. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

#### 2.7 ADHESIVE ANCHOR BOLTS

A. Adhesive Anchor Bolts: Drilled-in and capsule anchor system containing PVC or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive. Provide anchor bolts and hardware with zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

#### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine areas and equipment to receive seismic-control devices for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for reinforcement and cast-in-place anchors to verify actual locations before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 APPLICATIONS

A. Anchor, support, and restrain electrical products in accordance with the delegated design details required by this specification section.

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B. Strength of Support and Seismic-Restraint Assemblies: Select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.

# 3.3 SEISMIC-RESTRAINT DEVICE INSTALLATION

- A. Coordinate the location of embedded connection hardware with supported equipment attachment and mounting points and with requirements for concrete reinforcement and formwork specified in specification Division 3.
- B. Equipment and Hanger Restraints:
  - 1. Install resilient, bolt-isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch.
  - 2. Install seismic-restraint devices using methods determined by the delegated design submittal of this specification section.
- C. Install cables so they do not bend across edges of adjacent equipment or building structure.
- D. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.
- E. Attachment to Structure: Anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.
- F. Drilled-in Anchors:
  - 1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
  - 2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
  - 3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
  - 4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
  - 5. Set anchors to manufacturer's recommended torque using a torque wrench.
  - 6. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

## 3.4 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

- A. Install flexible connections in runs of raceways, cables, wireways, cable trays, and busways where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where connection is terminated to equipment that is anchored to a different structural element from the one supporting them as they approach equipment.
  - 1. Flexible connection shall allow for worst case movement between the independently supported elements.
  - 2. Initial positons of the flexible or sliding element shall be based on initial position of structure relevant to movement in any direction.
- B. Sliding or compression/expansion raceway elements shall have adjacent pull boxes to allow for ingress or pay out of cable/wire associated with movement of the element.

END OF SECTION 260548.16

# SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Equipment identification nameplates.
  - 2. Identification for conductors, cables AC and MC cables
  - 3. Underground-line warning tape.
  - 4. Warning labels and signs.
  - 5. Instruction signs.
  - 6. Receptacle Identification Labels
  - 7. Miscellaneous identification products.

#### 1.3 REFERENCES

- A. American National Standards Institute (ANSI):
  1. ANSI A13.1 "Scheme for Identification of Piping Systems"
- B. Occupational Safety and Health Administration (OSHA). 29 CFR Labor Chapter XVII Part 1910-145 "Occupational and Safety Health Standards" 1992.
- C. Washington Administrative Code (WAC) 296-24 Part B-2 "Safety Color Code for Marking Physical Hazards."

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each electrical identification product indicated.
- B. Samples: For each type of label and sign to illustrate size, colors, lettering style, mounting provisions, and graphic features of identification products.
- C. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.

## 1.5 QUALITY ASSURANCE

- A. Comply with ANSI A13.1and IEEE C2..
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.
- E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

#### 1.6 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.
- B. Note that equipment names and room numbers shown on the Contract Drawings may not be final names and numbers. Confirm all final naming prior to label manufacture.
- C. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- D. Coordinate installation of identifying devices with location of access panels and doors.
- E. Install identifying devices before installing acoustical ceilings and similar concealment.

# PART 2 - PRODUCTS

## 2.1 EQUIPMENT NAMEPLATES

- A. Materials:
  - 1. Engraved plastic laminate three-layer laminated plastic with punched or drilled holes for screw mounting
  - 2. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed
  - 3. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process.
  - 4. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Overlay shall provide a weatherproof and UV-resistant seal for label.

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- 5. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch (25 mm)
- B. Dimension
  - 1. Nameplate minimum of 1 3/4" high by 5" wide.
  - 2. Lettering height for panel or equipment identifier @ 1/4".
  - 3. Lettering height for remaining lines @ 1/8" high with 1/8" spacing between lines.
  - 4. Normal System: White letters on black background.
  - 5. Comply with ANSI 13.1.
- C. Panelboard Nameplates
  - 1. Provide engraved plastic nameplate for each new panelboard with the following information:
    - Line 1: Panelboard Name
    - Line 2: Source from which panel is fed (e.g.Fed From SWBD 4N2A)
    - Line 3: Transfer switch from which panel is fed (if applicable)

Line 4: Amps, voltage, phase and wire

- D. Disconnects, Starters, Combination Starters and Other Devices
  - 1. Provide phenolic nameplate for each device with the following information:

Line 1: Load served

Line 2: Panelboard and circuit number from which device is fed

Line 3: Fuse size or breaker size as applicable

## 2.2 CONDUCTOR, CABLE AND AC AND MC CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each conductor and cable size.
- B. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.
- C. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

- D. Snap-Around Labels: Slit, pre-tensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of conductor or cable it identifies and to stay in place by gripping action.
- E. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch, with stamped legend, punched for use with self-locking cable tie fastener.

# 2.3 UNDERGROUND-LINE WARNING TAPE

- A. Tape:
  - 1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
  - 2. Printing on tape shall be permanent and shall not be damaged by burial operations.
  - 3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.
- B. Color and Printing:
  - 1. Comply with ANSI Z535.1 through ANSI Z535.5.
  - 2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, HIGH VOLTAGE.
  - 3. Inscriptions for Orange-Colored Tapes: TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE.
- C. Protective Tapes Suitable for Conductive or Inductive Tracing.
  - 1. Detectable three-layer laminate, consisting of a printed pigmented polyolefin film, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core, bright-colored, continuous-printed with the inscription indicated above, compounded for direct-burial service.
  - 2. Overall Thickness: 5 mils.
  - 3. Foil Core Thickness: 0.35 mil.

## 2.4 WARNING LABELS AND SIGNS

- A. Comply with NFPA 70 and 29 CFR 1910.145.
- B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.
- C. Baked-Enamel Warning Signs:
  - 1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
  - 2. 1/4-inch grommets in corners for mounting.
  - 3. Nominal size, 7 by 10 inches.

- D. Metal-Backed, Butyrate Warning Signs:
  - 1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396inch galvanized-steel backing; and with colors, legend, and size required for application.
  - 2. 1/4-inch grommets in corners for mounting.
  - 3. Nominal size, 10 by 14 inches.
- E. Warning label and sign shall include, but are not limited to, the following legends:
  - 1. Multiple Power Source Warning: "DANGER ELECTRICAL SHOCK HAZARD -EQUIPMENT HAS MULTIPLE POWER SOURCES."
  - 2. Workspace Clearance Warning: "WARNING OSHA REGULATION AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."

# 2.5 INSTRUCTION SIGNS

- A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch thick for signs up to 20 sq. inches and 1/8 inch thick for larger sizes.
  - 1. Engraved legend with black letters on white face.
  - 2. Punched or drilled for mechanical fasteners.
  - 3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.
- B. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch.
- C. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.

# 2.6 RECEPTACLE IDENTIFICATION LABELS

- A. Materials (Where engraved device faceplates are not used)
  - 1. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Overlay shall provide a weatherproof and UV-resistant seal for label.
- B. Identification
  - 1. Label normal receptacle cover plates with the circuit number supplying them below the device using 3/16" high, black filled letters.
  - 2. For all receptacles other than 15 and 20 amp, 120 volts, provide separate nameplate with ampere rating, voltage and phase.

# 2.7 CABLE TIES

- A. General-Purpose Cable Ties: Fungus inert, self extinguishing, one piece, self locking, Type 6/6 nylon.
  - 1. Minimum Width: 3/16 inch.
  - 2. Tensile Strength at 73 deg F, According to ASTM D 638: 12,000 psi.
  - 3. Temperature Range: Minus 40 to plus 185 deg F.
  - 4. Color: Black except where used for color-coding.
- B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self extinguishing, one piece, self locking, Type 6/6 nylon.
  - 1. Minimum Width: 3/16 inch.
  - 2. Tensile Strength at 73 deg F, According to ASTM D 638: 12,000 psi.
  - 3. Temperature Range: Minus 40 to plus 185 deg F.
  - 4. Color: Black.
- C. Plenum-Rated Cable Ties: Self extinguishing, UV stabilized, one piece, self locking.
  - 1. Minimum Width: 3/16 inch.
  - 2. Tensile Strength at 73 deg F, According to ASTM D 638: 7000 psi.
  - 3. UL 94 Flame Rating: 94V-0.
  - 4. Temperature Range: Minus 50 to plus 284 deg F.
  - 5. Color: Black.

## 2.8 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in Division 09 painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

#### PART 3 - EXECUTION

#### 3.1 INSTALLATION - GENERAL

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- C. Apply identification devices to surfaces that require finish after completing finish work.

- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- F. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:
  - 1. Outdoors: UV-stabilized nylon.
  - 2. In Spaces Handling Environmental Air: Plenum rated.
- G. Painted Identification: Comply with requirements in Division 09 painting Sections for surface preparation and paint application.

# 3.2 EQUIPMENT IDENTIFICATION:

- A. Label and mark equipment per all applicable codes.
- B. On each unit of equipment, install unique designation nameplate that is consistent with naming used in wiring diagrams, schedules, and the Operation and Maintenance Manual.
- C. In addition to equipment listed in Part 2 provide nameplates for:
  - 1. Access doors for concealed electrical devices
  - 2. Transformers
  - 3. Enclosed over-current protective devices
  - 4. Electrical cabinets, enclosures and terminal cabinets
  - 5. Contactors
  - 6. Variable speed drives
  - 7. Monitoring and control panels and equipment
- D. Confirm all final naming prior to label manufacture.
- E. Labeling Instructions:
  - 1. Indoor Equipment: Engraved, laminated acrylic or melamine label.
  - 2. Outdoor Equipment: Engraved, laminated acrylic or melamine label with screw fasteners
  - 3. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
  - 4. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

# 3.3 CIRCUIT CONDUCTOR IDENTIFICATION

- A. Power-Circuit Conductor Identification, 600 V or Less:
  - 1. For conductors in vaults, pull and junction boxes, manholes, and handholes, use colorcoding conductor tape to identify the phase.

- 2. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder and branch-circuit conductors.
  - a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
  - b. Colors for 208/120-V Circuits:
    - 1) Phase A: Black.
    - 2) Phase B: Red.
    - 3) Phase C: Blue.
    - 4) Neutral: White
    - 5) Equipment Ground: Green
    - 6) Isolated Ground: Green with yellow tracer
  - c. Colors for 480/277-V Circuits:
    - 1) Phase A: Brown.
    - 2) Phase B: Orange.
    - 3) Phase C: Yellow.
    - 4) Neutral: Gray
    - 5) Equipment Ground: Green
    - 6) Isolated Ground: Green with yellow tracer
  - d. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
- 3. Conductors to Be Extended in the Future: Attach self adhesive label to conductors and list source.
- B. Power-Circuit Conductor Identification, More than 600 V: For conductors in vaults, pull and junction boxes, manholes, and handholes, use metal tags **with circuit designation**. For conductors to be extended in the future, attach self metal tag to conductors and list source. Install tags at all points of accessibility including manholes, pad-mounted switches and interior switch-gear. Firmly attach all tags to each cable phase using plastic tie wraps. Position tags so that they are clearly legible to the observer.
- C. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
  - 1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
  - 2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
  - 3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.

# 3.4 RACEWAY IDENTIFICATION

A. Junction Box Color Coding

1. Color Code all junction and pull boxes installed in accessible ceiling spaces and exposed in unfinished areas using spray paint on the box and entire cover in the following manner:

<u>System</u>	<u>Color</u>
480 Volt Power	Brown
277 volt lighting	Yellow
120/208 volt	Unpainted
Emergency Power	Orange
Fire Alarm	Red
Telephone/Network	Black
Television	Gold
Access Control	Gray
Intercom	White

2. Use black felt tip marker following painting to indicate the circuit numbers in 1" (25mm) high letters contained within.

# 3.5 UNDER GROUND LINE IDENTIFICATION

- A. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, and communication wiring.
  - 1. Install underground-line warning tape for direct-buried cables, cables in raceway and duct banks.
- B. Underground-Line Warning Tape Installation: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.

#### 3.6 WARNING SIGNS

- A. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Selfadhesive warning.
  - 1. Comply with 29 CFR 1910.145.
  - 2. Identify system voltage with black letters on an orange background.
  - 3. Apply to exterior of door, cover, or other access.
  - 4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:
    - a. Power transfer switches.
    - b. Controls with external control power connections.

# END OF SECTION

# SECTION 260923 - LIGHTING CONTROL DEVICES

## PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS
  - A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
  - B. Related Sections include the following:
    - 1. Section 260519 Low Voltage Electrical Power Conductors and Cables
    - 2. Section 260943 Network Lighting Controls
    - 3. Section 265100 Interior Lighting
    - 4. Section 265600 Exterior Lighting

#### 1.2 SUMMARY

- A. This Section includes the following lighting control devices:
  - 1. Stand alone room automatic controls
- B. This Section includes the following daylighting control devices:
  - 1. Dimmed control of electronic dimming ballasts and drivers with photo sensor(s).

#### 1.3 DEFINITIONS

- A. LED: Light-Emitting Diode
- B. PIR: Passive Infrared
- C. DT: Dual Technology

## 1.4 SUBMITTALS

- A. Make submittals in accordance with Section 260500 Common Work Results For Electrical.
- B. Product Data: Provide clearly marked and legible data sheets for each item of equipment being installed on the project. This shall include each major replaceable component that is part of a larger assembly. Data sheets should clearly indicate:
  - 1. Equipment manufacturer, make, model number, size, nameplate data, etc.
  - 2. Dimensional and performance data for specific unit provided as appropriate
  - 3. Required environmental operating parameters

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#### LIGHTING CONTROL DEVICES

- 4. UL, FM and ETL listing and category
- 5. Manufacturer contact information including address, telephone number, facsimile number, email address, web site address and contact person or persons.
- 6. Local manufacturer's representative contact information including address, telephone number, facsimile number, email address, web site address and contact person or persons.
- C. Shop Drawings: Show installation details for occupancy and light-level sensors.
  - 1. Lighting plan showing location, orientation, and coverage area of each sensor. This plan shall take into consideration the size and use of each space as well as the specific capabilities of submitted manufacturer's equipment to provide proper coverage to the areas of control.
  - 2. Interconnection diagrams showing field-installed wiring.
- D. Label List: Submit list of proposed text for all labels prior to manufacturing for review and approval by Owner's representative.
- E. Warranty: Submit a copy of product warranty that complies with contract document requirements. Where these requirements exceed manufacturer's standard warranty include cost of extended warranty in contract price.
- F. Maintenance Requirements: Submit maintenance requirements manual or guidelines. This document should detail the requirements necessary to comply with the warranty. This is required for the submittal process and is in addition to the O&M requirements.
- G. Samples: Provide sample devices and finishes plus other samples when requested, as part of the submittal process.
- H. Commissioning Checklist: Submit a copy of the proposed commissioning checklist to be utilized for this project.
- I. Commissioning Results: Submit a copy of the completed commissioning documents.

## 1.5 COORDINATION

- A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.
- 1.6 QUALITY ASSURANCE
  - A. Qualifications

- 1. Manufacturer shall have been in the business of manufacturing and providing service for lighting control equipment for similar capabilities and size, under the same name and ownership, for a minimum of three years preceding bid date of the project.
- 2. All components and assemblies shall be factory pre-tested prior to installation.
- 3. Factory trained technicians shall be on site for start-up, commissioning and training.
- 4. Factory trained technicians shall be available for telephone support twenty-four (24) hours a day, seven (7) days a week.
- 5. Lighting control devices must be approved by the CEC (California Energy Commission).
- B. Regulatory Requirements
  - 1. Underwriters Laboratories: Provide U.L. listed lighting control equipment.
  - 2. Code of Federal Regulations: 47 CFR FCC All assemblies are to be in compliance with FCC emissions standards specified in Part 15 for Class A application.

## 1.7 WARRANTY

- A. Manufacturer's Warranty: The manufacturer shall provide a written warranty agreeing to provide parts to replace any portion of the lighting control system equipment that fails due to material or workmanship for a period of twelve months from warranty commencement.
- B. Warranty Commencement: Warranty shall begin at the point of substantial completion of the system installation, which is defined as the date when commissioning and owner training has been completed and the owner obtains beneficial use of the system.
- C. Warranty Replacement Parts: The manufacturer shall be able to ship replacement parts within 24 hours for any component that that fails due to material or workmanship during the warranty period.

#### PART 2 - PRODUCTS

#### 2.1 DAYLIGHT-HARVESTING DIMMING CONTROLS

- A. Manufacturer: Subject to compliance with the contract documents, provide products from one of the following manufacturers:
  - 1. Douglas
  - 2. Greengate (Cooper Controls)
  - 3. Leviton
  - 4. Lutron
  - 5. Novitas, Inc.
  - 6. PCI
  - 7. SensorSwitch
  - 8. Wattstopper
  - 9. Hubbell Building Automation, Inc.

- 10. Lighting Control & Design, Inc. (LC&D)
- Acuity Lighting Group, Inc. 11.
- Β. System Description: Sensing daylight and electrical lighting levels, the system shall adjust the indoor electrical lighting levels. As daylight increases, the lights shall be dimmed. 1.
  - Lighting control set point is based on two lighting conditions:
    - a. When no daylight is present (target level).
    - When significant daylight is present. b.
  - 2. Provide system programming with two hand-held, remote-control tools.
    - a. Initial setup tool.
      - Tool for occupants to adjust the target levels by increasing the set point up to 25 b. percent, or by minimizing the electric lighting level.
- C. Photo sensors shall provide an ON-set point and a separate OFF set point, thereby creating a dead band to prevent unnecessary cycling of the electric lights. Set point setting shall be verified with a digital volt meter connected to test leads provided by the sensor. Sensor shall send an electronic, low voltage signal to a remote power pack or other control device which is directly connected to the load. Footcandle level shall be set 30 fc or as noted on the drawings.
- D. Dimming sensors shall interface with the lighting fixture(s) in one of the following ways:
  - The photo sensor shall interface with a 0 to 10 VDC controllable electronic dimming 1 driver. Dimming sensor shall connect directly to the driver with 2 low voltage wires. Photo sensing element shall be a photoelectric sensor. Sensors shall be closed loop for single zone control or open loop for multi-zone control.
  - 2. The photo sensor shall interface with a control module that operates one or more 0 to 10 VDC controllable electronic dimming drivers. Dimming sensor shall connect directly to the control module with 2 low voltage wires. Photo sensing element shall be a photoelectric sensor. Sensors shall be closed loop for single zone control or open loop for multi-zone control

#### 2.2 STAND ALONE ROOM AUTOMATIC CONTROLS

- Α. Manufacturers:
  - Subject to compliance with the contract documents, products of one of the following 1. vendors are acceptable:
    - nLight by Sensor Switch, Acuity Brands Lighting, Inc.; a.
    - Wattstopper DLM b.
    - c. Lutron Energi Savr Node
    - d. Cooper Controls/Greengate Room Controller (for non-networked applications only)
- Β. Intelligent Room Controllers
  - Room Controllers must be designed to power and accept signals from remote low voltage 1. sensors, or other control devices, and directly switch the line voltage of the desired load controlled.
  - Room Controllers must accept 120, 240, or 277 VAC utilizing a dual tap transformer. 2.

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- 3. Room Controllers shall allow power for auxiliary devices, depending on model.
- 4. Room Controller shall employ Zero Cross Circuitry for each load, and shall be capable of switching a 20A load and dimming 0-10V loads. In addition, controllers shall be capable of dimming alternate methods, including but not limited to incandescent dimming, magnetic low voltage, forward phase electronic low voltage and LED drivers, and dimmable two-wire and three-wire fluorescent loads.
- 5. Room Controllers shall have 1, 2, or 3 switch legs, but no more than a 20A load per device.
- C. Ceiling Mounted Occupancy Sensors
  - Ceiling mounted dual technology digital (passive infrared and ultrasonic or microphonic) occupancy sensor. Furnish the Company's system which accommodates the square-foot coverage requirements for each area controlled, utilizing room controllers, digital occupancy sensors and accessories which suit the lighting and electrical system parameters.

#### 2.3 CONDUCTORS AND CABLES

- A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG, complying with Section 260519 Low Voltage Electrical Power Conductors and Cables.
- B. Classes 2 and 3 Control Cable: Multiconductor cable with stranded copper conductors not smaller than No. 22 AWG, complying with Section 260519 - Low Voltage Electrical Power Conductors and Cables. Provide plenum rated as required.
- C. Class 1 Control Cable: Multiconductor cable with stranded copper conductors not smaller than No. 18 AWG, complying with Section 260519 - Low Voltage Electrical Power Conductors and Cables. Provide plenum rated as required.
- D. Install unshielded, twisted-pair cable for control and signal transmission conductors, complying with Section 260519 - Low Voltage Electrical Power Conductors and Cables. Provide plenum rated as required.

#### PART 3 - EXECUTION

#### 3.1 SENSOR INSTALLATION

A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies.

- B. Install and aim sensors in locations to achieve at least 90 percent coverage of areas indicated. Install sensors in accordance with manufacturer's instructions. Do not exceed coverage limits specified in manufacturer's written instructions.
- C. Where sensors are integral to light fixtures, coordinate orientation and location of fixture with sensor position.

#### 3.2 DEVICE INSTALLATION

#### A. Dimmers:

- 1. Install dimmers within terms of their listing.
- 2. Verify that dimmers used for fan speed control are listed for that application.
- 3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.
- B. Arrangement of Devices: Group adjacent switches under single, multigang wall plates.

#### 3.3 WIRING INSTALLATION

- A. Wiring Method: Comply with Section 260519 Low Voltage Electrical Power Conductors and Cables.
- B. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.
- C. Size conductors according to lighting control device manufacturer's written instructions, unless otherwise indicated.
- D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

#### 3.4 IDENTIFICATION

- A. Identify components and power and control wiring according to Section 260553 Identification For Electrical Systems.
- B. Label time switches and contactors with a unique designation.

## 3.5 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections and prepare test reports:

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- 1. After installing time switches and sensors, and after electrical circuitry has been energized, adjust and test for compliance with manufacturers' commissioning checklist and section 260126 Maintenance and Testing of Electrical Systems.
- 2. Operational Test: Verify actuation of each sensor and adjust time delays.
- B. Remove and replace lighting control devices where test results indicate that they do not comply with specified requirements.
- C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

## 3.6 SYSTEM STARTUP AND COMMISSIONING

- A. Commissioning shall take place prior to demonstration of system to Owner. After the system has been installed the Contractor shall provide manufacturer's recommended commissioning with factory trained and authorized technicians on-site, to:
  - 1. Verify that the contractor has properly installed and interconnected all necessary components.
  - 2. Verify correct operation of all system components.
  - 3. Verify that all switch and contact inputs are in compliance with contract requirements.
  - 4. Occupancy sensors and photo-sensors: Ensure that each sensor is correctly placed and oriented to provide the intended function. Adjust sensor location if unanticipated obstructions are present that impede the proper operation of the device.
  - 5. Occupancy Sensors: Adjust sensitivity and time delay of the occupancy sensor and test to ensure it provides appropriate response. Set initial time delay for 15 minutes.
  - 6. Dual Technology Type Occupancy Sensors: If interferences occur, disable either PIR or ultrasonic technology as appropriate for application.
  - 7. Daylight harvesting: Calibrate sensors after all furnishings and interior finishes are installed. Adjust photo-sensor to determine the threshold for switching based upon the detected light level. Calibrate sensor under normal daylight levels and dusk light levels.
  - 8. Daylight dimming controls: Confirm that fluorescent lamps are pre-seasoned by manufacturer or season lamps as recommended by manufacturer prior to dimming.
  - 9. Submit completed verification checklist.

# 3.7 OWNER'S INSTRUCTIONS AND SYSTEM DEMONSTRATION

- A. System Demonstration
  - 1. Schedule demonstration a minimum of two-weeks prior to system turn over and substantial completion. Schedule with owner's representative and electrical engineer.
  - 2. Demonstrate complete system operation and contract compliance to designated owner's representative and engineer to prove system is functional and ready for comprehensive training.
- B. System Instruction

- The Contractor shall after one week (minimum) written notification to Architect conduct an instruction session during which all maintenance and operational aspects of the system will be described and demonstrated to personnel selected by the Owner. The session shall be conducted by a Contractor's representative thoroughly familiar with the characteristics of the system. O & M manual information regarding the system shall be turned over to the Architect prior to scheduling the instruction session.
- 2. Training shall utilize the following draft documents:
  - a. Draft O&M Manual
  - b. Contractor's record drawings
- 3. The training effort shall validate the O&M Manual and record drawing documentation.

END OF SECTION

# SECTION 260943 – NETWORK LIGHTING CONTROL

## PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
  - 1. Division 26 Section "Lighting Control Devices" for time clocks, photoelectric sensors, occupancy sensors, wallbox controls and multipole contactors.
  - 2. Division 26 Section "Central Dimming Controls" or "Modular Dimming Controls" for dimming control components.

#### 1.2 SUMMARY

- A. Section Includes: microprocessor based, networked, digital, addressable lighting control system including control relay panels, addressable relays, addressable wall switches, addressable photocells, network astronomical time clock, contact closure interface devices, analog sensors, digital addressable sensors, integration interface module(s), dimmers, digital addressable multi-input dimming ballasts, control workstation with graphic user interface (GUI), software, handheld programmer(s) and required accessories to meet performance indicated in the contract documents.
- B. All components of the system shall communicate via the digital intelligent lighting control network.

#### 1.3 REFERENCED STANDARDS

- A. American Society for Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
  - 1. ASHRAE 135-1995 and Addendum 135a and 135b: BACnet: A Data Communications Protocol for Building Automation and Control Networks
- B. The Institute of Electrical and Electronics Engineers, Inc. (IEEE)
   1. IEEE C62.41, Guide for Surge Voltages in Low-Voltage AC Power Circuits (ANSI)
- C. Underwriter's laboratories, Inc. (UL)
  - 1. UL 50, Standard for Enclosures for Electrical Equipment
  - 2. UL 486A, Standard for Wire Connectors and Soldering Lugs for Use with Copper Conductors
  - 3. UL Standard 489, Molded-Case Circuits Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures
  - 4. UL 508, Standard for Industrial Control Equipment

- 5. UL 916, Standard for Energy Management Equipment
- 6. UL 924, Standard for Emergency Lighting & Power Equipment
- D. National Electrical Manufacturer Association (NEMA) 1. 250 Enclosures
- E. Electronics Industries Alliance/Telecommunications Industry Association (EIA/TIA)
   1. EIA/TIA 485A-98
- F. Code of Federal Regulations
  - 1. 47 CFR FCC All assemblies to be in compliance with FCC emissions standards specified in Part 15 for Class A application.

# 1.4 DEFINITIONS AND ABBREVIATIONS

- A. BACnet<sup>™</sup> A networking communication protocol that complies with ASHRAE 135
- B. BAS building automation system typically the digital mechanical control system
- C. DALI: Digital addressable lighting interface.
- D. Digital Addressable System the switches, relays and accessory control devices shall be individually addressable and shall communicate (two-way) over a single UL listed Category 5, 4pair UTP cable or dedicated non-polarized conductor pair.
- E. LCP lighting control panel
- F. LonWorks<sup>™</sup> A control network technology platform for designing and implementing interoperable control devices and networks
- G. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling and power-limited circuits.
- H. Monitoring: Acquisition, processing, communication, and display of equipment status data, metered electrical parameter values, power quality evaluation data, event and alarm signals, tabulated reports, and event logs.
- I. PC Personal computer
- J. Power Line Carrier: Use of radio-frequency energy to transmit information over transmission lines whose primary purpose is the transmission of power.
- K. RS-485: A serial network protocol, similar to RS-232, complying with TIA-485-A.
- L. Schedule one ON and OFF cycle

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- M. TOD Time of Day
- N. UTP: Unshielded twisted pair.

## 1.5 SYSTEM DESCRIPTION

- A. Design Requirements
  - 1. Environmental Operating Conditions
    - a. Temperature:  $14^{\circ}$  F. (-10° C.) to  $104^{\circ}$  F. (40° C.)
    - b. Humidity: 45% relative humidity at  $32^{\circ}$  F. (0° C.) to 85% relative humidity at  $95^{\circ}$
    - F. (35° C.) c. Static Immunity: 15 kV
    - d. Conducted lightning and line transient immunity: 6 kV
- B. Performance Requirements: System shall have the following performance capabilities:
  - 1. Control Schemes
    - a. Time-of Day (TOD) control
    - b. Photocell control
    - c. Dimming control via 0-10 VDC
    - d. Daylighting control via photodiode inputs with range of set points adjustable at the Master Control panel or remotely via modem.
    - e. Astronomical sunrise and sunset control
    - f. Sweep Off with programmable duration Blink OFF Warning (10 second to 60 minute delay to OFF)
    - g. Manual after hours Override with programmable duration ON time and Blink OFF Warning
    - h. External contact closure control input
  - 2. Software
    - a. Control and Scheduling a visual representation of each device on the bus, with ability to show real time status and change the status of any individual device, relay, switch, photocell, or zone.
  - 3. Communications: System shall have the following communications operation and control capabilities:
    - a. RS-485 lighting control network via laptop serial connection to any lighting control panel, switch, photocell, or interface.
    - b. Work station via RS-485 lighting control network and via separate local area computer network connected to the RS-485 network.

# 1.6 SUBMITTALS

- A. General: Submittal documentation shall conform to the contract document submittal requirements including:
  - 1. Make submittals in accordance Section 260500 Common Work Results For Electrical.
  - 2. Additional requirements described in this specification section

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- B. Provide the following submittals for review and approval:
  - 1. Bill of Material: Provide a complete itemized list of all materials being supplied to meet the project requirements. Each item shall have a distinctive identification that shall correlate to and be consistent with the identifications on the product data sheets and shop drawings.
  - 2. Product Data: Provide data sheets for each individual item of equipment being installed on the project. This shall include each major replaceable component that is part of a larger assembly. Data sheets shall indicate:
    - a. Equipment manufacturer, make, model number, electrical requirements, performance data, dimensions, weight, arrangement of components and clearance and access requirements
    - b. Required environmental operating parameters
    - c. UL listing and category
    - d. Manufacturer contact information including address, telephone number, facsimile number, email address, web site address and contact person or persons.
    - e. Local manufacturer's representative contact information including address, telephone number, facsimile number, email address, web site address and contact person or persons.
    - f. Copies of price book sheets will not be acceptable as a submittal.
  - 3. Shop Drawings
    - a. Plan View Drawing: Indicate the exact locations of all components
    - b. One-line Block Drawing: Indicate interconnectivity requirements between all individual components and interfaces with other systems such as network, telephone and building control systems.
    - c. Typical Device Wiring Diagrams: provide component wiring diagram to indicate how each component is wired to specific terminals at both ends.
  - 4. Programming Information: provide individual programming information for each item of equipment being installed
  - 5. Label List: Submit list of proposed text for all labels prior to manufacturing for review and approval by Owner's representative.
  - 6. Software
    - a. Provide software programming and operating manual(s)
  - 7. Warranty Specimen: Provide specimen warranty that complies with contract document requirements. Where these requirements exceed manufacturer's standard warranty include cost of extended warranty in contract price.
  - 8. Maintenance Requirements: Provide maintenance requirements manual or guidelines. This document should detail the requirements necessary to comply with the warranty. This is required for the submittal process and is in addition to the O&M requirements.
  - 9. Samples: Provide sample switches and finishes plus other samples as indicated and when requested, as part of the submittal process.
  - 10. Quality Assurance
    - a. Specification Compliance Summary provide a document that indicates whether the vendor complies or does not comply with each specification requirement. When the vendor does not comply describe the deviation in detail and indicate how the vendor believes they are meeting the intent of the specification and the reason this should be approved.

- b. Provide documentation of manufacturer's burn-in factory test of assembled lighting control panels.
- C. Closeout Submittals: Provide the indicated project closeout documents and drawings when required by the Division 1 specifications
  - 1. Record Drawings hard copy and complete AutoCAD compatible drawing files on CD
  - 2. O&M Manuals hard copy and electronic format on CD
  - 3. Software Program
    - a. Provide software programming and operating manual.
    - b. Provide hard copy printout of all project specific software programming (this is not manufacturer's proprietary operating code).
    - c. Provide two (2) back-up CD sets with all software programs and graphics supplied and customized for the project.
    - d. Provide complete as-built hard copy and electronic copy on CD (Excel<sup>™</sup> format) of the relay map showing relay identification control schemes and load controlled.
    - e. Provide hard copy and electronic file on CD (Microsoft Word<sup>™</sup> or Excel<sup>™</sup> format) of the program schedules. Indicate all programs for control include load identification, relay, input device identification, time –of-day schedule, holiday schedule, etc. Provide in format similar to the attached specimen at the end of this specification section.
    - f. Provide printout of all software graphic screens.
    - g. Provide complete point (device) address list after all project specific software is installed and tested and accepted.
  - 4. System Passwords: provide a list of all system default passwords and provide a list of all other password holders allowed system access such a remote factory diagnostic access.
  - 5. Warranty with start and end dates clearly identified.
  - 6. Provide manufacturer's extended warranty offer and terms for the system, software and relays.
  - 7. Field quality control and commissioning test reports.
  - 8. Spare Parts and delivery receipt.
  - 9. Training signoff receipt.
  - 10. Training video DVD set.
  - 11. AHJ signoff where appropriate and required.
  - 12. Vendor's maintenance proposal.

#### 1.7 QUALITY ASSURANCE

- A. Qualifications
  - 1. Manufacturer shall have been in the business of manufacturing, installing and providing service for lighting control systems of similar capabilities and size, under the same name and Ownership, for a minimum of three years preceding bid date of the project.
  - 2. Manufacturer shall be financially sound and shall provide acceptable third party confirmation of same if requested.
  - 3. Manufacturer shall have factory trained technicians.
    - a. Factory trained technicians shall be on site for start-up, commissioning and training.

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- b. Factory trained technicians shall be available for on-site support within 24 hours of notification.
- c. Factory trained technicians shall be available for free of charge, telephone technical support twenty four (24) hours a day, seven (7) days a week.
- 4. Telephone support: Manufacturer shall provide free telephone programming support via modem during the warranty period.
- 5. Service: Manufacturer shall have maintenance agreements available for service during and after the warranty period.
- B. Regulatory Requirements
  - 1. Code of Federal Regulations
    - a. 47 CFR FCC: All assemblies are to be in compliance with FCC emissions standards specified in Part 15 for Class A application.
    - b. Telephone Override System shall also be in compliance with standards specified in Part 68.
- C. Component Pre-testing: All relay panels, switches, photocells, and interface devices shall be pre-wired at the factory. Each panel shall undergo complete performance, burn-in and operational testing of both individual components and complete system prior to shipping to site. All components shall undergo factory burn-in sufficient to mitigate "infancy failure" of components on-site during start-up and commissioning.
- D. Pre-Installation Meetings
  - 1. Contractor, vendor (or vendor's representative), Owner and engineer shall meet after submittals are approved and prior to start of low voltage control system installation, to discuss and agree on:
    - a. Schedule of system installation.
    - b. Programming documentation for lighting control schedules and control schemes.
    - c. Programming documentation for lighting control graphics.
    - d. Interface with building control system.
    - e. Telephone, wireless and network access.
    - f. System startup and commissioning schedule.
    - g. Record documentation requirements and schedule.
    - h. Training schedule.

## 1.8 COORDINATION

A. Coordinate the location of all exposed low voltage lighting control switches and sensor devices with architectural finishes and mill work to ensure symmetrical appearance and to avoid interferences.

#### 1.9 DELIVERY, STORAGE, AND HANDLING

A. Packing, Shipping, Handling, and Unloading

- 1. Contractor shall make all arrangements to have equipment properly packed for shipping conditions and shipped to site for timely delivery. Contractor shall make all arrangements for delivery and unloading on site.
- B. Acceptance at Site
  - 1. Contractor shall receive material on site and shall immediately open and inspect for damage and ensure correct materials have been received. Provide notice to Owner's representative of any problems and schedule impacts related to shipping damage and acceptance problems.
- C. Storage and Protection
  - 1. Once contractor has received material and inspected it, material shall be re-packed as necessary and stored in an environmentally protected and secure space in compliance with manufacturer's recommendations and requirements.

# 1.10 PROJECT SITE CONDITIONS

- A. Environmental Requirements
  - 1. Equipment shall not be stored on site until building is secured and has appropriate environmental control to meet manufacturer's requirements for proper storage and operation.

#### 1.11 WARRANTY

- A. Installation Warranty: The installing contractor shall provide a written warranty agreeing to provide labor and materials to replace any portion of the lighting control system equipment or wiring that fails due to materials or workmanship for a period of twelve months from warranty commencement.
- B. Manufacturer's Warranty: The manufacturer shall provide a written warranty agreeing to provide parts to replace any portion of the lighting control system equipment that fails due to material or workmanship for a period of three years from warranty commencement.
- C. Relay Warranty: In addition to the manufacturer's warranty above, the manufacturer shall provide a written warranty specifically for the relays. Warranty shall indicate warranty period and replacement process for each type of relay on the project. This minimum warranty period shall be three years and shall commence from the date of final acceptance.
- D. Software Warranty: Provide all software upgrades and patches issued by the manufacturer, free of charge during the warranty period.
- E. Warranty Commencement: Warranty shall begin at the point of substantial completion of the system installation, which is defined as the date when commissioning and Owner training has been completed and the Owner obtains beneficial use of the system.

F. Warranty Replacement Parts: The manufacturer shall be able to ship replacement parts within 24 hours for any component that that fails due to material or workmanship during the warranty period.

## 1.12 SYSTEM STARTUP, COMMISSIONING AND DEMONSTRATION

- A. Commissioning shall take place prior to demonstration of system to Owner. After the system has been installed and the network wiring and telephone lines are operational, the Contractor shall provide manufacturer's recommended commissioning with factory trained and authorized technicians on site, to:
  - 1. Verify that the contractor has properly installed and interconnected all necessary components
  - 2. Verify correct operation of all system components
  - 3. Test and verify fully functional communication wiring
  - 4. Verify each relay address and operation
  - 5. Verify each switch address and operation
  - 6. Verify each TOD schedule
  - 7. Verify that all relays for each schedule are functioning with the correct schedule
  - 8. Verify that all switch and contact inputs are in compliance with contract requirements
  - 9. Verify all schedule documentation. Correct deficiencies to hardware, software and documentation as necessary to comply with contract documents and reflect actual installation and programming
  - 10. Verify all software functions and capabilities
  - 11. Verify all interfaces with other systems are functioning correctly
  - 12. Test all overrides
  - 13. Test all connectivity functions including telephone overrides, wireless, handheld programmers, laptop links, etc. Test at each panel.
  - 14. Aim and adjust all occupancy sensors and photocell devices for proper operation.
  - 15. Verify proper operation of all workstation components and peripheral devices
  - 16. Verify all telephone and network links including factory troubleshooting connections for remote diagnostics.
- B. System Demonstration
  - 1. Contractor shall schedule demonstration a minimum of two-weeks prior to system turn over and substantial completion. Schedule with Owner's representative, electrical engineer, and factory service technician responsible for system commissioning.
  - 2. Demonstrate complete system operation and contract compliance to designated Owner's representative and engineer. This demonstration will not be as detailed as the separate Owner instruction. This demonstration will prove system is functional and ready for comprehensive training.
  - 3. Walk through the complete graphic screen package with the Owner's representative.
  - 4. Walk through the complete schedule with the Owner's representative and obtain sign-off.

# 1.13 TRAINING

3.

- A. System Instruction
  - 1. Contractor shall make arrangements for appropriate training space and furnishings similar to a normal classroom. Space shall be on-site where possible. Contractor shall provide temporary furnishings if required. Space shall be free of distracting noise and shall have temperature controlled similar to any classroom.
  - 2. Contractor shall provide two sessions of training
    - a. Original Session: Schedule the first four (4) hour session with the Owner's designated staff at least two-weeks prior to the training day. Training session shall be scheduled no sooner than 14 days and no later than 60 days after owner occupancy. Maximum of (5) five trainees per session. Training shall be provided by factory trained technician familiar with the specific installation. Provide reprogramming of the lighting control system based on owner's requested written changes.
    - b. Follow-up Session: Schedule a follow-up, four (4) hour session to take place no sooner than ninety days after the original session and no later than 30 days prior to the expiration date of the one (3)-year warranty period.
    - Training shall utilize the following draft documents:
    - a. Draft O&M Manual
    - b. Contractor's record drawings
    - c. Manufacturer trained technician
    - d. Owner's program schedule
  - 4. Video Recording
    - a. Provide professional digital video recording with audio, of the original training session. Training session shall be stored in digital format suitable for replay on a computer. Recording shall be good quality with intelligible sound.
    - b. Provide three complete DVD sets of training sessions
  - 5. The training effort will provide the Owner's designated staff with the knowledge to operate, maintain and make revisions to the program. It will also validate the O&M Manual and record drawing documentation.

# 1.14 SPARE COMPONENTS AND EXTRA DEVICES

- A. Maintenance Service. As part of project closeout, contractor shall provide manufacturer's recommended service contract for support during the warranty period and one additional year. Provide cost for:
  - 1. 24-hour telephone support
  - 2. Software upgrades
  - 3. On-site support
  - 4. Software revisions to graphical user interface
  - 5. Scheduled and recommended maintenance

## 1.15 SOFTWARE SERVICE AGREEMENT

- A. Technical Support: Beginning with Substantial Completion, provide software support for two years.
- B. Upgrade Service: Update software to latest version at Project completion. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system. Upgrade shall include new or revised licenses for use of the software.
  - 1. Provide 30 days' notice to Owner to allow scheduling and access to system and to allow Owner to upgrade computer equipment if necessary.

# PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Subject to compliance with the contract documents, products of one of the following vendors are acceptable:
  - 1. Acuity Brands Lighting, Inc.
  - 2. Crestron
  - 3. Douglas
  - 4. Hubbell Building Automation
  - 5. Intelligent Lighting Controls (ILC)
  - 6. Leviton Mfg. Company Inc.
  - 7. Lighting Control & Design (LC&D)
  - 8. Lutron
  - 9. NexLight
  - 10. Square D; a brand of Schneider Electric.
  - 11. Starfield Controls, Inc.
  - 12. Touch-Plate Technologies.
  - 13. Triatek, Inc.
  - 14. Wattstopper

## 2.2 LIGHTING RELAY CONTROL PANEL

- A. Enclosure: Each enclosure shall have the following features:
  - 1. NEMA 1 surface mounted (unless otherwise indicated) steel enclosure with lockable, hinged door.
  - 2. Minimum of 16 gauge steel construction, 18 gauge for remote relay enclosures (8 or less relays).
  - 3. Completely painted with baked enamel paint or powder coated process finish. Galvanized steel enclosure can is acceptable.

- 4. Code gauge steel barrier shall separate the load voltage(s) and the Class 2 control voltage compartments of the panel.
- 5. 16 AWG steel barrier shall separate the load voltages, 120 VAC and 277 VAC when both are present.
- 6. Panels must be available in various relay increments up to 48 relays per enclosure.
- 7. Panels must be able to be fully populated to maximum relay capacity without requiring the addition of any cards, additional electronics or additional power supply.

# B. BASIC LIGHTING CONTROL PANEL COMPONENTS

- 1. Microprocessor based controller, pre-assembled, plug-in electronic circuit boards including controller motherboard.
- 2. Relays
  - a. 20 Amp, zero crossing relay type rated for 200,000 operations and suitable for:
    - 1) 20 amperes 277/480 VAC Ballast
    - 2) 2400 watts tungsten, lamps
    - 3) 20 amperes HID lamp and ballast
    - 4) 1/2 HP, 120 VAC motor
    - 5) 1.5 HP, 240-277 VAC motor
- 3. Switch input module(s): Provide switch contact input module(s) with sufficient numbers of inputs to meet project requirements. Input types shall be completely user programmable to accept any combination of momentary, or maintained and two or three-wire switches.
- 4. Network module(s): Provide network communications modules of the types and in the quantities required to connect all LCP's in the network, work stations, laptops, LAN systems and specified interface systems.
- 5. Interconnect cables: Provide all necessary interconnect cables for the LCP, control work station, laptop (when utilized for maintenance or program entry).
- 6. Power supply: Provide dual voltage (120 VAC and 277 VAC) transformer with primary and secondary fusing and LED power *ON* indicator.
- 7. Required accessories: provide accessories required by this specification for the operation capabilities required and described.
- 8. Nonvolatile memory or Lithium battery backup shall be provided so data is not lost during power outages or brown outs lasting up to 1 year.
- 9. Filtering to reduce noise emissions on incoming power.
- 10. TVSS to mitigate impact from power line spikes.
- C. Network Communications Bus
  - 1. System shall communicate over one of the following bus mediums:
    - a. UL listed Category 5e, 4-pair UTP sequential daisy chain with end-of-line termination device
    - b. Two-wire, Class 2P, non-polarized bus in any connection topology such as star, loop or daisy chain or any combination of these
    - c. Fiber optic multimode or single mode cable as required by manufacturer's system
  - 2. RS-485 communications protocol
  - 3. Lighting Control LAN Link: Provide appropriate lighting control LAN module for each lighting control panel
- 4. Telephone Override: Provide a voice prompted telephone override interface module. Interface module shall accept up to 3 phone lines and allow up to 3 simultaneous phone calls. Provide voice prompted menu and a minimum of 999 unique pass codes (when required for the project).
- D. Operational Features
  - 1. Programmable astronomical date and time clock with a minimum of 1 year power loss protection, automatic leap year and daylight savings time adjustment.
  - 2. Relay Control
    - a. Individual control of each relay position in the network
    - b. Status indication of the state of each relay
    - c. Manual override of each relay
    - d. Sequenced ON of all relays with programmable stagger times to reduce the in-rush effects on the power system
    - e. Programmable grouping of relays from one relay per group up to every relay in the entire system.
    - f. Ability to assign any relay to any group without rewiring
    - g. Positive relay status feedback and failure to respond warning
  - 3. Programmable OFF flash warning, programmable from 10 seconds to 60 minutes of warning time.
  - 4. Refresh commands to outputs to assure proper status; refresh command interval on a user programmable rate of once every 3-30 minutes.
  - 5. Any switch shall be able to control any relay or group of relays anywhere on the network
  - 6. Programmable switch input module with sufficient capacity to meet the project requirements and capable of accepting inputs from dry contacts, 2 or 3-wire, maintained or momentary switches.
  - 7. Programmable switch input timers with intervals up to 18 hours
  - 8. Software capability to run a diagnostic check of the memory at any time. If the panel detects any problem with its memory after power up it shall provide warning indication a problem exists.
  - 9. Ability for each LCP to function independently of other panels if a network failure occurs. All the features listed here shall continue to operate.
  - 10. Automatic program re-boot and system restoration after a power outage of up to 14 days or more.
- E. Communications
  - 1. RS-485 and RS-232 serial communications ports connection for lighting control network connection and laptop connection to any lighting control panel.
  - 2. Work station via RS-485 and RS-232 lighting control network and via separate local area computer network connected to the RS-485 network.
    - a. Provide software and connectivity to the local area network to allow individual users to have ON/OFF control of their lighting using Windows based Software, a PC and an internet browser. Include multi-level password protections
  - 3. Wireless network
    - a. Provide full system remote programming, data logging, status, control function, diagnostic analysis over a telephone modem

- b. Include software, hardware and IEEE 802.11 compatible interface module, transmitting antennae and receiving antennae.
- F. Programming Means and Methods: System shall accept control at each LCP via one or all of the following:
  - 1. Local Keypad and Display: built in keypad and alpha numeric display with all commands in plain English.
  - 2. Hand-held Programmer and Display: provide portable, handheld device with operations and capabilities similar to the built-in keypad. Handheld device should communicate with the LAN and any panelboard using a connection to any LCP via a serial cable or with wireless infrared technology.
  - 3. Laptop computer via software and a built-in modem with direct connection via on-board serial port and cable.
  - 4. Control Computer Workstation with Connectivity and Software
    - Provide workstation configuration that includes the following components as a minimum: a. Pentium 4 CPU. 1.8 GHZ minimum clock speed, with a 60 gigabyte (GB) hard
      - a. Pentium 4 CPU, 1.8 GHZ minimum clock speed, with a 60 gigabyte (GB) hard disk, 512 MB synchronous dynamic random access memory (SDRAM) and expandable to 1 GB, two USB ports, two parallel ports and two asynchronous serial ports shall be provided for connection of peripherals, one 1.44M-3 1/2" floppy drive and one 24X CD RW drive.
    - b. Operating system for the computer operator workstation shall be Microsoft Windows NT, Windows XP or Windows 2000.
    - c. Microsoft wireless optical mouse
    - d. An enhanced keyboard with 101-key layout and dedicated numeric keypad for rapid data entry.
    - e. 17" color flat screen LCD monitor and video controller card shall provide a high resolution, SXGA monitor to display real time dynamic graphic data, execute operator commands, and report system activity. Video resolution shall be minimum 1280 by 1024 pixels. 250 candela per square meter brightness, 550:1 contrast ratio, 170 degree horizontal and vertical viewing angles, 50,000 hour life, anti-glare panel surface. View Sonic Model VE175b.
    - f. The system shall have modem compatibility with EIA-232C connection and automatic answer/originate capability. Minimum speed shall be 56 Kbps.
    - g. 10/100MBS Network card
    - Printer Include a printer for activity log, software documentation, alarm summary printing and report printing. 9-pin impact head dot matrix, bi-directional printer. High speed draft, 410 cps at 10 cpi, near letter quality at 77 cps at 10 cpi, 80 column, 240 x 144 dpi resolution; provide parallel port connectivity and optional Ethernet interface card, 32 kB input buffer. Epson Fx-880 series with required options.

# 2.3 EXTERNAL COMPONENTS AND ACCESSORIES

- A. Switches
  - 1. General Switches

- a. All system switches shall be digitally addressable and connected to the lighting control network bus with a single category 5, 4-pair unshielded twisted pair cable
- b. Switch quantities of 1 to 6 switches on a single gang face plate
- c. Provide switches in the quantity and configurations indicated at each station
- d. Engraved labeling capability for each switch button (stick on labels are not acceptable.)
- e. LED Annunciation
  - 1) On Status for each button
  - 2) Location LED always on, for each switch group location
- 2. Key Switches: Provide digitally addressable key switch where indicated on the documents
- 3. Switch Wall Plates: Provide white wall plates. Submit sample of each type when requested.
- B. Occupancy Sensor: Provide compatible occupancy sensors as required by contract drawings. Connect to switch input interface module and program the desired function.
- C. Photocell (exterior, ON/OFF applications): Provide digitally addressable photocell sensor and necessary interface module as required by the contract drawings. Photocell signal shall be transmitted to the LCP for processing and control. System shall display real time readout in footcandles. Trigger point(s) shall be programmable (photocells requiring screw driver sensitivity adjustment are not acceptable.
- D. Photo sensors (interior daylighting applications): Provide digitally addressable photo sensor daylight sensor(s) and necessary interface module(s). Photo sensor signal shall be transmitted to the LCP or digital addressable ballast for processing and control. System shall display real time readout in footcandles and trigger point(s) shall be programmable.

# 2.4 INTEROPERABILITY

When interfaces with other building systems are specified, the lighting control system shall have a tested, proven and completely seamless interface.

# A. Dimming

1. DMX 512 (theatrical dimming protocol)

# 2.5 SOFTWARE

- A. Time of Day Scheduling (TOD)
  - 1. Scheduling by building, area, zone, groups of zones, individually controlled lighting zones and groups of individually controlled lighting zones
  - 2. Each schedule shall provide beginning and ending dates and times (hours: minutes)
  - 3. Weekly repeating schedule capability, i.e. between 8:00 a.m. and 5:00 p.m., Monday through Friday
  - 4. Capability of entering date schedules in advance

- 5. Schedules shall be self-deleting when effective dates have passed
- 6. Leap years shall be adjusted automatically
- B. The Graphical User Interface (GUI)
  - 1. GUI workstation software shall make extensive use of color to communicate information; displaying 1024 by 768 pixels 24 bit True Color as a minimum, with infinite pan and zoom features to maintain image quality.
  - 2. Comprehensive software package completely compatible with Owner's current Windows platform
  - 3. Enables operators to manage the facilities on a day-to-day basis
    - a. Monitor real time status
    - b. Define and adjust schedules via a visual representation of each device on the bus
    - c. Ability to change the status of any individual device, relay or zone
    - d. "Point and Click" mouse interface based upon floor plans and area graphics
    - e. Adjust and monitor set points
  - 4. Enables operators to make all schedule additions, modifications and deletions using the mouse and appropriate dialog boxes
  - 5. Ability to schedule system wide with a single operator command by individual control device and user defined groups of control devices
  - 6. Operator Group Definition
    - a. Defined combination of lighting control devices that can be scheduled
    - b. Ability to designate any group to be a member of another group.
  - 7. Capability to edit all schedules off line and download any or all schedule changes to the network link modules
  - 8. Capability to upload any or all schedules from a network link module in any LCP, to the workstation
  - 9. Color-coded viewing of all normal, holiday and override schedules
  - 10. Organize lighting control network in a logical hierarchy of systems, sites, areas and lighting circuits
    - a. Lighting Circuit a group of lighting fixture and dimmers controlled by one relay or LCP dimmer output signal.
    - b. Area the physical area within a building such as an individual floor, that contains multiple lighting circuit zones or other geographical boundaries.
    - c. Site collection of lights controlled by a network of lighting control panels; generally, a building or group of buildings.
    - d. System collection of sites, areas, and lighting contained within a single database maintained by a single group of operators.
  - 11. Capability to design and display graphics of system, site, area and lighting circuits indicating:
    - a. System block diagrams
    - b. Site plan views with building and equipment locations and identifying landmarks.
    - c. Area floor plan maps indicating lighting circuit zones throughout the buildings.
    - d. Real time status display of all lighting points at appropriate locations on the graphic representation.
    - e. Light level sensor status and analog readouts in appropriate engineering units at appropriate locations on the graphic representation.
    - f. Separate graphic screen for each building, each floor, each lighting zone.

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12. The following commands and information shall be selectable from a graphic menu:

EXIT	LINK STATUS	GROUPS
HELP	SCHEDULE	SET POINT
RETURN	UP/DOWN LOAD	PARAMETERS
PRINT	TRENDS	CONFIGURE POINT
GRAPHS		CALIBRATE POINT
XFR SCHEDULES		MINIMIZE VIEW

- 13. Password level protection with at least five levels of access:
  - a. Administrator complete access, including password controls
  - b. Maintenance all access except password
  - c. Scheduler modify and apply existing schedules to a zone and review status (no programming)
  - d. User control (*ON/OFF/LEVEL ADUST*)user's zone only (no programming and scheduling changes)
  - e. Monitor check status only
- 14. Trending
  - a. The system shall be able to trend and display either numerically or graphically:
    - 1) Analog light sensor
    - 2) Lighting zone
    - 3) Calculated point
    - 4) Any output
  - b. Provide simultaneous trend graphing of multiple parameters with automatic and manual scaling, distinct colors
  - c. Dynamically update at user-defined intervals
  - d. Zoom-in on a section for more detailed examination
  - e. Pick any point on a trend and display numerical value
- C. Touch Screen: Provide lighting control workstation with "Touch Screen" control capability for

# PART 3 - EXECUTION

# 3.1 INSTALLATION

- A. Where shown on the drawings, the contractor shall furnish and install programmable lighting controllers of the quantities, sizes and types indicated and required by contract documents.
- B. All equipment shall be installed in accordance with manufacturer requirements and in compliance with all applicable local and national codes and standards.
- C. Wiring
  - 1. Install manufacturer's recommended wiring types in quantities and types required and indicated on approved shop drawings.
  - 2. Do not mix low voltage control (less than 120 VAC), 120 VAC or 277 VAC conductors in the control panelboards. Provide metal dividers that comply with NEC.

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- 3. Place manufacturer supplied end-of-line terminators at each end of line in the system bus per manufacturer instructions.
- 4. Neatly lace and rack wiring in cabinets.
- 5. Terminate Category 5, 4 twisted pair cable on the RJ45 jack connectors provided with each lighting control device, per manufacturer instructions.
- 6. Do not exceed 80% of manufacturer's maximum circuit bus length to any system connection point.
- 7. All items on the bus shall be connected per manufacturer's directions. "Tee tap bus connectivity is preferred, but series (daisy chain) is acceptable.
- 8. All screw post control and power conductor terminations shall have Thomas & Betts *StaKon*<sup>™</sup> ring or spade lug connectors.
- 9. Torque all screws and terminations to manufacturer's recommended torque-tightening values when provided or to UL 468A and 468B which ever is applicable.
- 10. All terminations in panel enclosures shall be on UL listed terminal strips suitable for the application and location intended.

# D. Labeling

- Lighting Control Panels provide label for each lighting control panel per Section 260553
  Identification For Electrical Systems shall include:
  - LCP Unique Identification
  - Control Power Fed from *(panelboard and circuit number)* Communication Bus from *(device identification and location)*
  - Communication Bus to (device identification and location)
- 2. Relays each relay to have unique identification label that is consistent with software documentation, drawings and schedules.
- 3. Switches –label all switches (behind the plates with permanent marking pen) to indicate point identification that is consistent with software documentation, drawings and schedules.
- 4. Dry contacts input devices, other input devices provide engraved laminated label black letters on white background) on each device to indicate point identification that is consistent with software documentation, drawings and schedules.
- 5. Conductors provide sleeve wire tags for each conductor terminated in the LCP. Tag shall indicate where conductor goes and what signal is on the conductor. T&B series or equal. Example: 277 V SW to Load or 1HL2A-12 or To PC-LCP12A-I12.
- 6. Engrave and label multi-gang switch plates to indicate load controlled. Submit proposed labels prior to manufacturing for review and approval by Owner's representative.
- 7. Provide code required sign on lighting control panels to warn of the danger of high voltage.

# 3.2 PROGRAMMING

A. Factory: Provide all initial programming and a complete graphics package from the factory. Programming to comply with Owner approved schedules, control zones and identification nomenclature B. On-site: Time of Day Schedules: Contractor to provide all field updates based on as-built revisions and directives from the Owner. This will include programming and data input to initialize the system with the control schedules and schemes agreed to by the Owner's representative.

# 3.3 CONSTRUCTION

- A. Interface with Other Work: Coordinate with other trades to provide connections and interface devices to ensure all interoperability described and required by this specification and other related sections of the specification.
- B. Sequences of Operation: Coordinate with other trades to provide complete sequence of operation descriptions for all interfaces. Provide electronic versions of final sequences in the most current version of Microsoft Word format. Text font shall be Arial, 12 point with 1" margins on all sides. Provide one framed 8-1/2 inch by 11 inch copy of each sequence for mounting adjacent to the equipment as directed by the Owner's representative

# 3.4 DAYLIGHTING SENSORS

- A. Provide sensors for each different interior daylight exposure including skylights.
- B. Comply with local energy code for number of daylight zones and sensors.

# 3.5 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services: Provide a factory trained and authorized field service technician to inspect and approve all lighting control field installation work (equipment installation, terminations, programming), make all necessary adjustment and calibrations, test operation of the completed system, demonstrate system to Owner's representative and assist with the training.
- B. Testing
  - 1. Complete all manufacturer's recommended commissioning and startup procedures.
  - 2. Test continuity of all circuits
  - 3. Complete all testing specified in Part 1

# 3.6 ADJUSTING

A. Occupancy Sensors: Provide a factory trained and authorized field service technician to aim and adjust sensitivity of each occupancy sensor to obtain desired operational reliability and sensing with final furniture and equipment layouts.

- B. Photocells: Provide a factory trained and authorized field service technician to aim and adjust sensitivity of each photocell to obtain desired *ON/OFF* operational thresholds of the photocell control.
- C. Clock: Provide a factory trained and authorized field service technician to demonstrate and make the final clock, calendar and latitude settings for accurate and reliable operation of the system. Perform activities at the first training session.

# 3.7 CLEANING

- A. The contractor shall remove dirt and debris from the equipment.
- B. Clean equipment and devices internally and externally using methods and materials recommended by the manufacturer.

# 3.8 DEMONSTRATION and TRAINING

- A. Contractor shall schedule demonstration and training for the designated Owner staff. The training shall take place on site and shall include:
  - 1. System overview
  - 2. Walk through project to view all equipment locations and labels to verify the record drawings
  - 3. Review of O&M manual
  - 4. Review of record drawings
  - 5. Review of all program schedules
  - 6. Review of all LCP relay panel schedules
  - 7. Review of manufacturer's recommended maintenance
  - 8. Demonstration of correct functioning of all hardware and software
  - 9. Demonstration of system startup and restoration after power loss
  - 10. Demonstrate preparation of graphics, changing of set points, setting schedules, defining input points, assigning global schedule, overrides, holiday scheduling, etc.
  - 11. Demonstrate online technical assistance with factory.
- B. Training Schedule
  - 1. First Session
    - a. Shall be scheduled after contractor has commissioned the system and verified operation. The O&M manuals and record drawings must be completed because the training will also be used to verify the accuracy of these documents
    - b. 8-hour session
    - c. Factory start-up technician or certified Manufacturer's representative shall lead training
  - 2. Follow-up
    - a. Shall be scheduled for the eleventh month after substantial completion and prior to expiration of the one year warranty period.

- b. 4-hour session
- C. Training Facilities
  - 1. Provide classroom type space with a laptop computer connected to the Lighting Control LAN and to a projector.
  - 2. Provide screen
  - 3. Provide lunch and refreshment service as appropriate
- D. Printed Training Material
  - 1. Include manufacturer's published operating manual for each attendee

END OF SECTION

# SECTION 262726 - WIRING DEVICES

# PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Receptacles, receptacles with integral GFCI, and associated device plates.
  - 2. Weather-resistant receptacles.

# 1.3 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. GFCI: Ground-fault circuit interrupter.
- C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.
- D. RFI: Radio-frequency interference.
- E. TVSS: Transient voltage surge suppressor.
- F. UTP: Unshielded twisted pair.

# 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: List of legends and description of materials and process used for pre-marking wall plates.

# 1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

#### SECTION 262726

#### WIRING DEVICES

### 1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packinglabel warnings and instruction manuals that include labeling conditions.

### PART 2 - PRODUCTS

# 2.1 MANUFACTURERS

- A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
  - 1. Cooper Wiring Devices; Division of Cooper Industries, Inc. (Cooper).
  - 2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
  - 3. Leviton Mfg. Company Inc. (Leviton).
  - 4. Pass & Seymour/Legrand (Pass & Seymour).
- B. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

#### 2.2 GENERAL WIRING-DEVICE REQUIREMENTS

- A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.
  - 1. Receptacles controlled by an energy management device shall be marked with the symbol required by NEC section 406.3(E), Controlled Receptacle Marking. The marking shall consist of imprinting "CONTROLLED" and the NEC symbol on the receptacle.

### 2.3 STRAIGHT-BLADE RECEPTACLES

- A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.
  - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Cooper; 5351 (single), CR5362 (duplex).
    - b. Hubbell; HBL5351 (single), HBL5352 (duplex).
    - c. Leviton; 5891 (single), 5352 (duplex).
    - d. Pass & Seymour; 5361 (single), 5362 (duplex).

# 2.4 GFCI RECEPTACLES

- A. General Description:
  - 1. Straight blade, non-feed-through type.
  - 2. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 943 Class A (including auto monitoring and end of life power denial requirements), and FS W-C-596.
  - 3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.
- B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:
  - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Cooper; VGF20.
    - b. Hubbell; GFR5352L.
    - c. Pass & Seymour; 2095.
    - d. Leviton; 7899.

### 2.5 WALL PLATES

- A. Single and combination types shall match corresponding wiring devices.
  - 1. Plate-Securing Screws: Metal with head color to match plate finish.
  - 2. Material for Finished Spaces: Smooth, high-impact thermoplastic.
- B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weatherresistant die-cast aluminum with lockable cover.

# 2.6 FINISHES

- A. Device Color:
  - 1. Wiring Devices Connected to Normal Power System: As selected by Architect unless otherwise indicated or required by NFPA 70 or device listing.
- B. Wall Plate Color: For plastic covers, match device color.

# PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Coordination with Other Trades:
  - 1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.

- 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
- 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
- 4. Install wiring devices after all wall preparation, including painting, is complete.
- B. Conductors:
  - 1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
  - 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
  - 3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
  - 4. Existing Conductors:
    - a. Cut back and pigtail, or replace all damaged conductors.
    - b. Straighten conductors that remain and remove corrosion and foreign matter.
    - c. Pigtailing existing conductors is permitted, provided the outlet box is large enough.
- C. Device Installation:
  - 1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
  - 2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
  - 3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
  - 4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
  - 5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
  - 6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
  - 7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
  - 8. Tighten unused terminal screws on the device.
  - 9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.
- D. Receptacle Orientation:
  - 1. Install ground pin of vertically mounted receptacles down, and on horizontally mounted receptacles to the right.
- E. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.
- F. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top.

G. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

# 3.2 RECEPTACLES

A. Provide exterior GFCI receptacle within 25'-0" of each roof mounted mechanical equipment, for all outdoor receptacles, and other locations shown on the drawings.

# 3.3 GFCI RECEPTACLES

A. Install non-feed-through-type GFCI receptacles where protection of downstream receptacles is not required.

### 3.4 IDENTIFICATION

- A. Comply with Section 260553 "Identification for Electrical Systems."
- B. Identify each receptacle with panelboard identification and circuit number. Use hot, stamped, or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.
  - 1. For receptacles other than 15 and 20 amp, 120 volts, engrave cover-plate or provide separate nameplate with ampere rating, voltage and phase. Minimum lettering size 3/16".

### 3.5 CLEANING

- A. Remove excess plaster from interior of outlet boxes.
- B. Clean devices and cover-plates after painting is complete. Replace stained or improperly painted devices or cover-plates.

#### 3.6 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
  - 1. Test Instruments: Use instruments that comply with UL 1436.
  - 2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.
- B. Tests for Convenience Receptacles:
  - 1. Line Voltage: Acceptable range is 105 to 132 V.
  - 2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.

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WIRING DEVICES

- 3. Ground Impedance: Values of up to 2 ohms are acceptable.
- 4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
- 5. Receptacle Polarity Test: Test every receptacle installed or reconnected under this contract with a receptacle circuit tester. Tester shall test for open ground, reverse polarity, open hot, open neutral, hot and ground reversed, hot or neutral and hot open. Rewire receptacles with faults and retest. Submit statement of completed testing signed by the electrician that performed the test.
- 6. Ground-Fault Receptacle Circuit Interrupter Tests: Test each receptacle or branch circuit breaker having ground-fault circuit protection to assure that the ground-fault circuit interrupter will not operate when subjected to a ground-fault current of less than 4 milliamperes and will operate when subjected to a ground-fault current exceeding 6 milliamperes. Perform testing using an instrument specifically designed and manufactured for testing ground-fault circuit interrupters. Apply the test to the receptacle. "TEST" button operation will not be acceptable as a substitute for this test. Replace receptacles that do not shutoff power with 7/1000 of an ampere within 1/40th of a second and retest.
- 7. Using the test plug, verify that the device and its outlet box are securely mounted.
- 8. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.
- C. Wiring device will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

END OF SECTION

# SECTION 262729 - MODULAR WIRING SYSTEM

# PART 1 - GENERAL

# 1.1 CONDITIONS AND REQUIREMENTS

A. The General Conditions, Supplementary Conditions, and Division 01 – General Requirements apply.

### 1.2 SECTION INCLUDES

A. Modular wiring system consisting of factory-assembled connectors and cable sets designed to interface with various power applications including raised floor boxes, service poles, surface raceways, wireways, and convenience outlets.

### 1.3 RELATED SECTIONS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

### 1.4 SUBMITTALS

- A. Product Data: Submit for modular wiring system components including:
  - 1. Distribution units.
  - 2. Cable whips.
  - 3. Cable sets.
  - 4. Power adapters.
  - 5. Cable splitters.
  - 6. Power taps.
  - 7. Wire connectors.
  - 8. Prewired raised floor boxes and covers.
- B. Shop Drawings: For modular wiring system components not adequately described by product data. Include plans, elevations, sections, details, and attachments to other work.

# 1.5 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in manufacture of modular wiring system components of the types and sizes required, whose products have been in satisfactory use in similar service for not less than 10 years. Provide modular wiring system components produced by a manufacturer listed in this section.
- B. Source Limitations: Obtain each type of modular wiring system components through one (1) source from a single manufacturer.
- C. Modular Wiring System Components: Comply with requirements of applicable local codes, NEC, UL, and NEMA Standards pertaining to modular wiring system components. Listed and labeled in accordance with NFPA 70, Article 100.

# 1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver modular wiring system components in factory labeled packages.
- B. Store and handle in strict compliance with manufacturer's written instructions and recommendations.
- C. Protect from damage due to weather, excessive temperature, and construction operations.

# PART 2 - PRODUCTS

# 2.1 MANUFACTURERS

A. Basis-of-Design Product: The design for modular wiring system components is based on the Walkerflex Modular Wiring System manufactured by Legrand/Wiremold, 60 Woodlawn Street, West Hartford, CT 06110; toll-free 800-621-0049, telephone 860-233-6251, fax 860-232-2062; Web Site: www.legrand.us/wiremold.

# 2.2 MATERIALS

- A. Any system component that is made from a polymeric compound shall be made from material that will meet UL requirements for air handling spaces other than ducts or plenum applications.
- B. The wire connectors or applicable system components shall contain up to 10 pins or socket contacts rated for 20 amps, 600 volts.

- C. Cable assemblies and connectors shall utilize a pin and socket contact design. Cable assemblies shall be constructed of a UL-listed cable utilizing THHN #10 AWG conductors. All neutral conductors shall be THHN #10AWG wire.
- D. The number of conductors in the cable assembly shall be as described by function and installation drawings. Color codes all components for voltage and key to avoid the possibility of electrical shock.

# 2.3 MODULAR WIRING SYSTEM COMPONENTS

- A. Classification and Use: The system is designed for indoor, dry applications, and has been examined and tested by Underwriters Laboratories Inc. to comply with UL183 and bear the U.S. and Canadian UL Listing Mark for 20A, 120V and 277V applications. The system shall conform to National Electrical Code Article 604. The products shall be suitable for use in air handling spaces other than ducts or plenums as set forth in the National Electrical Code, Section 300-22(c).
- B. Distribution Boxes: Prewired Distribution Boxes Model NDUP manufactured by Legrand/Wiremold.
  - 1. Converts conventional wiring into flexible wiring. Installed at, or near, home-run location under floor or the ceiling structure. Provide grounding conductors as required by the National Electrical Code (NEC) and in compliance with requirements set forth therein.
  - Provide distribution box with one (1) to 20 connection points mounted in a UL-Listed enclosure. Provide with 1/2-inch (12.7mm) and 3/4-inch (19.1mm) knockouts for through wiring and tapping of branch circuits in the field. Provide each wire connector with pre-stripped 5/8-inch (15.9mm) color-coded 10 AWG leads with 600V, 90 degree C insulation.
  - 3. Construct of cold-rolled galvanized steel. Provide with four (4) mounting supports that raise the unit 3/8-inch (9.52mm) from the mounting surface. Secure the 6-pin wire connector secured to the box with a snap lock connector or a lock nut. Secure the 10-pin wire connector to the box with a snap lock nut.
  - 4. Equip the box with factory-installed terminal blocks for wiring and circuit identification purposes. Factory-mount terminal blocks on a terminal strip in accordance with manufacturer's specifications.
  - 5. Distribution boxes shall be UL-listed and identified as such on each cover. Boxes shall be acceptable for use in air handling spaces other than ducts or plenums in accordance with NEC 300.22(c). Mark compliance with this provision on the box cover.
  - 6. Affix labeling to the outside of the box cover plate indicating the circuit number and locations as it relates to the terminal blocks, manufacturing and testing date.
  - 7. Provide the quantity and types of main distribution boxes as required by the circuitry indicated on the Contract Drawings.
- C. Wire Connectors: Locking Ring Style Wire Connectors Model NWC manufactured by Legrand/Wiremold.

- 1. The wire connectors are used to transition between the distribution units, cable sets, and end devices (floor boxes, poles, or raceway).
- 2. Each wire connector shall contain #10 AWG with all neutral conductors being #10 AWG copper wires with 600V, 90 degree C insulation. Color code each wire and strip 5/8-inch (15.9mm).
- Construct wire connectors of a glass-reinforced, high impact, low smoke, nylon material which will be suitable for air handling spaces in accordance with UL2043 and NEC 300.22(c). The connectors shall pass UL7460 cold impact test. Provide wire connectors with a specific location for labeling to designate panel feed and circuits.
- 4. Provide wire connectors with pin and socket type terminals conforming to UL183 and EIA364 vibration testing criteria. Fabricate the pin and socket type terminals from C155 Copper Alloy material with a thickness of .016-inch. House and secure the terminals in such a manner so as to eliminate the possibility of push back and/or misalignment of terminals.
- 5. Provide the quantity and types of wire connectors as required by the Contract Drawings.
- D. Power Cable Sets: Power Cable Sets Model NCS manufactured by Legrand/Wiremold.
  - 1. The cable set carries power from the distribution boxes to other components in the modular wiring system. One (1) or more cable set cables may be attached end-to-end to provide for any length required.
  - 2. Cable Set: Contains #10 AWG with all neutral conductors being #10 AWG copper wire with 600V, 90 degree C insulation from one (1) end to the other. Color code each wire and strip 5/8-inch (15.9mm).
  - 3. Cable Set Housing: Construct of glass-reinforced, high impact, low smoke, nylon material which will be suitable for air handling spaces in accordance with UL2043 and NEC300.22(c). The connectors shall pass UL7460 cold impact test. Provide wire connectors with a specific location for labeling to designate panel feed and circuits.
    - a. The cable set housing shall be a 5-piece design (3-6 wire) for the 8-10 wire connectors. Incorporate a locking feature into the cable set housing to produce an audible sound when engaged with the cable set, cable whip or cable splitter.
  - 4. Cable Set: Contains pin and socket type terminals which shall conform to UL183 and EIA364 Vibration testing criteria. Fabricate the pin and socket type terminals from C155 Copper Alloy material with a thickness of .016-inch. House and secure the terminals in such a manner so as to eliminate the possibility of push back and/or misalignment of terminals.
  - 5. Provide the quantity and types of cables as required by the Contract Drawings.
- E. Power Adapters: Power Adapters Model NPA manufactured by Legrand/Wiremold.
  - 1. The power adapter is an interface component between the flexible wiring system and the item to be energized such as raised floor boxes, power poles, convenience outlets and various lighting fixtures.
  - 2. Provide each power adapter with #10 with all neutral conductors being #10 AWG copper wire with 600V, 90 degree C insulation. Color code each wire and strip 5/8-inch (15.9mm). When fitted with a connector, provided by the Contractor, the field-installed power adapter shall require a 1/2-inch (12.7mm) trade size knockout in the service fitting for installation.

- 3. Provide the power adapter with one (1) port for power "IN" and two (2) ports for power "OUT".
- 4. Power Adapter: Construct of a glass-reinforced, high impact, low smoke, nylon material which will be suitable for air handling spaces in accordance to UL2043 and NEC300.22(c). The connectors shall pass UL7460 cold impact test. Provide wire connectors with a specific location for labeling to designate panel feed and circuits.
  - a. Provide power adapter with pin and socket type terminals which shall conform to UL183 and EIA863 Vibration testing criteria. Fabricate the pin and socket type terminals from C155 Copper Alloy material with a thickness of .016-inch. House and secure the terminals in such a manner so as to eliminate the possibility of push back and/or misalignment of terminals.
  - b. The power adapter housing shall be a 5-piece design (3-6 wire). Incorporate a locking feature into the power adapter housing to produce an audible sound when engaged with the cable set, cable whip or cable splitter.
- 5. Provide the quantity and types of power adapters as required by the Contract Drawings.
- F. Cable Splitters: Cable Splitters Model NCBS manufactured by Legrand/Wiremold.
  - 1. The cable splitter is used to split one (1) or more circuits so that it can be used in more than one (1) direction from a given point. This is designed for "daisy chain" application.
  - 2. Cable Splitters: Contain #12 AWG copper wires with 600V, 90 degree C insulation. Provide cable splitters with one (1) port for power "IN" and two (2) ports for power "OUT". Construct cable splitters of a glass-reinforced, high impact, low smoke, nylon material which will be suitable for plenum areas in accordance to UL2043 and NEC300.22(c). The connectors shall pass UL7460 cold impact test.
    - a. Cable Splitters: Contain pin and socket type terminals which shall conform to UL183 and EIA863 Vibration testing criteria. Fabricate the pin and socket type terminals from C155 Copper Alloy material with a thickness of .016-inch. House and secure the terminals in such a manner so as to eliminate the possibility of push back and/or misalignment of terminals.
  - 3. Splitter Housing: 5-piece design (3-6 wire) for the 8-10 wire connectors. Incorporate a locking feature into the splitter housing to produce an audible sound when engaged with the cable set, cable whip or cable splitter.
  - 4. Provide the quantity and types of splitter housings as required by the Contract Drawings.
- G. Power Taps: Model NPT manufactured by Legrand/Wiremold.
  - 1. Serves as interface components connecting the flex system to an item that is to be energized such as raised floor boxes, power poles, and lighting fixtures. Power taps are supplied with standard eight (8) inch leads on the end. Cannot be provided in 8-10 wire configurations.

# 2.4 SERVICE MODULES

A. Raised Floor Boxes manufactured by Legrand/Wiremold.

- 1. Round Recessed Raised and Stage Floor Boxes: CRFB Series Floor Boxes manufactured by Legrand/Wiremold.
  - a. Round recessed raised and stage floor boxes provide an interface between power, communication and audio/visual (A/V) cabling in a raised floor and at the work-station or activation location where power, communication and/or A/V device outlets are required. These devices provide flush and recessed outlets that will not obstruct the floor area. Refer to the Drawings for types. Boxes prewired for use with the Walkerflex System will have a cable set assembly or power adapter attached to the box to be connected to a distribution unit.
  - b. Construct CRFB Series Floor Boxes from die cast aluminum.
  - c. Design round recessed raised and stage floor boxes to be compatible with the complete line of Ortronics<sup>®</sup> workstation connectivity outlets and modular inserts, or Pass & Seymour Network Wiring System.
  - d. Surface Style Cover Assembly: Manufactured from die-cast aluminum; finish to be selected by Architect.

# PART 3 - EXECUTION

# 3.1 EXAMINATION

A. Examine conditions under which modular wiring and access floor service fittings and accessories are to be installed. Notify the Engineer in writing of conditions detrimental to proper completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected.

# 3.2 INSTALLATION

- A. Strictly comply with manufacturer's installation instructions and recommendations and approved shop drawings. Coordinate installation with adjacent work to ensure proper clearances and to prevent electrical hazards.
  - 1. Mechanical Security: Raceway systems shall be mechanically continuous and connected to all electrical outlets, boxes, device mounting brackets, and cabinets, in accordance with manufacturer's installation sheets.
  - 2. Electrical Security: Metal raceway shall be electrically continuous and bonded in accordance with the National Electric Code for proper grounding.
  - 3. Raceway Support: Raceway shall be supported at intervals not exceeding five (5) feet or in accordance with manufacturer's installation sheets.
  - 4. Accessories: Provide accessories as required for a complete installation, including insulated bushings and inserts where required by manufacturer.
  - 5. Unused Openings: Close unused raceway openings using the manufacturer's recommended accessories.

B. Furnish and install the 4-11/16-inch (119mm) square junction boxes where transitions are made from the conventional hard-wiring mode to the manufactured wiring system. Distribution interfacing units will be provided by the manufacturer, properly coded for function and voltage. Install cable assemblies in accordance with the installation drawings. The system manufacturer shall provide job site instructions to the Contractor for review, installation, methods of shipping material, identifying system area, floor, panel board, and ceiling distribution box. Identify any changes to the advanced wiring system installation drawings made during the installation and indicate on as-built drawings.

# 3.3 CLEANING AND PROTECTION

- A. Clean exposed surfaces using non-abrasive materials and methods recommended by manufacturer.
- B. Protect modular wiring and access floor service devices until acceptance.

END OF SECTION

### SECTION 262813 - FUSES

### PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

A. Section Includes:1. Cartridge fuses rated 600-V ac and less.

#### 1.3 REFERENCES

- A. American National Standards Institute (ANSI)
- B. National Electrical Manufacturers Association (NEMA)
- C. Underwriters Laboratories (UL)

# 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include the following for each fuse type indicated:
  - 1. Dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings.
  - 2. Current-limitation curves for fuses with current-limiting characteristics.
  - 3. Time-current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse
  - 4. Coordination charts and tables and related data.

# 1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fuses to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
  - 1. Ambient temperature adjustment information.
  - 2. Current-limitation curves for fuses with current-limiting characteristics.

- 3. Time-current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse
- 4. Coordination charts and tables and related data.

# 1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.

### 1.7 QUALITY ASSURANCE

- A. Source Limitations: Obtain fuses, for use within a specific product or circuit, from single source from single manufacturer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Comply with NEMA FU 1 for cartridge fuses.
- D. Comply with UL 248-11 for plug fuses.

#### 1.8 PROJECT CONDITIONS

A. Where ambient temperature to which fuses are directly exposed is less than 40 deg F (5 deg C) or more than 100 deg F (38 deg C), apply manufacturer's ambient temperature adjustment factors to fuse ratings.

#### 1.9 COORDINATION

A. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size and with system short-circuit current levels.

#### PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- 1. Eaton, Inc.
- 2. Edison Fuse, Inc.
- 3. Ferraz Shawmut, Inc.
- 4. Littelfuse, Inc.

# 2.2 CARTRIDGE FUSES

- A. Characteristics: NEMA FU 1, nonrenewable cartridge fuse; class as specified or indicated; current rating as indicated; voltage rating consistent with circuit voltage.
- B. Current limiting, 200,000 AIC minimum interrupting capacity, unless noted otherwise.
- C. Circuits 601-6000 amps: Class L
- D. Circuits 600 amps and less: Class RK1 or Class J
- E. Motor Circuits: Class RK5 dual element time delay or Class L (601-6000A)
- F. Transformer Primary Circuits: Class RK5

# PART 3 - EXECUTION

# 3.1 EXAMINATION

- A. Examine utilization equipment nameplates and installation instructions to verify proper fuse locations, sizes, and characteristics.
- B. Examine fuses before installation. Reject fuses that are moisture damaged or physically damaged.
- C. Examine holders to receive fuses for compliance with installation tolerances and other conditions affecting performance, such as rejection features.
- D. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.
- E. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.
- F. Proceed with installation only after unsatisfactory conditions have been corrected.

# 3.2 INSTALLATION

- A. Install fuses in fusible devices at job site just prior to energization. Do not accept equipment with fuses installed at factory.
- B. Arrange fuses so rating information is readable without removing fuse.

### 3.3 CLEANING AND INSPECTION

A. Clean fuses, tighten connections and inspect fuse holders prior to energization of the equipment.

### 3.4 IDENTIFICATION

A. Install labels complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems" and indicating fuse replacement information on inside door of each fused switch and adjacent to each fuse block, socket, and holder.

END OF SECTION

# SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

# PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Fusible switches.
  - 2. Nonfusible switches.
  - 3. Receptacle switches.
  - 4. Shunt trip switches.
  - 5. Molded-case circuit breakers (MCCBs).
  - 6. Molded-case switches.
  - 7. Enclosures.
- B. Provide all disconnects required by code for equipment furnished under this and other Divisions of these specifications unless disconnects are integral with equipment and acceptable to the authority having jurisdiction.

### 1.3 REFERENCES

- A. National Electrical Manufacturers Association (NEMA)
- B. Underwriters Laboratories (UL)

# 1.4 DEFINITIONS

- A. NC: Normally closed.
- B. NO: Normally open.
- C. SPDT: Single pole, double throw.

# 1.5 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Enclosed switches and circuit breakers shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
  - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

# 1.6 ACTION SUBMITTALS

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
  - 1. Enclosure types and details for types other than NEMA 250, Type 1.
  - 2. Current and voltage ratings.
  - 3. Short-circuit current ratings (interrupting and withstand, as appropriate).
  - 4. Include evidence of NRTL listing for series rating of installed devices.
  - 5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.
  - 6. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device.
- B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.
  - 1. Wiring Diagrams: For power, signal, and control wiring.

# 1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Seismic Qualification Certificates: For enclosed switches and circuit breakers, accessories, and components, from manufacturer.
  - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
  - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
  - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- C. Field quality-control reports.
  - 1. Test procedures used.
  - 2. Test results that comply with requirements.

- 3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.
- D. Manufacturer's field service report.

# 1.8 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
  - 1. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.
  - 2. Time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device.

# 1.9 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.

#### 1.10 QUALITY ASSURANCE

- A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single source from single manufacturer.
- B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. Comply with NFPA 70.

# 1.11 PROJECT CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
  - 1. Ambient Temperature: Not less than minus 22 deg F (minus 30 deg C) and not exceeding 104 deg F (40 deg C).
  - 2. Altitude: Not exceeding 6600 feet (2010 m).

# 1.12 COORDINATION

A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

# PART 2 - PRODUCTS

# 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Eaton Electrical Inc
  - 2. ABB
  - 3. Siemens Energy & Automation, Inc.
  - 4. Schneider Electric.

# 2.2 RATINGS

A. Voltage: Meet or exceed voltage of the circuit the switch or circuit breaker is applied to.

# B. Current

- 1. Continuous current rating shall be either of the following:
  - a. As indicated on the drawings.
  - b. If not indicated, match or exceed the continuous current rating of the overcurrent protective device that protects the conductor providing incoming power to the switch or circuit breaker.
- 2. Short circuit withstand and interrupting ratings
  - a. Shall comply with either of the following:
    - 1) If the available short circuit current at the switch or circuit breaker is indicated on the drawings, exceed the indicated value while allowing for appropriate X/R derating.

- 2) Meet or exceed the AIC rating of the overcurrent protective device that protects the conductor providing incoming power to the switch or circuit breaker.
- b. Compliance: Short circuit withstand and interrupting ratings shall be complied with using any of the following methods:
  - 1) Listed short circuit ratings complying with above criteria.
  - 2) Independent testing laboratory recognized series connected ratings complying with the above criteria.
  - 3) Oversizing the indicated switch or circuit breaker rated current to obtain a listed short circuit withstand and interrupting rating complying with the above criteria, if the appropriate amount of space is available at the indicated location.
  - 4) If a nonfusible disconnect is indicated it may be changed to a fusible disconnect to obtain the required listed short circuit current withstand rating.
- 3. Overcurrent Protection
  - a. Provide overcurrent protection matching the ampacity indicated on the drawings.
  - b. When included as part of the disconnecting means for utilization equipment the overcurrent protection shall comply with the listing requirements of the utilization equipment. Obtain utilization equipment shop drawings as specified in the appropriate specification division to determine requirements.
- C. Poles: Match the circuit the switch or circuit breaker is applied to.

# 2.3 FUSIBLE SWITCHES

- A. Type GD, General Duty, Single Throw, 100 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with cartridge fuse interiors, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.
- B. Type HD, Heavy Duty, Single Throw, Larger than 100 amp: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- C. Accessories:
  - 1. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.

# 2.4 NONFUSIBLE SWITCHES

A. Type GD, General Duty, Single Throw, 100 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.

- B. Type HD, Heavy Duty, Single Throw, Larger than 100 amp. UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- C. Type HD, Heavy Duty, Double Throw, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

# 2.5 MOLDED-CASE CIRCUIT BREAKERS

- A. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.
- B. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
- C. Molded Case Switch: When serving only as a disconnecting means.
- D. Frame sizes 400 amp and larger: Electronic Trip Circuit Breakers: rms sensing, with the following field-adjustable settings:
  - 1. Instantaneous trip.
  - 2. Long- and short-time pickup levels.
  - 3. Long- and short-time time adjustments.
- E. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller, and let-through ratings less than NEMA FU 1, RK-5.

# 2.6 ACCESSORIES

- A. Lugs: Mechanical type, suitable for number, size, trip ratings, and conductor material.
- B. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
- C. Neutral Kit: Required where neutral conductor is indicated on the drawings. Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
- D. Additional accessories, where indicated
  - 1. Ground-Fault Protection: Comply with UL 1053; remote-mounted and powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings,

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ENCLOSED SWITCHES AND CIRCUIT BREAKERS push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.

- 2. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
- 3. Auxiliary Contacts: One SPDT switch with "a" and "b" contacts; "a" contacts mimic switch contacts, "b" contacts operate in reverse of switch contacts.
- 4. Alarm Switch: One SPDT contact that operates only when switch has tripped.

### 2.7 ENCLOSURES

- A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
  - 1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
  - 2. Outdoor Locations: NEMA 250, Type 3R.
  - 3. Kitchen, Wash-Down Areas: NEMA 250, Type 4X, stainless steel.
  - 4. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.
  - 5. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

### 2.8 NAMEPLATES

- A. Provide nameplates per Section 260553 Identification For Electrical Systems.
- B. Provide permanently attached nameplates (with mechanical fasteners) constructed of plastic (black on white) laminated material engraved through black surface material to white sublayer. Exception: Emergency distribution system component labeling - white letters on red background.
- C. Include the following information: Load name, voltage and phase and fuse size and type (when applicable).

# PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

# 3.2 INSTALLATION

- A. Install individual wall-mounted switches and circuit breakers level and plumb according to manufacturer's written instructions.
- B. Comply with mounting and anchoring requirements specified in Division 26 Section "Vibration and Seismic Controls for Electrical Systems."
- C. Securely mount adjacent to equipment on wall or acceptable mounting frame. Disconnect switches shall be mounted independent from the equipment they serve. Disconnects supported only by raceway are not acceptable.
- D. Wiring space within Disconnects, Fused Switches or Enclosed Circuit Breakers shall not be used for splices.
- E. Tighten electrical connectors and terminals according to manufacturer's published torquetightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- F. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- G. Install fuses in fusible devices.
- H. Comply with NECA 1.

# 3.3 CLEANING

A. After completing system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish including chips, scratches, and abrasions.

# 3.4 IDENTIFICATION

- A. Comply with requirements in Division 26 Section "Identification for Electrical Systems."
  - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
  - 2. Label each enclosure with engraved metal or laminated-plastic nameplate.

# 3.5 FIELD QUALITY CONTROL

A. Acceptance Testing Preparation:

- 1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
- 2. Test continuity of each circuit.
- B. Tests and Inspections:
  - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
  - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
  - 3. Perform the following infrared scan tests and inspections and prepare reports:
    - a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each enclosed switch and circuit breaker. Remove front panels so joints and connections are accessible to portable scanner.
    - b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each enclosed switch and circuit breaker 11 months after date of Substantial Completion.
    - c. Instruments and Equipment: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
  - 4. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

# 3.6 ADJUSTING

- A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.
- B. Set field-adjustable circuit-breaker trip ranges as directed.

END OF SECTION

# SECTION 265119 - LED INTERIOR LIGHTING

# PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

### 1.2 SUMMARY

- A. Section Includes:
  - 1. Interior lighting fixtures, lamps, and drivers.
  - 2. Emergency lighting units.
  - 3. Exit signs.
  - 4. Lighting fixture supports.
- B. Related Requirements:
  - 1. Section 260923 "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.
  - 2. Section 260933 "Central Dimming Controls" for architectural dimming systems.
  - 3. Section 260936 "Modular Dimming Controls" for architectural dimming systems.
  - 4. Section 260943 "Network Lighting Controls" for manual or programmable control systems with low-voltage control wiring or data communication circuits.
  - 5. Section 262726 "Wiring Devices" for manual wall-box dimmers and switches.
- C. Substitutions:
  - Bidders requesting approval to provide products other than those specifically listed in the Light Fixture Schedule shall submit requests in writing to the Architect and Lighting Designer ten days prior to the close of the bid period. Approval will be in the form of an addendum to the specifications issued to all registered plan holders. No requests for substitution will be considered after this date.
  - 2. Substitution request shall include all information required under paragraph 1.5 SUBMITTALS. Requests for approval shall be accompanied by a working fixture sample (including lamps and a cord and plug). Provide the name of at least one installation where each proposed substitute has been installed for at least six months along with the name and phone number of the Architect, Owners representative and the Lighting Designer of Record. If required by the Architect, the proposed substitutes must be installed at the bidder's expense in a location selected by the Architect.
### 1.3 REFERENCES

- A. National Electrical Manufacturer's Association (NEMA) LE5-1993:
  1. Procedure for determining Luminaire efficiency ratings.
- B. Underwriters Laboratories, Inc. (UL):
  - UL 924: Emergency Lighting and Power Equipment UL 1012 Power Units Other Than Class 2
  - UL 1310 Class 2 Power Units UL 1574: Track Lighting Systems UL 1598 Luminaires

## 1.4 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. CRI: Color Rendering Index.
- C. Fixture: See "Luminaire."
- D. IP: International Protection or Ingress Protection Rating.
- E. LED: Light-emitting diode.
- F. LER: Luminaire efficacy rating
- G. Lumen: Measured output of lamp and luminaire, or both.
- H. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

## 1.5 SYSTEM DESCRIPTION

- A. Light fixture schedule series numbers are a design series reference and do not necessarily represent the exact catalog number, size, voltage, wattage, type of lamp, driver, finish trim, ceiling type, mounting hardware, ceiling trim or special requirements as specified hereinafter or as required by the particular installations. Provide complete fixtures to correspond with the number of lamps, wattage and/or size specified.
- B. If there are discrepancies between fixture illustrations and the written description in the fixture schedule, the written description in the fixture schedule shall take precedence.
- C. Light fixture voltage shall match voltage of circuit serving the light fixture.

## 1.6 SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Arrange in order of luminaire designation.
  - 2. Include data on features, accessories, and finishes.
  - 3. Include physical description and dimensions of luminaires.
  - 4. Include emergency lighting units, including batteries and chargers.
  - 5. Include life, output (lumens, CCT, and CRI), and energy-efficiency data.
  - 6. Photometric data and adjustment factors based on laboratory tests, complying with IES LM-79 and IES LM-80].
    - a. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.
    - b. Testing Agency Certified Data: For indicated luminaires, photometric data certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.
- B. Shop Drawings: For nonstandard or custom luminaires.
  - 1. Include plans, elevations, sections, and mounting and attachment details.
  - 2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  - 3. Include diagrams for power, signal, and control wiring.
- C. Samples: For each lighting fixture if indicated in the Lighting Fixture Schedule. If indicated, each sample shall include the following:
  - 1. Lamps, LED boards and drivers, installed
  - 2. Cords and plugs

## 1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For luminaires and lighting systems to include in operation and maintenance manuals.
  - 1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.
  - 2. Provide cut sheets of all fixtures and control devices.
  - 3. Provide instruction manuals for all control systems.

#### 1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Lamps: Ten for every 100 of each type and rating installed. Furnish at least one of each type.

- 2. Diffusers and Lenses: One for every 100 of each type and rating installed. Furnish at least one of each type.
- 3. Globes and Guards: One for every 20 of each type and rating installed. Furnish at least one of each type.
- 4. LED Drivers: One for every 100 of each type installed. Furnish at least one of each type.
- 5. LED power supplies and transformers: One for every 100 of each type and rating installed. Furnish at least one of each type.
- 6. For lenses and louvers for track fixtures, refer to fixture schedule.

#### 1.9 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturer's laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.
- B. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7, accredited under the NVLAP for Energy Efficient Lighting Products, and complying with the applicable IES testing standards.
- C. Provide luminaires from a single manufacturer for each luminaire type.
- D. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.
- E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- F. Comply with NFPA 70.
- G. FM Global Compliance: Lighting fixtures for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.

#### 1.10 DELIVERY, STORAGE, AND HANDLING

A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

#### 1.11 WARRANTY

- A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
- B. Warranty Period: Five years from date of Substantial Completion.

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## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Luminaires shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- B. Seismic Performance: Luminaires and lamps shall be labeled vibration and shock resistant.
  - 1. The term "withstand" means "the luminaire will remain in place without separation of any parts when subjected to the seismic forces specified.
- C. Ambient Temperature: 41 to 104 deg F (5 to 40 deg C)
  - 1. Relative Humidity: Zero to 95 percent.

## 2.2 GENERAL MATERIAL REQUIREMENTS

- A. Metal Parts:
  - 1. Free of burrs and sharp corners and edges.
  - 2. Sheet metal components shall be steel unless otherwise indicated.
  - 3. Form and support to prevent warping and sagging.
- B. Steel:
  - 1. ASTM A36/A36M for carbon structural steel.
  - 2. ASTM A568/A568M for sheet steel.
- C. Stainless Steel:
  - 1. Manufacturer's standard grade.
  - 2. Manufacturer's standard type, ASTM A240/240M.
- D. Galvanized Steel: ASTM A653/A653M.
- E. Aluminum: ASTM B209.
- F. Finish ferrous mounting hardware and accessories to prevent corrosion and discoloration to adjacent materials.
- G. Fixtures shall be free of light leaks and designed to provide sufficient ventilation of electronic parts to provide the photometric performance required. Drivers shall be adequately vented.
- H. All sheet metal work shall be free from tool marks and dents and shall have accurate angles bent as sharp as compatible with the gauges of the required metal. Intersections and joints shall be formed true and of adequate strength and structural rigidity to prevent any distortion after assembly. Finish exposed edges so no sharp or ragged edges are exposed. All miters shall be in accurate alignment with abutting intersecting members.

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- I. Reflector Cones:
  - 1. Provide minimum 45° lamp and lamp image cut-off to light source. No visible lamp flashing in the cone.
  - 2. Plastic materials shall not be used for reflector cones, unless noted otherwise in the Light Fixture Schedule.
  - 3. Reflector cones shall not be riveted or welded to housing and shall be removable without tools. Retention devices shall not deform the cone in any manner. Trim shall be flush with finished ceiling without gaps or light leaks. Where the flange trim is separate from the cone, it shall have the same finish as the cone.
  - 4. Reflector cones shall be of uniform gauge, not less than 0.032-inch thick, high purity aluminum Alcoa 3002 alloy, free of spin marks or other defects.
  - 5. Manufacture reflector under the Alzak process. Refer to fixture schedule for cone color and specular or diffuse finish requirements. Submit one sample of each cone type for review when required in the fixture schedule.
- J. For adjustable fixtures, provide positive locking devices to fix aiming angle. Fixture shall be capable of being relamped without adjusting aiming angle.
- K. Safety: Provide safety devices for removable fixture elements (cones, reflectors, lenses, etc.) to support removable elements when not in normal operating position. Safety devices shall be detachable if necessary and shall not interfere with fixture performance, maintenance or the seating of any fixture element, and not be visible during normal fixture operation.
- L. Fixture Finish: Visible surfaces. Powder coated paint or natural aluminum as specified in Light Fixture Schedule. Color and finish as selected by architect. Concealed parts, (lamp holders, yokes, brackets, etc.) matte black.
- M. Off-state Power: Luminaires shall not draw power in the off state. Exception: Luminaires with integral occupancy, motion, photo-controls or individually addressable fixtures with external control and intelligence are exempt from this requirement. The power draw for such luminaires shall not exceed 0.5 watts when in the off state.

## 2.3 METAL FINISHES

A. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved samples and if they can be and are assembled or installed to minimize contrast.

## 2.4 WIRING

- A. Wiring shall be as required by code for fixture wiring.
- B. Flexible cord wiring between fixture components or to electrical receptacle and not in wireways shall have a minimum temperature rating of 105°C.

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- C. Cords shall be fitted with proper strain reliefs and watertight entries where required by application.
- D. No internal wiring shall be visible at normal viewing angles, i.e. above 45° from vertical.

## 2.5 POWER SUPPLIES:

- 1. Minimum power factor 90%.
- 2. Minimum operating temperature of  $-20\Box C$ .
- 3. Output operating frequency shall be minimum 120 Hz.
- 4. Power supply shall meet FCC requirements for non-consumer use.
- 5. Sound rating: Class A.
- 6. Power supply shall comply with IEEE C.62.41-1991, Class A operation.
- 7. Power supply shall comply with IEEE 1789-2015,
  - a. Below 90 Hz, Modulation (%) is less than 0.01×frequency.
  - b. Between 90 Hz and 3000 Hz, Modulation (%) is below 0.0333×frequency.
  - c. Above 3000 Hz, there is no restriction on Modulation (%).
- 8. Demonstrate conformance with product literature
- 9. Present tests that demonstrate driver performance at full dimming range, from 0.1% to 100% in 10% increments.

### 2.6 LUMINAIRE SUPPORT

- A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.
- B. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.
- C. Wires: ASTM A641/A641M, Class 3, soft temper, zinc-coated steel, 12 gage (2.68 mm).
- D. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.
- E. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

### 2.7 EMERGENCY LIGHTING WITH INTEGRAL POWER TRANSFER DEVICE

A. Directly controlled luminaires that respond to external controls and are used to provide emergency lighting by responding to bypass normal circuits in the event of loss of normal power, shall be UL 924 listed.

## PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 INSTALLATION

- A. Comply with NECA 1.
- B. Provide mounting accessories and trims for wall and ceiling construction types shown in Finish Schedule and on Drawings.
- C. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.
- D. For fixtures with replaceable lamps, install lamps in each luminaire.
- E. Remote Mounting of Drivers: Distance between the driver and fixture not to exceed that recommended by driver manufacturer. Verify requirements for maximum distance between driver and luminaire with driver manufacturers.
- F. Verify weight and mounting method of fixtures and provide suitable supports. Fixture mounting assemblies to comply with local seismic codes and regulations.
- G. Refer to architectural reflected ceiling plans for coordination of lighting fixture locations with mechanical and fire safety equipment. Where conflicts occur, consult with Architect prior to installing any of the systems.
- H. For fire rated ceilings and walls, provide rated enclosure for recessed light fixture, or consult with Architect and Lighting Designer to specify fixture suitable for use in rated ceiling or wall.
- I. Install fixtures with vent holes free of air blocking obstacles.
- J. Lighting fixtures located in recessed ceilings with a fire resistive rating of 1-hour or more to be enclosed in an approved fire-resistive rated box equal to that of the ceiling.
- K. Adjust aperture rings on all recessed fixtures to be flush with the finished ceiling.

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- L. Adjust variable position lampholders for proper lamp position prior to fixture installation.
- M. Blemished, damaged or unsatisfactory fixtures or accessories to be replaced with new.
- N. For pendant mounted fixtures, mounting height is from finished ceiling to top of pendant light fixture. For wall mounted fixtures, center on outlet box unless otherwise noted. Verify mounting provisions and other requirements prior to order of light fixtures.
- O. In accessible suspended ceilings, provide 72" flexible conduit wiring connection (flexible tubing not permitted) from a rigidly supported junction box.
- P. All finishes shall be unmarred upon project completion. Repair or replace damaged finishes.
- Q. Replace all burned out or inoperative lamps and LED boards at the end of the construction prior to Owner occupancy. LED boards with visibly different color LEDs will be considered inoperative and require replacement.

## 3.3 DIFFUSERS AND ENCLOSURES

- A. Remove protective plastic covers from lighting fixture diffusers only after construction work, painting and clean-up are completed. Remove all dirty lamps, reflectors and diffusers; clean and reinstall. When cleaning "Alzak" reflectors, use a manufacturer recommended cleaning solution. Reflectors damaged or impregnated with fingerprints shall be replaced at no cost to Owner.
- B. Whether surface mounted or recessed, remove all construction dirt and dust from heat sink fins to ensure proper dissipation of heat.

## 3.4 DOWNLIGHT/ACCENT/WALLWASH LIGHT FIXTURE SUPPORT

- A. Surface or Pendant Type: Attach heavy formed steel straps to the outlet box by means of threaded stems with locknuts, or directly to the outlet box where the light fixture is specifically so designed.
- B. Recessed Type: Mount in frames suitable for the ceiling, with recessed portion of the fixture securely supported from the ceiling framing. Bottom of light fixture to be flush with adjacent ceiling. Fixture trim shall totally conceal ceiling opening. Provide two #14 earthquake chains or #12 wires when fixture is supported by ceiling suspension system.
- C. Provide access as required for driver. Provide earthquake chains when light fixture is supported by the ceiling suspension system. For remote drivers, isolate driver from structure.

## 3.5 CEILING AND WALL LIGHT FIXTURE SUPPORT

- A. Where ceiling and/or wall are of insufficient strength to support weight of lighting fixtures installed, provide additional framing to support as required.
- B. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for wiring connections.

## 3.6 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

## 3.7 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
  - 1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
  - 2. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.
- B. Luminaire will be considered defective if it does not pass operation tests and inspections.
- C. Prepare test and inspection reports.

# 3.8 STARTUP SERVICE

- A. Comply with requirements for startup specified in Section 260943.16 "Addressable-Luminaire Lighting Controls."
- B. Comply with requirements for startup specified in Section 260943.23 "Relay-Based Lighting Controls."

## 3.9 ADJUSTING

- A. Focus all adjustable light fixtures under the direction of the Lighting Designer during a scheduled period of time prior to the completion of the project, after normal business hours if required. Include all equipment and personnel expenses (including overtime) required for adjustment.
- B. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting aimable luminaires to suit actual occupied conditions.

Provide up to two visits to Project during other-than-normal occupancy hours for this purpose. Some of this work may be required after dark.

1. Adjust aimable luminaires in the presence of Lighting Designer.

END OF SECTION

# SECTION 265619 – LED EXTERIOR LIGHTING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Exterior solid-state luminaires that are designed for and exclusively use LED lamp technology.
  - 2. Luminaire supports.
- B. Substitutions:
  - Bidders requesting approval to provide products other than those specifically listed in the Light Fixture Schedule shall submit requests in writing to the Architect and Lighting Designer ten days prior to the close of the bid period. Approval will be in the form of an addendum to the specifications issued to all registered plan holders. No requests for substitution will be considered after this date.
  - 2. Substitution request shall include all information required under paragraph 1.5 SUBMITTALS. Requests for approval shall be accompanied by a working fixture sample (including lamps and a cord and plug). Provide the name of at least one installation where each proposed substitute has been installed for at least six months along with the name and phone number of the Architect, Owners representative and the Lighting Designer of Record. If required by the Architect, the proposed substitutes must be installed at the bidder's expense in a location selected by the Architect.
- C. Related Requirements:
  - 1. Section 260923 "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.
  - 2. Section 260943.16 "Addressable-Luminaire Lighting Controls" and Section 260943.23 "Relay-Based Lighting Controls" for manual or programmable control systems with lowvoltage control wiring or data communication circuits.
  - 3. Section 260529 "Hangers and Supports for Electrical Systems"
  - 4. Section 260533 "Raceways and Boxes for Electrical Systems" for wiring connections and wiring methods

## 1.3 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. CRI: Color rendering index.
- C. Fixture: See "Luminaire."
- D. IP: International Protection or Ingress Protection Rating.
- E. Lumen: Measured output of lamp and luminaire, or both.
- F. Luminaire: Complete lighting unit, including LED board, reflector, driver and housing.

## 1.4 REFERENCES

Α.

Underwriters Laboratories, Inc. (UL):UL 924:Emergency Lighting and Power EquipmentUL 1012Power Units Other Than Class 2UL 1310Class Power UnitsUL 1598Luminaires

## 1.5 SYSTEM DESCRIPTION

- A. Light fixture schedule series numbers are a design series reference and do not necessarily represent the exact catalog number, size, voltage, wattage, type of LED board, driver, finish trim, ceiling type, mounting hardware, ceiling trim or special requirements as specified hereinafter or as required by the particular installations. Provide complete fixtures to correspond with the number of LEDs, wattage, light distribution and/or size specified.
- B. If there are discrepancies between fixture illustrations and the written description in the fixture schedule, the written description in the fixture schedule shall take precedence.
- C. Light fixture voltage shall match voltage of circuit serving the light fixture.

#### 1.6 SUBMITTALS

- A. For standard catalog items, provide original product sheets, -neatly and clearly marked- to indicate that light fixture, driver and lamps/LED boards fully comply with contract documents.
- B. Submittals shall have fixture types and project name clearly indicated and shall be prepared by the authorized manufacturer's representative serving the project area. A list of manufacturer's representatives (including website and telephone number) identifying which light fixture types

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they represent shall be included with submittals. Submittals or requests for substitutions not meeting these requirements will be rejected.

- C. Product Data: For each type of luminaire.
  - 1. Arrange in order of luminaire designation.
  - 2. Include data on features, accessories, and finishes.
  - 3. Include physical description and dimensions of luminaire.
  - 4. Lamps, include life, output (lumens, CCT, and CRI), and energy-efficiency data.
  - 5. Photometric data and adjustment factors based on laboratory tests, complying with IES LM-79 and IES LM-80.
    - a. Manufacturer's Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the NVLAP for Energy Efficient Lighting Products.
    - b. Testing Agency Certified Data: For indicated luminaires, photometric data certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.
  - 6. Wiring diagrams for power, control, and signal wiring.
  - 7. Means of attaching luminaires to supports and indication that the attachment is suitable for components involved.
- D. Shop Drawings: For nonstandard luminaires.
  - 1. Include plans, elevations, sections, and mounting and attachment details.
  - 2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  - 3. Include diagrams for power, signal, and control wiring.
- E. Product Schedule: For luminaires and lamps. Use same designations indicated on Drawings.
- F. Source quality-control reports.
- G. Sample warranty.

## 1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For luminaires and photoelectric relays to include in operation and maintenance manuals.
  - 1. Provide a list of all photoelectric relay types used on Project; use manufacturers' codes.

## 1.8 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

- 1. Glass, Acrylic, and Plastic Lenses, Diffusers and Louvers, Covers, and Other Optical Parts: One for every 100 of each type and rating installed. Furnish at least one of each type.
- 2. LED Drivers: One for every 100 of each type installed. Furnish at least one of each type.

## 1.9 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturers' laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.
- B. Provide luminaires from a single manufacturer for each luminaire type.
- C. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.
- D. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

#### 1.10 DELIVERY, STORAGE, AND HANDLING

A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering prior to shipping.

## 1.11 FIELD CONDITIONS

- A. Verify existing and proposed utility structures prior to the start of work associated with luminaire installation.
- B. Mark locations of exterior site luminaires for approval by Architect prior to the start of luminaire installation.

## 1.12 WARRANTY

- A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures, including luminaire support components.
    - b. Faulty operation of luminaires and accessories.
    - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
  - 2. Warranty Period: 5 years from date of Substantial Completion.

#### 1.13 EXTRA MATERIALS

- A. LED power supplies and transformers: Provide one case or 10% (whichever is less) of each type used on the project. Turn over to Owner and obtain signed receipt.
- B. Fuses: Provide one case or 10% (whichever is less) of each type used on the project. Turn over to Owner and obtain signed receipt.

## PART 2 - PRODUCTS

## 2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Luminaires shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- B. Seismic Performance: Luminaires and lamps shall be labeled vibration and shock resistant.
  - 1. The term "withstand" means "the luminaire will remain in place without separation of any parts when subjected to the seismic forces specified and the luminaire will be fully operational during and after the seismic event."

## 2.2 GENERAL MATERIAL REQUIREMENTS

- A. Finish mounting hardware and accessories to prevent corrosion and discoloration to adjacent materials.
- B. For weatherproof or vaportight installations, painted finishes of fixtures and accessories shall be weather resistant enamel using proper primers or galvanized and bonderized epoxy, so that the entire assembly is completely corrosion resistant for the service intended. Where aluminum parts come into contact with bronze or steel parts, apply a coating material to both surfaces to prevent corrosion.
- C. Non-vapor tight fixtures to have 1/8" dia. weep holes as required for proper drainage. Weep holes to be configured to prevent light leaks.
- D. Fixtures shall be free of light leaks and designed to provide sufficient ventilation electronic parts to provide the photometric performance required. Drivers and transformers shall be adequately vented.
- E. For adjustable fixtures, provide positive locking devices to fix aiming angle.
- F. Safety: Provide safety devices for removable fixture elements (cones, reflectors, lenses, etc.) to support removable elements when not in normal operating position. Safety devices shall be detachable if necessary and shall not interfere with fixture performance, maintenance or the seat-

ing of any fixture element, and not be visible during normal fixture operation. Safety device shall be made of corrosion resistant materials.

- G. Finishes:
  - 1. Painted surfaces shall have an outdoor life expectancy of not less than 20 years without any visible rust or corrosion.
  - 2. Finishes to comply with requirements set by the American Architectural Manufacturers Association (AAMA):
    - a. Baked on enamel and high-performance powder coating finish on aluminum: AAMA 304-05
    - b. Anodized aluminum: AAMA 611-98
    - c. Clear coat on aluminum: AAMA 612-02
  - 3. Finish colors shall be as specified.
- H. Diffusers: materials shall be UV stabilized.

#### 2.3 LUMINAIRE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. NRTL Compliance: Luminaires shall be listed and labeled for indicated class and division of hazard by an NRTL.
- C. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.
- D. UL Compliance: Comply with UL 1598 and listed for wet location.
- E. CRI of minimum 80. CCT of 3000 K.
- F. L70 lamp life of 50,000 hours.
- G. Nominal Operating Voltage: Per electrical drawings.
- H. Source Limitations: Obtain luminaires from a single manufacturer for each type designation.
- I. Off-state Power: Luminaires shall not draw power in the off state. Exception: Luminaires with integral occupancy, motion, photo-controls or individually addressable fixtures with external control and intelligence are exempt from this requirement. The power draw for such luminaires shall not exceed 0.5 watts when in the off state.

## 2.4 MATERIALS

- A. Metal Parts: Free of burrs and sharp corners and edges.
- B. Sheet Metal Components: Corrosion-resistant aluminum. Form and support to prevent warping and sagging.
- C. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools where indicated in the Fixture Schedule. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses.
- D. Diffusers and Globes:
  - 1. Acrylic Diffusers: 100 percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
  - 2. Glass: Annealed crystal glass unless otherwise indicated.
  - 3. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.
- E. Lens and Refractor Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.
- F. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:
  - 1. White Surfaces: 85 percent.
  - 2. Specular Surfaces: 83 percent.
  - 3. Diffusing Specular Surfaces: 75 percent.
- G. Housings:
  - 1. Rigidly formed, weather- and light-tight enclosure that will not warp, sag, or deform in use.
  - 2. Provide filter/breather for enclosed luminaires.
- H. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
  - 1. Label shall include the following lamp characteristics:
    - a. "USE ONLY" and include specific lamp type.
      - b. Lamp diameter, shape, size, wattage and coating.
      - c. CCT and CRI for all luminaires.

## 2.5 FINISHES

A. Variations in Finishes: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

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- B. Luminaire Finish: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finish process and color of pole or support materials.
- C. Factory-Applied Finish for Aluminum Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
  - 1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
  - 2. Natural Satin Finish: Provide fine, directional, medium satin polish (AA-M32); buff complying with AA-M20 requirements; and seal aluminum surfaces with clear, hard-coat wax.
  - 3. Class I, Clear-Anodic Finish: AA-M32C22A41 (Mechanical Finish: Medium satin; Chemical Finish: Etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
  - 4. Class I, Color-Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: Medium satin; Chemical Finish: Etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker), complying with AAMA 611.

## 2.6 LUMINAIRE SUPPORT COMPONENTS

A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

## 2.7 EMERGENCY LIGHTING WITH INTEGRAL POWER TRANSFER DEVICE

- A. Directly controlled luminaires that respond to external controls and are used to provide emergency lighting by responding to bypass normal circuits in the event of loss of normal power, shall be UL 924 listed.
- PART 3 EXECUTION

## 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for luminaire electrical conduit to verify actual locations of conduit connections before luminaire installation.
- C. Examine walls, roofs, and site for suitable conditions where luminaires will be installed.

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D. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 GENERAL INSTALLATION REQUIREMENTS

- A. Comply with NECA 1.
- B. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.
- C. Fasten luminaire to structural support.
- D. Supports:
  - 1. Sized and rated for luminaire weight.
  - 2. Able to maintain luminaire position after cleaning and relamping.
  - 3. Support luminaires without causing deflection of finished surface.
  - 4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.
- E. Wall-Mounted Luminaire Support:
  - 1. Attached to a minimum 1/8 inch backing plate attached to wall structural members.
- F. Wiring Method: Install cables in raceways. Conceal raceways and cables.
- G. Coordinate layout and installation of luminaires with other construction.
- H. Adjust aperture rings on all recessed fixtures to be flush with the finished ceiling.
- I. Adjust luminaires that require field adjustment or aiming. Adjustments shall occur during a scheduled period of time prior to the completion of the project, after normal business hours if required. Include all equipment and personnel expenses (including overtime) required for adjustment.
- J. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" and Section 260533 "Raceways and Boxes for Electrical Systems" for wiring connections and wiring methods.

## 3.3 DIFFUSERS AND ENCLOSURES

A. Remove protective plastic covers from lighting fixture diffusers only after construction work, painting and clean-up are completed. Remove all dirty lamps, reflectors and diffusers; clean and reinstall. When cleaning "Alzak" reflectors, use a manufacturer recommended cleaning solution. Reflectors damaged or impregnated with fingerprints shall be replaced at no cost to Owner.

B. For LED fixtures, whether surface mounted or recessed, remove all construction dirt and dust from heat sink fins to ensure proper dissipation of heat.

## 3.4 INSTALLATION OF INDIVIDUAL GROUND-MOUNTED LUMINAIRES

A. Aim as indicated on drawings under the direction of the Architect after trees are planted.

## 3.5 CORROSION PREVENTION

- A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.
- B. Steel Conduits: Comply with Section 260533 "Raceways and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch- thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

#### 3.6 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

### 3.7 FIELD QUALITY CONTROL

- A. Inspect each installed luminaire for damage. Replace damaged luminaires and components.
- B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
  - 1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
  - 2. Verify operation of photoelectric controls.
- C. Luminaire will be considered defective if it does not pass tests and inspections.
- D. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

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#### 3.8 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain luminaires.

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## 3.9 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting the direction of aim of luminaires to suit occupied conditions. Make up to two visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.
  - 1. During adjustment visits, inspect all luminaires. Replace lamps or luminaires that are defective.
  - 2. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
  - 3. Adjust the aim of luminaires in the presence of the Architect.

# END OF SECTION

## SECTION 270528 - PATHWAYS FOR COMMUNICATIONS SYSTEMS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections apply to this Section.

### 1.2 SUMMARY

- A. Section Includes:
  - 1. Metal conduits and fittings.
  - 2. Boxes, enclosures, and cabinets.
- B. Related Requirements:
  - 1. Section 270533 "Conduits and Backboxes for Communications Systems" for conduits, wireways, surface raceways, boxes, enclosures, cabinets, handholes, and faceplate adapters serving electrical systems.

### 1.3 DEFINITIONS

- A. ARC: Aluminum rigid conduit.
- B. GRC: Galvanized rigid steel conduit.
- C. IMC: Intermediate metal conduit.
- D. EMT: Electrical metallic tubing
- E. PVC: Polyvinyl Chloride
- F. RNC: Rigid non-metallic conduit
- G. HDPE: High-density polyethylene
- H. RTRC: Reinforced thermosetting resin conduit

#### SECTION 270528

## 1.4 ACTION SUBMITTALS

A. Product Data: For surface pathways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Pathway routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:
  - 1. Structural members in paths of pathway groups with common supports.
  - 2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.
- B. Qualification Data: For professional engineer.
- C. Seismic Qualification Certificates: For pathway racks, enclosures, cabinets, equipment racks and their mounting provisions, including those for internal components, from manufacturer.
  - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
  - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
  - 3. Detailed description of equipment anchorage devices on which certification is based and their installation requirements.
  - 4. Detailed description of conduit support devices and interconnections on which certification is based and their installation requirements.
- D. Source quality-control reports.

## PART 2 - PRODUCTS

# 2.1 METAL CONDUITS AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. AFC Cable Systems, Inc.
  - 2. Allied Tube & Conduit; a Tyco International Ltd. Co.
  - 3. Electri-Flex Company.
  - 4. O-Z/Gedney; a brand of EGS Electrical Group.
  - 5. Southwire Company.

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- 6. Thomas & Betts Corporation.
- B. General Requirements for Metal Conduits and Fittings:
  - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
  - 2. Comply with ANSI/TIA-569-E.
- C. GRC: Comply with ANSI C80.1 and UL 6.
- D. ARC: Comply with ANSI C80.5 and UL 6A.
- E. IMC: Comply with ANSI C80.6 and UL 1242.
- F. EMT: Comply with ANSI C80.3 and UL 797.
- G. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
  - 1. Fittings for EMT:
    - a. Material: Steel.
    - b. Type: Compression.
  - 2. Expansion Fittings: PVC or steel to match conduit type, complying with UL-467, rated for environmental conditions where installed, and including flexible external bonding jumper.
  - 3. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch with overlapping sleeves protecting threaded joints.
- H. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

## 2.2 BOXES, ENCLOSURES, AND CABINETS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Hoffman; a Pentair company.
  - 2. Hubbell Incorporated; Killark Division.
  - 3. Lamson & Sessions; Carlon Electrical Products.
  - 4. O-Z/Gedney; a brand of EGS Electrical Group.
  - 5. RACO; a Hubbell company.
  - 6. Thomas & Betts Corporation.
  - 7. Wiremold / Legrand.
- B. General Requirements for Boxes, Enclosures, and Cabinets:

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- 1. Comply with ANSI/TIA-569-E.
- 2. Boxes, enclosures and cabinets installed in wet locations shall be listed for use in wet locations.
- C. Sheet-Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.
- E. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
- F. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- G. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized, cast iron with gasketed cover.
- H. Device Box Dimensions: 4-11/16 inches square by 2-1/8 inches deep.
- I. Gangable boxes are allowed.
- J. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.
- K. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 with continuous-hinge cover with flush latch unless otherwise indicated.
  - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
  - 2. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
- L. Cabinets:
  - 1. NEMA 250, Type 1, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
  - 2. Hinged door in front cover with flush latch and concealed hinge.
  - 3. Key latch to match panelboards.
  - 4. Metal barriers to separate wiring of different systems and voltage.
  - 5. Accessory feet where required for freestanding equipment.

# PART 3 - EXECUTION

### 3.1 PATHWAY APPLICATION

- A. Outdoors: Apply pathway products as specified below unless otherwise indicated:
  - 1. Exposed Conduit: GRC.
  - 2. Concealed Conduit, Aboveground: GRC, EMT.
  - 3. Underground Conduit: RNC, Type EPC-40-PVC.
  - 4. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
- B. Indoors: Apply pathway products as specified below unless otherwise indicated:
  - 1. Exposed, Not Subject to Physical Damage: EMT.
  - 2. Exposed, Not Subject to Severe Physical Damage: EMT.
  - 3. Concealed in Ceilings and Interior Walls and Partitions: EMT.
  - 4. Damp or Wet Locations: GRC.
  - 5. Boxes and Enclosures: NEMA 250 Type 1, except use NEMA 250 Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.
- C. Minimum Pathway Size: 1-inch trade size.
- D. Pathway Fittings: Compatible with pathways and suitable for use and location.
  - 1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
  - 2. EMT: Use compression, steel fittings. Comply with NEMA FB 2.10.
- E. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.
- F. Install surface pathways only where indicated on Drawings.
- G. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

### 3.2 INSTALLATION

A. Comply with NECA 1, NECA 101, and ANSI/TIA-569-E for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum pathways. Comply with NFPA 70 limitations for types of pathways allowed in specific occupancies and number of floors.

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- B. Keep pathways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal pathway runs above water and steam piping.
- C. Complete pathway installation before starting conductor installation.
- D. Comply with requirements in Section 270529 "Hangers and Supports for Communications Systems" for hangers and supports.
- E. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- F. Install no more than the equivalent of two 90-degree bends in any pathway run. Support within 12 inches of changes in direction. Utilize long radius ells for all optical-fiber cables.
- G. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- H. Support conduit within 12 inches of enclosures to which attached.
- I. Pathways Embedded in Slabs:
  - 1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure pathways to reinforcement at maximum 10-foot intervals.
  - 2. Arrange pathways to cross building expansion joints at right angles with expansion fittings.
  - 3. Arrange pathways to keep a minimum of 1 inch of concrete cover in all directions.
  - 4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
  - 5. Change from ENT to GRC before rising above floor.
- J. Stub-ups to Above Recessed Ceilings:
  - 1. Use EMT for pathways.
  - 2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
- K. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of pathway and fittings before making up joints. Follow compound manufacturer's written instructions.
- L. Coat field-cut threads on PVC-coated pathway with a corrosion-preventing conductive compound prior to assembly.
- M. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install insulated bushings on conduits terminated with locknuts.

- N. Install pathways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- O. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
- P. Cut conduit perpendicular to the length. For conduits of 2-inch trade size and larger, use roll cutter or a guide to ensure cut is straight and perpendicular to the length.
- Q. Install pull wires in empty pathways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.
- R. Surface Pathways:
  - 1. Install surface pathway for surface telecommunications outlet boxes only where indicated on Drawings.
  - 2. Install surface pathway with a minimum 2-inch radius control at bend points.
  - 3. Secure surface pathway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight pathway section. Support surface pathway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.
- S. Install pathway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed pathways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install pathway sealing fittings according to NFPA 70.
- T. Install devices to seal pathway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all pathways at the following points:
  - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
  - 2. Where an underground service pathway enters a building or structure.
  - 3. Where otherwise required by NFPA 70.
- U. Comply with manufacturer's written instructions for solvent welding PVC conduit and fittings.
- V. Expansion-Joint Fittings:
  - Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F, and that has straight-run length that exceeds 25 feet. Install in each run of aboveground RMC and EMT conduit that is located where environmental temperature change may exceed 100 deg F and that has straight-run length that exceeds 100 feet.

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- 2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
  - a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
  - b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
  - c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
  - d. Attics: 135 deg F temperature change.
- 3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.
- 4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
- 5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.
- W. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.
- X. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surface to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.
- Y. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
- Z. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
- AA. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
- BB. Set metal floor boxes level and flush with finished floor surface.
- CC. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

#### 3.3 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR COMMUNICATIONS PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 270544 "Sleeves and Sleeve Seals for Communications Pathways and Cabling."

#### 3.4 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

#### 3.5 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage or deterioration.
  - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
  - 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

### END OF SECTION 270528

## SECTION 270529 - HANGERS AND SUPPORTS FOR COMMUNICATIONS SYSTEMS

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

## 1.2 SUMMARY

A. Section includes discrete J-hooks, slings and related accessories for supporting communications and other low voltage cables above accessible ceilings and below accessible raised floor systems.

## 1.3 SUBMITTALS

- A. Product Data: Provide the following:
  - 1. Product data on all cable support devices and accessories. Indicate materials, finishes, load ratings, dimensions, listings, approvals and attachment methods.
- B. Shop Drawings: For projects where the low voltage systems cable pathways are not shown on the drawings, they are to be contractor designed per Part 3. The contractor shall prepare and submit proposed main pathway (20 cables or more), layout drawings for review and approval by the Owner's representative prior to installing supports. Shop drawings shall:
  - 1. Indicate pathways on plan view showing pathway coordination with mechanical components, lighting components, sprinkler head components, plumbing components and electrical components
  - 2. Include elevations and sections to indicate space allocations and coordination with work of other trades
  - 3. Include details to describe the different support configurations, accessories, attaching means and cable groupings

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HANGERS AND SUPPORTS FOR COMMUNICATIONS SYSTEMS

## 1.4 QUALITY ASSURANCE

- A. Hangers, supports and accessories shall be listed to Underwriter's Laboratories, Inc Standard 2239.
- B. Pre-Installation Meetings: Contractor shall set up a pre-installation meeting to discuss communication and other low voltage cable support layout work and installation guidelines. Contractor shall organize meeting a minimum of 30 days prior to initiating hangers and support installation work. Attendees shall include general contractor, cable tray contractor, cable contractor(s), mechanical contractor, sprinkler contractor low voltage system vendors, Architect and Engineer. Purpose of meeting shall be to coordinate work between the parties to have a consistent layout for all communications and low voltage system cables, minimize interferences and to make cable system accessibility for future Owner modifications and maintenance high priority issue for all installers.

#### 1.5 COORDINATION

A. Examine drawings and existing conditions above ceilings and include additional supports in bid price to avoid ducts, pipes, conduits, etc. Installation in existing ceilings is very difficult. Include extra labor time involved in bid price.

## PART 2 - PRODUCTS

## 2.1 WIDE BASE CABLE SUPPORTS

- A. J-hooks Galvanized loop with integrated cable retainers, complies with ANSI/TIA structured cabling system requirements.
- B. Accessories: Provide applicable accessories to independently support J-hooks from structure. This includes extender bracket for mounting multiple J-hooks on a single support, fasteners and clamps for connecting to wall, beams, rods, dedicated support wires and *C* and *Z* Purlins as required for specific construction.
- C. Manufacturer.
  - 1. nVent CADDY Cat HP J-hook series
  - 2. Chatsworth RapidTrak<sup>™</sup> series
  - 3. Or approved equivalent.

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HANGERS AND SUPPORTS FOR COMMUNICATIONS SYSTEMS

## 2.2 SOFT CABLE SLING SUPPORTS

- A. Adjustable sling cable supports suitable for plenums. 4 inch or 6 inch diameter loop for (325) Cat6 4-pair UTP cables, (210) Cat6A 4-pair UTP cables or inner duct.
- B. Accessories: Provide applicable accessories to independently support slings from structure. This includes fasteners and clamps for connecting to walls, beams, rods, ceiling tee bars, dedicated support wires and *C* and *Z* Purlins as required for specific construction.

## C. Material

- 1. Construction: Polyethylene strands woven and laminated, reinforced seams, connected steel mounting and fastening hardware.
- 2. Suitable for plenum location installation
- D. Manufacturer
  - 1. nVent CADDY Cat 425 series
  - 2. Or approved equivalent

## PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. Support all cables not supported in conduits and cable tray with J-hooks or slings. Space Jhooks or slings at a maximum of 48-inches apart and at each change of direction of the cables. Maintain maximum sag of 12-inches between supports.
- B. Install supports to route cables parallel and perpendicular to building lines. Hang cable supports from 3/8" all thread rods, dedicated #8 galvanized ceiling drop wire or wall brackets connected directly to structure. Do not support from the ceiling grid, ceiling wire system, conduit or other trades work.
- C. Provide the appropriate sized J-hooks as required. Minimum 1" width and flared edges where cables enter and leave support. 2-inch diameter loop for (25) 4-pair UTP cables and 4-inch diameter loop for (50) 4-pair UTP cables.
- D. Provide multiple hooks at each hanger location as required by cable count and cable segregation requirements.
- E. Install cable bundles no closer than 5-inches in all directions from ballasted light fixtures.

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HANGERS AND SUPPORTS FOR COMMUNICATIONS SYSTEMS

- F. Where main pathways are indicated on the drawings, contractor shall follow indicated pathway as closely as possible according to field conditions. Pathway for smaller cable counts shall be laid out and documented on the as-built drawings by the contractor.
- G. Where specific main pathways are not indicated, the cable pathways for all communication systems shall be laid out by the contractor and coordinated with other disciplines and the systems designer.
- H. Do not tie wrap cables to the J-hooks. Provide cable retainers at each J-hook.
- I. Provide applicable accessories to independently support J-hooks from structure, including extender bracket for mounting multiple J hooks on a single support, fasteners and clamps for connecting to wall, beams, rods, dedicated support wires and C and Z Purlins as required for specific construction.
- J. At a minimum, brace multiple J-hook assemblies from structure with diagonal braces at each change of direction.
- K. Coordinate the allocation of ceiling space and the mounting elevations of various systems to allow maintenance and accessibility for future modifications. Cable supports shall be as close to the ceiling as possible while allowing ceiling tiles to be removed. Supports shall be located to avoid interference with maintenance access to other equipment.

END OF SECTION

# SECTION 270533 - CONDUITS AND BACKBOXES FOR COMMUNICATIONS SYSTEMS

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections apply to this Section.
- B. Other References

ANSI/TIA-569-E	Commercial Building Standard for Telecommunications Pathways and Spaces
ANSI/TIA-607-D	Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications

#### 1.2 DESCRIPTION

- A. Provide raceway systems for the installation of the communications cabling. Installation shall include
  - 1. Raceways and Wireways (including sleeves, expansion fittings, penetrations and seals)
  - 2. Pull and Junction Boxes
  - 3. Outlet Boxes, mud rings, and cover plates

# 1.3 SUBMITTALS

- A. Provide submittal information in accordance with Section 270500 Common Work Results for Communications and supplementary requirements described in this specification.
- B. Product Data: Provide the following:
  - 1. Product data on all cable support devices and accessories. Indicate materials, finishes, load ratings, dimensions, listings, approvals and attachment methods.
- C. Shop Drawings: For projects where the low voltage systems cable pathways are not shown on the drawings, they are to be contractor designed per Part 3. The contractor shall prepare and submit proposed main pathway (defined as 20 cables or more), layout drawings for review and approval by the Owner's representative prior to installing supports. Shop drawings shall:

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- 1. Indicate pathways on plan view showing pathway coordination with mechanical components, lighting components, sprinkler head components, plumbing components and electrical components
- 2. Include elevations and sections to indicate space allocations and coordination with work of other trades
- 3. Include details to describe the different support configurations, accessories, attaching means and cable groupings

# PART 2 - PRODUCTS

## 2.1 WALL OUTLETS

A. Shall consist of a 4-11/16" square, 2-1/8" deep (minimum) box, with knockouts for 3/4", 1", and 1-1/4" conduits, as manufactured by Steel City, OZ/Gedney or equal.

## 2.2 FLOOR OUTLETS

A. See Section 260533.10 - Flush Floor Outlets for flush floor outlets.

## 2.3 OUTLET DEVICE RING

- A. Provide single gang device ring.
- B. Device rings shall be by the same manufacturer as the outlet boxes.
- C. Coordinate device ring requirements with cable/outlet installer.

## 2.4 DEVICE PLATES

A. Provide blank device cover plates for all un-cabled or "future" outlets.

## 2.5 PULL WIRE

A. Shall be plastic having not less than 200-pound tensile strength.

### **SECTION 270533**
# PART 3 - EXECUTION

# 3.1 WALL OUTLETS IN WALLS WITH ACCESSIBLE CEILINGS

A. Provide a minimum 1" individual conduit from each outlet location to an accessible ceiling space. Provide non-metallic conduit bushing prior to cable installation.

# 3.2 WALL OUTLETS IN WALLS WITH NON-ACCESSIBLE CEILINGS

A. Provide an individual conduit from each outlet location to an accessible ceiling space. Provide non-metallic conduit bushing prior to cable installation.

# 3.3 FLOOR MOUNTED OUTLETS

- A. All conduits from floor outlets shall terminate in a space on the same floor as the outlet.
- B. Provide an individual conduit from each outlet location to an accessible ceiling space.

# 3.4 FLOOR OUTLETS/ BOXES IN SLAB ON GRADE

A. Provide an individual conduit from each outlet box to a consolidation point interior to the building within 25 feet of the point where the conduit exits the slab.

# 3.5 CONDUIT SIZING TABLE

A. Provide conduits for communications outlets sized as follows:

Wall Outlets	1"
Multiple Gang Recessed Floor Outlets/Boxes	1-1/4"

# 3.6 RACEWAYS

A. Shall conform to specification as outlined in section 1.1, and Division 27 related sections - with the additional requirement that no length of run shall exceed 100 feet and shall not contain more than two 90-degree bends or the equivalent without a code size pull box sized per Pull Box Sizing table below. Provide pull boxes where necessary to comply with these requirements. Locate pull boxes in straight runs only, not as a replacement for an elbow.

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- B. Conduits with an internal diameter of two inches or less shall have a bend radius at least 6 times the internal conduit diameter. Conduits greater than two inches shall have a bend radius at least 10 times the internal conduit diameter.
- C. Provide an insulated bushing on all conduits terminated in an enclosure, prior to cable installation.
- D. Terminate conduits stubbed out above accessible ceiling space so that the conduit is parallel with the ceiling and provide an insulating bushing, prior to cable installation.
- E. Terminate conduit at cable trays at an accessible location within 6" of tray with an insulated bushing and provide bonding jumper or terminate conduit to the cable tray with an insulated bushing. Provide insulated bushing on conduits prior to cable installation.

# 3.7 PULL BOXES

A. Pull boxes shall be sized per the following table:

Conduit Trade Size	Width	Length	Depth	Width increase for additional conduit
1	4	16	3	2
1-1/4	6	20	3	3
1-1/2	8	27	4	4
2	8	36	4	5
2-1/2	10	42	5	6
3	12	48	5	6
3-1/2	12	54	6	6
4	15	60	8	8

# PULL BOX SIZING (inches)

# 3.8 PULL CORDS

A. Nylon type pull cords shall be included in all raceways over 10 feet long. Leave not less than 12 inches of slack at each end of the pull wire.

# 3.9 RACEWAY RISER SLEEVES

A. Riser raceways to be installed through floors with tops 6 inches above each floor to give continuous cable riser capability. Provide Firestopping to meet requirements of Division 01.

END OF SECTION

SECTION 270533

# SECTION 283111 - DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

# PART 1 - GENERAL

# 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. All Division 28 Specification Sections must be coordinated with and integrated into this Section.

# 1.2 DEFINITIONS

- A. LED: Light-emitting diode.
- B. NICET: National Institute for Certification in Engineering Technologies.

### 1.3 SYSTEM DESCRIPTION

A. Noncoded, UL-certified and placarded addressable system, with multiplexed signal transmission, dedicated to fire-alarm service only.

# 1.4 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Fire-alarm control unit and raceways shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
  - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
- B. System shall comply with local fire code, building code, mechanical code, electrical code, and rules and interpretations as required by the Authority Having Jurisdiction.

# 1.5 CONTRACTOR DESIGN

- A. The contract drawings indicate the general nature of the fire alarm system, but do not necessarily show all components or system aspects required by this specification. The drawings are intended to aid the contractor in providing the complete fire alarm system.
- B. Notification device performance: The locations of fire alarm notification devices shown on the drawings indicate the rooms and spaces to be covered by the indicated types of devices, but

not necessarily the total quantity of devices required in each room or space to meet the applicable codes, as device performance varies among manufacturers. Contractor shall provide design calculations based on vendor device performance characteristics for each space and notification method indicating compliance with applicable codes and criteria.

C. Raceways, routing and wiring are not shown on the drawings and it shall be the responsibility of the contractor to design raceway routing and wiring and to show the same on shop drawings.

# 1.6 SUBMITTALS

- A. Provide submittal information in accordance with Section 280500 Common Work Results for Electronic Safety and Security and supplementary requirements described in this specification.
  - 1. Submittals shall be approved by authorities having jurisdiction prior to submitting them to Architect.
  - 2. Shop Drawings shall be prepared by persons with the following qualifications:
    - a. Trained and certified by manufacturer in fire-alarm system design.
    - b. NICET-certified fire-alarm technician, Level IV minimum.
    - c. Licensed or certified by authorities having jurisdiction.
- B. Product Data: For each type of product indicated.
- C. Shop Drawings: For fire-alarm system. Include plans, elevations, sections, details, and attachments to other work.
  - 1. Comply with recommendations in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72.
  - 2. Include performance parameters and installation details for each detector, verifying that each detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
  - 3. Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale and coordinating installation of duct smoke detectors and access to them. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators. Locate detectors according to manufacturer's written recommendations.
  - 4. Include voice/alarm signaling-service equipment rack or console layout, grounding schematic, amplifier power calculation, and single-line connection diagram.
  - 5. Drawings showing the location of each addressable device and each notification device with details as needed to comply with listing conditions of the device.
  - 6. Floor plans showing size and route of cable and raceways.
- D. Design Calculations: To comply with codes, performance requirements and design criteria, include analysis:
  - 1. .Show compliance with requirements for selecting the spacing and sensitivity of detection, complying with NFPA 72.
  - 2. Battery sizing calculations
  - 3. Voltage drop calculations

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- 4. Visible and audible notification device performance demonstrating compliance with NFPA 72 and local building code.
- 5. For systems with voice notification: amplifier capacity
- E. Input/Output Matrix
  - 1. Submit matrix showing for each system input the appropriate system response including control unit annunciation, notification appliance activation, fire safety controls, and supplementary actions.

# 1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Seismic Qualification Certificates: For fire-alarm control unit, accessories, and components, from manufacturer.
  - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
  - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
  - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- C. Field quality-control reports.

# 1.8 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," deliver copies to authorities having jurisdiction and include the following:
  - 1. Comply with the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
  - 2. Provide "Record of Completion Documents" according to NFPA 72 article "Permanent Records" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter.
  - 3. Record copy of site-specific software.
  - 4. Provide "Maintenance, Inspection and Testing Records" according to NFPA 72 article of the same name and include the following:
    - a. Frequency of testing of installed components.
    - b. Frequency of inspection of installed components.
    - c. Requirements and recommendations related to results of maintenance.
      - d. Manufacturer's user training manuals.
  - 5. Manufacturer's required maintenance related to system warranty requirements.
  - 6. Abbreviated operating instructions for mounting at fire-alarm control unit.
- B. Software and Firmware Operational Documentation:
  - 1. Software operating and upgrade manuals.

- 2. Program Software Backup: On magnetic media or compact disk, complete with data files.
- 3. Device address list.
- 4. Printout of software application and graphic screens.

# 1.9 QUALITY ASSURANCE

- A. Installer Qualifications: Installation shall be by personnel certified by NICET as fire-alarm Level II technician.
- B. Source Limitations for Fire-Alarm System and Components: Obtain fire-alarm system from single source from single manufacturer. Components shall be compatible with, and operate as, an extension of existing system.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. NFPA Certification: Obtain certification according to NFPA 72 by an NRTL or UL-listed alarm company.

# 1.10 SERVICE INTERRUPTION

- A. Do not interrupt fire-alarm service to facilities occupied by Owner or others unless permitted under the following conditions
  - 1. Notify Owner no fewer than two days in advance of proposed interruption of fire-alarm service.
  - 2. Do not proceed with interruption of fire-alarm service without Owner's written permission.
  - 3. Provide "fire watch" or similar temporary guard service to affirm the same role as the fire alarm system in protecting the facility's occupants and the owner's property. Obtain approval from the authority having jurisdiction for the proposed method.

# 1.11 SEQUENCING AND SCHEDULING

- A. Existing Fire-Alarm Equipment: Maintain existing equipment fully operational until new equipment has been tested and accepted. As new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service and label existing fire-alarm equipment "NOT IN SERVICE" until removed from the building.
- B. Equipment Removal: After acceptance of new fire-alarm system, remove existing disconnected fire-alarm equipment and wiring.

# PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Honeywell: including Notifier, Silent Knight, Gamewell, .

# 2.2 SYSTEM OPERATIONAL DESCRIPTION

- A. Non-coded, UL-certified addressable system, with multiplexed signal transmission and horn/strobe evacuation.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Fire-alarm signal initiation shall be by one or more of the following components:
  - 1. Manual stations.
  - 2. Smoke detectors.
  - 3. Duct smoke detectors.
  - 4. Verified automatic alarm operation of smoke detectors.
  - 5. Automatic sprinkler system water flow.
  - 6. Heat detectors in elevator shaft and pit.
- D. Fire-alarm signal shall initiate the actions identified and as required by code. For each required action refer to appropriate discipline drawings (for example architectural for door locks, mechanical for fans and dampers, etc) and determine the quantity, rating, and location of interface modules required to initiate the action. The actions are:
  - 1. Identify alarm at fire-alarm control unit and remote annunciators.
  - 2. Transmit an alarm signal to the remote alarm receiving station.
  - 3. Activate alarm notification appliances in accordance with facility requirements.

# 2.3 CIRCUITS

- A. Initiating Device, Notification Appliance, and Signaling Line Circuits: NFPA 72, Class B.
  1. Signaling Line Circuits: Style 4
  - 2. Install no more addressable devices on each signaling line circuit than 70% of the signaling line circuit capacity. Circuits shall not be shared between floors or smoke control zones.
  - 3. Allow for 20% spare circuits of each type, but no less than three spares.
  - 4. Power supplies shall have 30% spare capacity.
- B. Wire
  - 1. Non-Power-Limited Circuits: Conductors shall be 600-V rated, 75 deg C, color-coded insulation.

- a. Low-Voltage Circuits: No. 16 AWG, minimum, stranded copper (maximum of seven strands).
- b. Line-Voltage Circuits: No. 12 AWG, minimum, solid or stranded copper.
- 2. Power-Limited Circuits: NFPA 70, Types FPL, FPLR, or FPLP, as recommended by manufacturer.
- C. Raceways, Outlets, and Junction Boxes
  - 1. Shall conform to specification sections "Raceways" and "Outlet and Junction Boxes".
  - 2. Provide 5" square by 2-2/7" deep outlet boxes with plaster ring for all flush mounted notification appliances.

# 2.4 NOTIFICATION APPLIANCES

- A. General Requirements for Notification Appliances: Individually addressed, connected to a signaling line circuit, equipped for mounting as indicated and with screw terminals for system connections.
  - 1. Combination Devices: Factory-integrated audible and visible devices in a singlemounting assembly, equipped for mounting as indicated and with screw terminals for system connections.
- B. Chimes, Low-Level Output: Vibrating type, 75-dBA minimum rated output.
- C. Chimes, High-Level Output: Vibrating type, 81-dBA minimum rated output.
- D. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet (3 m) from the horn, using the coded signal prescribed in UL 464 test protocol.
- E. Visible Notification Appliances: Xenon strobe lights comply with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- (25-mm-) high letters on the lens.
  - 1. Rated Light Output:
    - a. As determined by contractor analysis.
    - b. 15/30/75/110 cd, selectable in the field.
  - 2. Mounting: Wall mounted unless otherwise indicated.
  - 3. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
  - 4. Flashing shall be in a temporal pattern, synchronized with other units.
  - 5. Strobe Leads: Factory connected to screw terminals.
  - 6. Mounting Faceplate: Factory finished, white.

# 2.5 ADDRESSABLE INTERFACE DEVICES

A. Description: Microelectronic monitor module, NRTL listed for use in providing a system address for alarm-initiating or supervisory/reporting devices, for wired applications.

- B. In NEMA 1 enclosure with exterior label. Internal label with I/O point(s) identification.
- C. Integral Relay: Capable of providing a direct signal with appropriate contact ratings to system interface, or receiving signal from system interface, including but not limited to:
  1. Fan shutdown motor controller

OVERVOLTAGE AND SURGE PROTECTION

A. All equipment connected to alternating current circuits shall be protected from surges in accordance with IEEE C62.41.1/IEEE C62.41.2 B3 combination waveform and NFPA 70. Fuses shall not be used for surge protection. The surge protector shall be rated for a maximum let thru voltage of 350 Volts ac (line-to-neutral) and 350 Volt ac (neutral-to-ground).

# PART 3 - EXECUTION

2.6

# 3.1 EQUIPMENT INSTALLATION

- A. Comply with NFPA 72 for installation of fire-alarm equipment.
  - 1. Mount signaling and notification devices within the more stringent of the restrictions imposed by NFPA 72 and the restrictions imposed by device manufacturer.
- B. Wiring
  - 1. Install all wiring in raceways dedicated to the fire alarm system
  - 2. Wiring in panels, cabinets, and other enclosures shall be neatly bundled and channeled. Provide channel routing to all I/O and neatly fan wiring to terminus.
  - 3. Ground per code.
- C. Connecting to Existing Equipment: Verify that existing fire-alarm system is operational before making changes or connections.
  - 1. Connect new equipment to existing control panel in existing part of the building.
- D. Audible Alarm-Indicating Devices: Install not less than 6 inches below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille.
- E. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn, unless it is integral with audible alarm indicating device. Install wall mounted devices such that the bottom of the lens is not less than 80 inches above the finished floor. Ceiling mount devices allowed where shown and shall be approved for ceiling application. More than two visible notification devices in the same room or adjacent space within the field of view shall flash in synchronization. Synchronization of devices not in the same field of view is allowed. In corridors where there are more than two devices in any field of view, they shall be spaced a minimum of 55' apart or they shall flash in synchronization.
- F. Fan Shut down relays: Install within 5 feet of the motor controller.

# 3.2 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

# 3.3 GROUNDING

A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.

# 3.4 FIELD QUALITY CONTROL

- A. Field tests shall be witnessed by authorities having jurisdiction.
- B. Perform tests and inspections.
- C. Tests and Inspections:
  - 1. Visual Inspection: Conduct visual inspection prior to testing.
    - a. Inspection shall be based on completed Record Drawings and system documentation that is required by NFPA 72 in its "Completion Documents, Preparation" Table in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter.
    - b. Comply with "Visual Inspection Frequencies" Table in the "Inspection" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.
  - 2. System Testing: Comply with "Test Methods" Table in the "Testing" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
  - 3. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.
  - 4. Test audible appliances for the private operating mode according to manufacturer's written instructions.
  - 5. Test visible appliances for the public operating mode according to manufacturer's written instructions.
  - 6. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
- D. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.
- E. Fire-alarm system will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.

END OF SECTION

### SECTION 310000 - EARTHWORK

#### PART 1 - GENERAL

#### 1.1 DESCRIPTION

A. This work includes excavation, fill, compaction, and grading for general site work, structure, and utilities.

### 1.2 STANDARD SPECIFICATIONS

- A. All work to be performed and materials to be used shall be in accordance with current City of Kirkland standards and specification and the 2022 Standard Specifications and Standard Plans for Road, Bridge and Municipal Construction, as published by the Washington State Department of Transportation, unless otherwise indicated herein.
- B. The Contractor shall have one copy of the Standard Specifications at the job site.
- C. The Standard Specifications apply only to performance and materials and how they are to be incorporated into the work. The legal/contractual relationship sections and the measurement and payment sections do not apply to this document.

### 1.3 QUALITY ASSURANCE

### A. Soil Testing

- 1. The Owner will engage a Geotechnical Consultant to test soil materials proposed for use in the work and for quality control testing during excavation and fill operations.
- 2. Samples of materials shall be furnished to the Geotechnical Consultant by the Contractor at least one week before their anticipated use.
- 3. Under this contract, smooth out areas for density tests and otherwise facilitate testing work as directed.

#### 1.4 EXISTING CONDITIONS

A. Site Information: Subsurface conditions were investigated by RZA Agra. Their report dated January 1993. This report and any other available data is included in the construction documents.

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- 1. The data on indicated subsurface conditions are not intended as representations or warranties of accuracy or continuity of such condition between test pits or boring. It is expressly understood the owner will not be responsible for interpretations or conclusions drawn therefrom by the Contractor. The data is made available for the convenience of the Contractor.
- 2. Additional test pits and other exploratory operations may be made by the Contractor at no cost to the Owner provided that the excavations are backfilled, compacted, and approved by the Geotechnical Consultant.

### PART 2 - PRODUCTS

# 2.1 STRUCTURAL FILL

- A. Structural fill shall be imported well graded granular material free of organics and debris. Maximum particle size 4 inches and no more than 5 percent fines (material passing No. 200 sieve) with at least 30 percent retained on the U.S. No. 4 sieve.
- B. On-Site soils free of organics and debris with a maximum particles size of 4inches capable of being compacted as specified.

#### 2.2 NONSTRUCTURAL FILL

A. Nonstructural fill shall be on-site or imported well-graded granular material free of organics and debris. Maximum particle size 4 inches and no more than 30 percent fines (material passing No. 200 sieve). Material shall be capable of being compacted as specified under the weather conditions prevailing at time of construction.

# 2.3 GRAVEL BACKFILL FOR PIPE ZONE BEDDING

A. Gravel backfill for pipe zone bedding shall conform to Section 9-03.12(3) of the WSDOT Standard Specifications.

# 2.4 SAND

A. Sand shall conform to Section 9-03.13 of the WSDOT Standard Specifications.

#### 2.5 GRAVEL BACKFILL FOR WALLS

A. Gravel backfill for walls shall conform to Section 9-03.12(2) of the WSDOT Standard Specifications.

### 2.6 GRAVEL BACKFILL FOR DRAINS

A. Gravel backfill for drains shall conform to Section 9-03.12(4) of the WSDOT Standard Specifications.

### 2.7 TRENCH BACKFILL

A. Trench backfill shall conform to Section 9-03.15 of the WSDOT Standard Specifications.

### PART 3 - EXECUTION

#### 3.1 EXCAVATION

- A. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of the Owner's Representative. Unauthorized excavation, as well as remedial work directed by the Owner's Representative, shall be at no change in contract amount.
  - 1. Under footings, foundation bases, or retaining walls, fill unauthorized excavation with CDF or lean mix concrete. The bottom width of the excavation shall be defined by a line extending downward and out from the outer edge of the footing at an angle of 1H:1V.
  - 2. Elsewhere, backfill and compact unauthorized excavations with structural fill as specified herein.
- B. Over excavation: In certain areas where soft spots occur in the subgrade, satisfactory subgrade shall be achieved by overexcavation and replacement with structural fill material or lean mix concrete.
  - 1. Location and extent of soft spot areas to be verified by Owner's Geotechnical Consultant in the field.
- C. Stability of Excavations: Slope the sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.

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- D. Shoring and Bracing: Provide shoring and bracing to comply with local codes and authorities having jurisdiction. Provide materials for shoring and bracing, such as sheet piling, uprights, stringers and cross-braces, in good serviceable condition. Maintain shoring and bracing in excavations regardless of the time period excavations will be open. Carry down shoring and bracing as the excavation progresses.
- E. Dewatering: Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.
  - 1. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines and other dewatering system components necessary to convey water away from excavations.
  - 2. Establish and maintain temporary drainage ditches and other diversions outside excavation limits for each structure to convey water. Do not use trench excavations as temporary drainage ditches.
- F. Material Storage: Stockpile excavated materials as required. Place, grade, shape and cover stockpiles for proper drainage and to prevent accumulation of excess moisture.
  - 1. Locate and retain soil materials away from edge of excavations.
  - 2. Dispose of excess soil material and waste materials legally off-site.
- G. Excavation for Buildings and Retaining Walls
  - 1. Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10foot, and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction, and inspection.
  - 2. In excavating for footings and foundations, take care not to disturb the bottom of the excavation. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive concrete. Compact base to the density required and allow testing of compaction prior to constructing concrete forms.
  - 3. Place footings on native soils, or properly compacted fill material. Where existing soft materials are encountered below footings, over excavate as required by the Owner's Geotechnical Consultant or until dense native soil is encountered and backfill with lean concrete. The minimum lateral limits of the overexcavation and lean concrete backfill beneath footings shall be defined by a line extending downward and out from the outer edge of the footing at an angle of 1H:1V. Maintain side slopes as required by authorities having jurisdiction.
- H. Excavation for Pavements: Cut surface under pavements to comply with cross-sections, elevations and grades as shown within a tolerance of plus or minus 0.10-foot.

- I. Excavation for Planting Areas: Conform to cross-sections, elevations and dimensions shown, within a tolerance of plus or minus 0.10-foot.
- J. Excavation for Trenches
  - 1. Excavate trenches to the depth indicated or required. Carry the depth of trenches for piping to establish the indicated flow lines and invert elevations.
  - 2. Where rock is encountered, carry the excavation 6 inches below the required elevation and backfill with a 6-inch layer of bedding material.
  - 3. Grade bottoms of trenches as indicated, notching under pipe bells to provide solid bearing for the entire body of the pipe.
- K. Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.

# 3.2 SUBGRADE VERIFICATION

- A. Following site preparation and excavation for the building, paved surfaces and roadways, the exposed subgrades shall be observed and approved by the Owner's Geotechnical Consultant.
- B. Over excavate any soft, loose or disturbed soils identified by the Geotechnical Consultant and replace with compacted structural fill.
- C. If required by Geotechnical Consultant, provide equipment and labor for proofrolling.

# 3.3 BACKFILL AND FILL

- A. For backfill of all excavations use material sampled and tested by the Owner's Geotechnical Consultant.
- B. All fill used for the following shall be structural fill:
  - 1. Fill beneath footings and foundations.
  - 2. Backfill against footings, foundations and structural walls, except 2 feet of gravel backfill for walls shall be placed immediately adjacent to structures for drainage, unless otherwise shown on the drawings.
  - 3. Fill beneath building slabs.
  - 4. Fill within 3 feet vertically of the base of pavements
- C. Fill beneath areas to be landscaped shall be nonstructural fill.
- D. Backfill excavations as promptly as work permits, but not until completion of the following:

- 1. Acceptance by Owner's Representative of construction below finish grade including, where applicable, waterproofing, dampproofing, piping, conduits and perimeter insulation.
- 2. Inspection, testing, approval and recording locations of underground piping and conduits. Coordinate locations with surveyor for as-built survey.
- 3. Removal of concrete formwork.
- 4. Removal of shoring and bracing and backfilling of voids with satisfactory materials.
- 5. Removal of trash and debris.
- 6. Permanent or temporary horizontal bracing is in place on horizontally supported walls.
- E. Ground Surface Preparation
  - 1. Remove vegetation, debris, unsatisfactory soil materials, obstructions and deleterious materials from ground surface prior to placement of fills. On existing sloped surfaces, steeper than 1 vertical to 4 horizontal, cut benches into hillsides of 10 minimum width and 5 maximum height.
  - 2. When existing ground surface has a density less than that specified under "Compaction" for the particular area classification, break up the ground surface, pulverize, moisture-condition to within 2 percent of the optimum moisture content, and compact to required depth and percentage of maximum density.
- F. Placement and Compaction: Allowable thickness of fill lifts will depend on the material type and compaction equipment used. In no case place backfill and fill materials in layers more than 8 inches in loose depth for material compacted by heavy compaction equipment, and more than 4 inches in loose depth for material compacted by hand-operated tampers. For fill deeper than 3 feet below the base of pavements, lifts may be 12 inches maximum in loose depth.
  - 1. Before compaction, moisten or aerate each layer as necessary to provide the optimum moisture content.
  - 2. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification.
  - 3. Do not place backfill or fill material on surfaces muddy, frozen, or containing frost or ice.
  - 4. Place backfill and fill materials in such a manner as to prevent wedging action of backfill against structures.

#### 3.4 COMPACTION

- A. General: Control soil compaction during construction providing minimum percentage of density specified for each area.
- B. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum dry density determined in accordance with ASTM D 1557 ("Modified Proctor"):

- 1. Structure: Compact top 12 inches of subgrade where exposed, and each layer of backfill or fill material to 95 percent of maximum dry density.
- 2. Building Slab and Steps: Compact top 12 inches of subgrade and each layer of backfill or fill material to 95 percent of maximum dry density.
- 3. Lawn or Unpaved Areas: Compact top 12 inches of subgrade and each layer of backfill or fill material to 85 percent of maximum dry density.
- 4. Walkways: Compact top 12 inches of subgrade and each layer of backfill or fill material to 95 percent of maximum dry density.
- 5. Pavements: Compact top 12 inches of subgrade and each layer of backfill or fill material to 95 percent of maximum dry density.
- 6. Utility Bedding and Backfill: Compact each layer of bedding and backfill to 95 percent of maximum dry density.
- 7. Granular Fill Placed Against Subgrade Walls: Compact to 90 percent of maximum with small hand-operated equipment to avoid over compaction.
- C. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material. Prevent free water from appearing on surface during or subsequent to compaction operations.
  - 1. Remove and replace, or scarify and air dry, soil material too wet to permit compaction to specified density.
  - 2. Soil material removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by disking, harrowing or pulverizing until moisture content is reduced to a satisfactory value.

# 3.5 GRADING

- A. General: Uniformly grade areas of work including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.
- B. Grading Outside Building Lines: Grade areas adjacent to building lines to drain away from structures and to prevent ponding. Finish surfaces shall be free from irregular surface changes.
- C. Compacted as specified, and to required elevation. Provide final grades within a tolerance of 1/2-inch when tested with a 10-foot straightedge.
- D. Compaction: After grading, compact surfaces to the depth and percentage of maximum density for each area classification.

#### 3.6 WET WEATHER PROVISIONS

- A. Schedule earthwork operations to minimize the potential for erosion, siltation, and disturbance of site soils.
- B. Perform earthwork operations in discrete areas as required to minimize the exposure of disturbed soils to wet weather.
- C. Compact exposed soil to reduce the infiltration of rain water.
- D. Direct surface water away from fills and excavations.
- E. Provide temporary pumping equipment to keep excavations and construction free of water.
- F. Soils that become too wet for compaction shall be removed and replaced with compacted structural fill.

### 3.7 DISPOSAL OF EXCESS AND WASTE MATERIALS

- A. Transport acceptable excess excavated material to temporary stockpile areas on the Owner's property. Remove any unused excess excavated material from the site, and dispose of legally off the Owners property, prior to final inspection.
- B. Remove waste materials, including unacceptable excavated material, trash and debris and dispose of legally off the Owner's property.

### 3.8 FIELD QUALITY CONTROL

- A. Quality Control Testing During Construction: Allow Owner's Geotechnical Consultant to observe, test and approve subgrades and fill layers before further construction work is performed.
- B. Footings for structures and retaining walls shall be observed by the Geotechnical Consultant for bearing capacity verification prior to concrete placement. Compaction tests shall be performed if in the opinion of the Geotechnical Consultant they are necessary.
- C. If subgrades or fills which have been placed are below specified density, provide corrective work as specified at no additional expense.

### 3.9 PROTECTION

- A. Protect newly graded areas from traffic and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades in settled, eroded, and rutted areas to specified tolerances.
- C. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, compact to required density and provide other corrective work as specified, with retesting, prior to further construction.

# END OF SECTION

# SECTION 32 12 16 - ASPHALT PAVEMENT

### PART 1 - GENERAL

### 1.1 DESCRIPTION

- A. The work includes constructing asphalt pavement for patching in the parking lot.
- B. All work to be performed and materials to be used shall be in accordance with City of Kirkland (COK) standards and specifications and the 2022 Standard Specifications and Standard Plans for Road, Bridge and Municipal Construction, as published by the Washington State Department of Transportation (WSDOT), unless otherwise indicated herein.
- C. The Contractor shall have one copy of the Standard Specifications and Standard Plans at the job site.
- D. The Standard Specifications apply only to performance and materials and how they are to be incorporated into the work. The legal/contractual relationship sections and the measurement and payment sections do not apply to this document.

### 1.2 SUBMITTALS

A. Asphalt Mix Design: submit mix design information and test results.

# PART 2 - PRODUCTS

# 2.1 TACK COAT

A. Tack coat shall conform to the requirements of Section 5-04.3(4) of the WSDOT Standard Specifications.

#### 2.2 ASPHALT PAVEMENT

A. Asphalt pavement shall be Class 1/2-inch with aggregate conforming to Section 9-03.8 and asphalt PG 58 H-22 conforming to Section 9-02.1(4) of the WSDOT Standard Specifications. Asphalt percentage of the total mixture shall be 5.0 to 7.5 percent.

SECTION 32 12 16

ASPHALT PAVEMENT

# PART 3 - EXECUTION

# 3.1 TACK COAT

- A. Tack coat shall be placed in conformation with Section 5-04.3 of the WSDOT Standard Specifications.
- 3.2 ASPHALT PAVEMENT
  - A. Asphalt pavement shall be constructed in conformance with Section 5-04.3 of the WSDOT Standard Specifications, except as modified herein. Prime coat is not required and tack coat is required as specified therein.
  - B. Asphalt pavement more than four inches thick shall be placed in multiple layers. Each layer shall not exceed four inches in thickness or be less than two inches. Asphalt pavement four inches thick or less may be placed in one layer.

END OF SECTION

# SECTION 32 17 23 - PAVEMENT MARKINGS AND SIGNAGE

### PART 1 - GENERAL

# 1.1 DESCRIPTION

A. This section includes specifications for furnishing and installing pavement markings and parking control signs.

#### 1.2 STANDARD SPECIFICATIONS

- A. All work to be performed and materials to be used shall be in accordance with the U.S. Federal Highway Association 2009 Manual on Uniform Traffic Control Devices (MUTCD), the 2022 Standard Specifications and Standard Plans for Road, Bridge and Municipal Construction, as published by the Washington State Department of Transportation (WSDOT), and in accordance with City of Kirkland (COK) standards and specifications unless otherwise indicated herein.
- B. The Contractor shall have one copy of the Standard Specifications and Standard Plans at the job site.
- C. The Standard Specifications apply only to performance and materials and how they are to be incorporated into the work. The legal/contractual relationship sections and the measurement and payment sections do not apply to this document.

### 1.3 PRODUCT DATA

A. Product Data: Submit data for all products to be used.

# PART 2 - PRODUCTS

#### 2.1 PAINT

A. Paint for pavement markings shall comply with Section 9-34.2 of the WSDOT Standard Specifications. The paint shall be factory mixed, quick drying and nonbleeding. Colors shall be as indicated on the drawings.

SECTION 32 17 23

PAVEMENT MARKING AND SIGNAGE

# 2.2 SIGNS

A. All parking signs shall be reflective sheeting on sheet aluminum conforming to Sections 9-28.8 and 9-28.12 of the WSDOT Standard Specifications. Posts shall conform to Section 9-28.14 of the WSDOT Standard Specifications.

# PART 3 - EXECUTION

- 3.1 Pavement markings installation shall conform with Section 8-22.3 of the WSDOT Standard Specifications, except that the Contractor shall be responsible for all layout and control points, striping shall not deviate more than 1/4-inch in 10 feet from a straight line and striping shall not be more than 1-inch from the specified locations. Paint striping shall only be applied after the pavement has been allowed to cure 14 days minimum, when the pavement is clean and dry and when the temperature is above 50 degrees F.
- 3.2 Signs shall be located and installed as shown on the plans. All sign posts shall be plumb and all signs shall be level.

# END OF SECTION

# SECTION 32 33 00 - SITE FURNISHINGS

### PART 1 - GENERAL

- 1.1 SCOPE
  - A. General: Furnish all labor, equipment and materials necessary for the provision and installation of miscellaneous site improvement items, including, but not limited to:
    - 1. Bicycle Racks Salvaged items
    - 2. Flagpoles
  - B. Items indicated as salvaged shall be salvaged, stored, re-assembled, relocated and installed by Contractor. Coordinate with Owner for storage and manufacturer's instructions for salvaged site furnishings.
  - C. Although not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to, or necessary for complete installation.
  - D. Related Sections:
    - 1. Section 02 40 00 Site Demolition
    - 2. Section 03 30 00 Site Cast-in-Place Concrete

# 1.2 SUBMITTALS

- A. General: Submit the following according to the Conditions of the Contract and Division 1 specification sections.
- B. Product Data:
  - 1. Provide manufacturer's product data and installation instructions for all items in this section. For items identified as salvaged obtain and submit manufacturer's product data and installation instructions from the Owner. Verify quantities and manufacturer model number of each site furnishing.

#### 1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Contractor and fabricators must have 3-5 years of experience in work of highest professional quality of a similar nature; must have adequate facilities and personnel for indicated work; and must be acquainted with all of the work related to this section and any other work which might affect preparation for installation of this work.
- 1.4 WARRANTY

- A. General: Submit a warranty according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Coverage: The Warranty shall protect the Owner from all installation, manufacturing and material defects related to work in this Section.
- C. Conditions: The warranty shall ensure prompt repair or replacement of work which does not perform as required because of failures in workmanship and materials. The repairs/replacement shall be made by the warrantor within 20 days of receipt of complaint in writing, except if adverse weather conditions prevent it. The warranty shall guarantee work in this Section for a period of one year from the date of final acceptance of the entire project by the Owner. If repairs/replacement do not occur within 20 days of complaint receipt, the Owner reserves the right to have the work performed by others and to be reimbursed by the warrantor for the cost of the work.
- D. Warrantor: The warranty shall be promulgated by the parent company of the installer, and shall be signed by an authorized individual in the parent company.

# PART 2 - PRODUCTS

# 2.1 BICYCLE RACKS (Salvaged)

- A. General: Contractor to salvage (3) surface mounted horseshoe shaped bike racks manufactured by DERO from existing north entrance, or approved equal. Bike rack finish is black powder coat. Coordinate with Owner for manufacturer's instructions for relocation and installation.
- B. Contractor to provide stainless steel tamper resistant anchor bolts size and quantity as required to secure bike racks to concrete pavement and per manufacturer's recommendation.

# 2.2 FLAGPOLES

- A. General: Provide (2) flagpoles for (1) flag each pole with hardware and fittings for internal winch halyard system including standard flag arrangement for 4' x 6' flag, vinyl or neoprene coated counterweight with eyelet, and beaded retainer ring. Provide all hardware and fittings for ground sleeve/ embedded mounting in concrete footing as shown on drawings and per manufacturer's recommendations.
- B. Flagpole: 25' height, one piece commercial grade tapered aluminum flagpole with 6" butt diameter and .188" wall thickness, clear anodized finish, rated for 120 mph wind speed (flagged), model IW-256188, as manufactured by The Flagpole Company, 1-800-805-9728, www.theflagpolecompany.com, or approved equal.
- C. Hardware and Fittings: Internal winch halyard system with locking access panel and removable hand crank, 6" anodized gold ball finial, cast aluminum revolving non-fouling internal halyard truck assembly, stainless steel aircraft cable, standard stainless steel flag snap hooks for 4' x 6' flag, spun aluminum flash collar with finish to match flagpole, and corrugated steel ground sleeve with lightening spike arrestor and steel centering wedges, as manufactured by The Flagpole Company, 1-800-805-9728, , <u>www.theflagpolecompany.com</u>, or approved equal.

- D. Flags: (2) 4'x 6' flags (one per flagpole) to be provided by Owner. Contractor to coordinate with Owner for flag installation and provide and install clips for Owner provided flags.
- E. Flagpole lighting: Coordinate flagpole lighting with flagpole installation. Provide all light fixtures, electrical devices, conduit and wiring per electrical drawings and as necessary for complete installation. All electrical shall comply with current code requirements and per electrical drawings and specifications.
- F. Furnish and install all hardware, supplementary or miscellaneous items, appurtenances and devices incidental to, or necessary for complete installation.
- G. Concrete Footings as required per manufacturer's recommendation and per 2.3 below.

# 2.3 C.I.P. CONCRETE FOOTINGS

A. General: Concrete as specified in Section 03 30 00.

# 2.4 HARDWARE

A. General: To be hot-dipped galvanized after fabrication in conformance with ASTM Designation A-153 or stainless steel where noted. Furnish all fastenings, connections, washers, and other necessary hardware to assemble the work. All bolt ends and exposed nuts shall be ballpeened or otherwise tamper-proofed as approved by Owner. All exposed nuts and washers shall be countersunk and not protrude beyond exposed wood surfaces except where otherwise detailed on drawings. All filed or peened surfaces, bolts, nuts, etc. that expose ungalvanized metal surfaces are to be painted with an approved zinc-rich metal preservative.

# PART 3 - EXECUTION

# 3.1 GENERAL

- A. Locate all site improvements in accordance with the drawings and specifications obtaining approval from the Owner's Representative where called for prior to installation. Provide and/or install improvements at location and quantity listed below, and as indicated on drawings.
- B. All site improvements to be set level, plumb and true unless otherwise noted.
- C. Where there is a conflict between manufacturer's recommendations for installation and the drawings, consult with Owner's Representative before proceeding.
- D. Comply with all applicable city, state, and federal code requirements.
- 3.2 BICYCLE RACKS (Salvaged)

- A. General: Install plumb and true in locations as indicated on the drawings and per manufacturer's instructions. Coordinate with Owner for relocation and manufacturer's installation instructions.
- B. Coordinate with Owner for temporary secure storage on the project site prior to permanent installation.

# 3.3 FLAGPOLES

- A. Stake location for approval prior to installation.
- B. General: Install plumb and true in approved locations as indicated on the drawings and per manufacturer's instructions.
- C. Coordinate with electrical for flagpole lighting.
- D. Coordinate with Owner for flag installation and orientation of flagpole access door (cylinder lock) and crank shaft.
- E. Ensure installation is safe, complete, and fully operational. In the presence of Owner, test operation of flagpole winch system to ensure proper operation and aiming of flag/ flagpole lights.
- F. Provide (2) keys to cylinder lock per flagpole and removable hand cranks to Owner.
- G. Comply with all applicable city, state, and federal code requirements.

# 3.4 C.I.P. CONCRETE FOOTINGS

A. General: Install concrete footings sized per drawings or as approved, and per Section 03 30 00. Tops of footings in unpaved areas shall be flush with finished grade, trowel finished and sloped away from posts. Tops of footings in asphalt and concrete paved areas shall be flush with finished grade of adjacent pavement or as per drawings.

# 3.5 CLEAN UP

A. General: Clean all portions of work of dirt and other surface soiling. Leave work in clean, perfect condition.

END OF SECTION 32 33 00

# SECTION 32 91 13 - PLANTING PREPARATION

# PART 1 - GENERAL

### 1.1 SCOPE

- A. General: Furnish all labor, equipment and materials necessary for plant bed, and lawn area preparation including:
  - 1. Subgrade Preparation
  - 2. Topsoil
  - 3. Soil Amendments at lawn areas
  - 4. Finish Grading
  - 5. Cleanup & Maintenance through Final Acceptance

#### B. Related Sections:

- 1. Section 32 93 00 Planting
- 2. Section 02 40 00 Site Demolition
- 3. Section 31 00 00 Earthwork

### 1.2 INSPECTION

A. General: Owner reserves right to reject materials at any time until final inspection and acceptance. Remove rejected material immediately from site. Produce upon request sales receipts for all material and certificates from federal, state and other authorities.

# 1.3 MATERIALS

A. General: No substitutions will be permitted which have not been submitted for prior approval to Owner's Representative. Furnish sufficient descriptive literature and/or samples for any material submitted as "equal" substitutes.

### 1.4 CONTRACTOR

A. General: Contractor must be experienced in landscape work of highest professional quality of a similar nature; must have adequate facilities and personnel for indicated work; and must become acquainted with all other work related to site improvements, and any other work which might affect preparation for installation of landscaping.

# 1.5 SUBMITTALS

- A. Test Certificates:
  - 1. Imported or approved on-site sandy loam component (sieve analysis; nutrient content; salt component and organic matter by weight)
  - 2. Imported topsoil sand component (sieve analysis)
  - 3. Imported topsoil compost component (sieve analysis; organic matter content by weight)

Submit reports and obtain approval prior to mixing at plant and importing to site.

- B. Handling Permit: Submit a copy of the solid waste Handling Permit issued to the supplier of the composted yard waste by the Jurisdictional Health Department.
- C. Samples Submit 1 cubic foot of each of the following:
  - 1. Topsoil sand component
  - 2. Topsoil compost component
  - 3. Topsoil sandy loam component
  - 4. Topsoil sand, compost and sandy loam components mixed in specified proportions.

# 1.6 QUALITY ASSURANCE

- A. General: Beginning work in this section indicates acceptance by the Contractor of all other previously installed related work.
- B. Testing during importation: During the course of importation of all granular surfacing materials, the Owner has the right to take random samples for testing. In the event that any sample tested reveals non-qualifying material is being imported the Contractor shall cease all importation, determine through testing the extent of the problem, and remove the non-qualifying material at no cost to the Owner. Importation will resume only when tests from a new source show compliance and are approved. Any delays or damage to completed work or cost of testing and inspection, due to removal of non-qualifying material are the responsibility of the Contractor.
- C. The Owner reserves the right to reject material at any time until final inspection and acceptance. Remove rejected material immediately from the site. Produce upon request sales receipts for all materials and certificates from federal, state and other authorities.

# 1.7 REFERENCES

A. General: Conform to the following standard specifications:

1.	Americ	an Society for	Testing Materials:
	ASTM	E-11	Sieve Size for Soil Testing
	ASTM	D-75	Sampling Material

ASTM D-422	Particle Size Analysis
ASTM D-1140	Washed Sieve Testing for #200
ASTM C-136	Fine and Course Aggregate Sieve Analysis

### 1.8 PROTECTION

A. General: Protect adjacent property, public walks, curbs and pavement, existing trees and vegetation to remain from damage. Do not place soil directly on paved surfaces. Locate all underground utilities prior to commencement of work. Repair at Contractor's expense damaged utilities, curbs, paving, walks, walls, structures, or existing trees and vegetation. Keep street and area drains open and free flowing. Do not store materials within the dripline of existing trees or vegetation to remain or outside the indicated limits of work unless otherwise approved. Remove and legally dispose of excess materials. Erect necessary signs and barriers against pedestrian/vehicular traffic.

# 1.9 CODES AND REGULATIONS

A. General: Comply with all applicable city, county, state and federal codes and regulations.

### 1.10 PRE-INSTALLATION CONFERENCE

- A. General: Prior to commencement of work by the landscape subcontractor, coordinate a preinstallation meeting at the site that includes the owner, owner's representative, general contractor and landscape subcontractor to discuss items covered in Sections 32 91 13 and 32 93 00. At a minimum, items to be discussed include:
  - 1. Existing condition of subgrade to receive topsoil. Subcontractor shall verify and certify acceptance of subgrade elevation and grading, common fill in planted areas prior to topsoil placement. Contractor shall notify owner's representative of any known problems with subgrade soil quality, drainage and permeability at this time.
  - 2. Soil preparation and installation.
  - 3. Plant material sources and installation.
  - 4. Planting construction schedules.
  - 5. Quality control, watering, and maintenance.

# PART 2 - PRODUCTS

- 2.1 TOPSOIL
  - A. General: Topsoil to be fertile, friable, sandy loam, and to supply the following composition requirements: weed and seed free; pH between 5.5 and 7.5; maximum particle size to be 1/2 inch, with 97% to 100% passing the 3/8" screen; soluble salts shall not exceed 600 ppm; free of clay and sod lumps, litter and toxic matter harmful to plant growth. Pure organic content shall be 10%

maximum by weight. Topsoil components shall be mixed in the following proportions (percentages below are by volume):

1. All plant bed areas: 10% composted yard waste, 60% sandy loam, 30% sand.

All components shall conform to the requirements indicated. Mixing of the soil components shall not occur on site unless on-site materials, mixing operation and locations are approved.

B. Sand: Conform to the following analysis using Tyler Standard Screens - U.S. Series Equivalent Number:

6	100%	
	10076	)
00%	95-100	0%
00%	85-100	0%
0%	75-90%	1%
0%	15-30%	1%
)	0-5%	
%	sieve procedure) 0-1.5%	%
00% 00% 0% 0%	95-100 85-100 75-90% 15-30% 0-5% sieve procedure) 0-1.5%	, 10% 10% 1% 1%

Submit separate sand sieve analysis for approval prior to mixing.

- C. Composted Yard Waste: Material derived from aerobic decomposition of recycled plant waste fully composted for a minimum of 6 months; material shall have a moisture content such that no visible free water or dust is produced when handling the material; no fresh sawdust or fresh wood by-products to have been added after the composting process has begun. No recycled sanican waste shall be used. Yard waste shall be from a permitted composting facility. 100% of compost-ed yard waste shall pass the 5/16 inch screen. Submit separate sample for approval prior to mixing. Available from Cedar Grove or approved equal.
- D. Sandy Loam: Shall be derived from the "A" Horizon of naturally occurring, free draining, friable soils. Soils with a high fine silt or clay content will be rejected. Submit separate sample for approval prior to mixing. Screened on-site soils will be considered if it does not contain woody debris or glacial till.

# 2.2 SOIL AMENDMENTS

- A. General: All lawn areas to receive sod shall be amended with 2 <sup>1</sup>/<sub>2</sub>" minimum depth of composted yard waste.
- B. Composted Yard Waste: Material derived from aerobic decomposition of recycled plant waste fully composted; material shall have a moisture content such that no visible free water or dust is produced when handling the material; no fresh sawdust or fresh wood by-products to have been added after the composting process has begun. No recycled sanican waste shall be used. Yard waste shall be from a permitted composting facility. 100% of composted yard waste shall pass the 5/16 inch screen. Submit separate sample for approval prior to mixing. Available from Cedar Grove or approved equal.

- 2.3 CHEMICALS
- A. General: Herbicide, insecticide and fungicide shall not be used on this project.
- 2.4 WATER
- A. General: Free of substances harmful to plant growth, delivered through on-site water sources.

# PART 3 - EXECUTION

- 3.1 TOPSOIL, SOIL AMENDMENTS, AND FINISH GRADING
  - A. General: Coordinate with all subgrade installations such as utilities and storm drainage.
  - B. Prepare subgrade by scarifying to minimum 4" depth and removing rocks and debris over 2" in diameter. <u>DO NOT</u> scarify soils within the dripline of existing trees or rootzones of existing vegetation to remain. Subgrade soils should be free-draining and without any impervious soils or other materials harmful to plant growth. It is the Contractor's responsibility to notify the Owner's Representative of any subgrade conditions deleterious to plant growth.
  - C. Spread Topsoil: Do not spread topsoil when frozen or excessively wet or dry. Topsoil depth after settlement:
    - 1. Plant Beds: Minimum 8" after settlement. Do not place topsoil on crown or base of existing trees or vegetation to remain.
  - D. Spread Soil Amendments: Do not spread when frozen or excessively wet or dry. Soil Amendment depth after settlement:
    - 1. All areas to be sodded: Minimum 2 1/2" depth of composted yard waste.
  - E. Till topsoil: In all plant bed areas rototill topsoil mix into existing subgrade to a 12" depth prior to planting <u>except within the dripline of existing trees or root zones of existing vegetation to remain</u>. Within the dripline of existing trees, tilling shall be performed by raking by hand to incorporate topsoil within the top 1"-2" of existing soils to avoid damage to existing tree roots or root zones of existing vegetation to remain.
  - F. Till lawn soil amendments: In lawn areas to be sodded, till soil amendments into existing subgrade to an 8" depth prior to sodding.
  - G. Finish Grading: Except as otherwise directed, perform all rough and fine grading required to attain the elevations, lines and forms indicated on the drawings. Grade to uniform levels or slopes between points where grades are given, with round surfaces at abrupt changes in levels. Rake entire surface to a smooth and even grade, remove all rocks over 1" diameter, remove grass roots and debris. Fine graded areas shall include all areas disturbed by work in this Contract which are to be planted or sodded.

- 1. Grading Tolerance:
  - a. Contours and spot elevations shown on the plans are finish grade elevations, unless otherwise noted.
  - b. Where drawings indicate positive drainage flow grades shall provide that drainage free of ruts, hummocks, or other uneven surfaces, which might hold or impede the flow of water. Maintain positive drainage away from building.
- 2. Relationship to Adjacent Areas:
  - a. Plant Beds: Finish grade (surface of 2" organic mulch layer) shall be flush with pavement surface and 1" below top of curbs and walls, unless otherwise noted.
  - b. Sodded Areas: Finish grade in all sodded areas shall be flush with surrounding grades, pavement surface and top of curbs.

# 3.2 CLEAN UP

- A. General: Remove from site all surplus subsoil, surplus imported soils/mulch and other debris resulting from work in this section.
- 3.3 FINAL ACCEPTANCE
  - A. Final Inspection & Acceptance: Final inspection of the work in this section will be made at the time of the Final Inspection of the entire project. Inspection will include a random check of materials depths. A final "punch list" will be issued at that time. Final Acceptance of the landscaped areas will be contingent upon Final Acceptance of the entire project.

END OF SECTION 32 91 13

SECTION 32 93 00 - PLANTING

### PART 1 - GENERAL

- 1.1 SCOPE
  - A. General: Furnish all labor, equipment and materials necessary for the installation of landscaping as indicated, including but not limited to:
    - 1. Fertilizer
    - 2. Limestone
    - 3. Antidesiccants
    - 4. Water
    - 5. Organic Mulch
    - 6. Plant Material
    - 7. Sod
    - 8. Plant Establishment Period and Maintenance
  - B. Related Sections:
    - 1. Section 32 91 13 Planting Preparation

# 1.2 STANDARD SPECIFICATIONS

- A. General: Conform to the following standard specifications, except as supplemented or modified hereinafter:
  - 1. Plant Names: "Report" issued by American Joint Committee on Horticultural Nomenclature Second Edition, 1942, and hereinafter called AJCHN. Names not present in this listing shall conform to accepted nomenclature in the nursery trade.
  - 2. Quality Standards: "American Standard for Nursery Stock," issued by the American National Standards Institute and hereinafter called ANSI Z60.1-2014.
- 1.3 INSPECTION
- A. General: Owner reserves right to reject material at any time until final inspection and acceptance. Remove rejected material immediately from site. Produce upon request sales receipts for all material and certificates from federal, state and other authorities.

# 1.4 MATERIALS

A. General: Whenever any material is specified by name/number, such specifications are for the purpose of facilitating a description of materials and establishing quality, and shall be deemed and construed to be followed by the words "or approved equal." No substitutions will be permitted which have not been submitted for prior approval to Owner's Representative. Furnish sufficient descriptive literature and/or samples for any material submitted as "equal" substitutes.
B. Materials: Furnish plant materials in accordance with Washington State Grading Code for No. 1 Grade; well established and vigorous normal habit of growth, must be free from disease, approved for quality, size and variety upon delivery at site. Verify prior to bid date all sources of supply. Ensure availability of listed sizes, species, variety and quality. Conform with size requirements indicated on drawings or specified herein after, and with requirements of ANSI Z60.1.

### 1.5 CONTRACTOR

A. General: Contractor must be experienced in landscape work of highest professional quality of a similar nature; must have adequate facilities and personnel for indicated work; and must become acquainted with all other work related to site improvements, and any other work which might affect preparation for installation of landscaping.

### 1.6 SUBMITTALS

- A. Samples Submit 1 cubic foot of each of the following:
  - 1. Organic Mulch
- B. Manufacturer's Certificates of Conformance:
  - 1. Fertilizer
  - 2. Limestone
  - 3. Antidesiccant
  - 4. Sod

## 1.7 QUALITY ASSURANCE

A. General: Beginning work in this section indicates acceptance by the Contractor of all other previously installed related work.

#### 1.8 PRE-INSTALLATION CONFERENCE

- A. General: Prior to commencement of the work by the landscape subcontractor, the owner, owner's representative, general contractor, and landscape subcontractor shall meet on site to discuss at a minimum:
  - 1. Plant materials
  - 2. Soil preparation and installation
  - 3. Planting schedules.
  - 4. Quality control, watering, and maintenance.

### 1.9 **PROTECTION**

A. General: Protect adjacent property, public walks, curbs and pavement, existing trees and existing vegetation from damage. Do not place organic mulch or soil directly on paved surfaces. Locate all underground utilities prior to commencement of work. Repair at Contractor's expense damaged utilities, curbs, paving, walks, walls, structures, or existing trees or vegetation. Keep street and area drains open and free flowing. Do not store materials within driplines of existing trees or vegetation or outside the indicated limits of work. Remove and legally dispose of excess materials. Erect necessary signs and barriers against pedestrian/vehicular traffic.

### 1.10 DELIVERY

- A. General: Protect all plant material, new and salvaged, from wind, drought, unusual weather or vandalism. Deliver branched plants with branches tied and exposed branches covered with material which allows air circulation. Prevent damage to root balls and desiccation of leaves. Deliver fertilizer and lime to the site in original unopened containers bearing manufacturer's chemical analysis, name, trade name, trademark, and indication of conformance to state and federal laws. Instead of containers, fertilizer may be furnished in bulk with certificate indicating the above information. Store fertilizer in a cool dry location away from contaminants. Protect sod from dehydration, contamination and heating during delivery, storage, and handling.
- B. Handling: Do not drop or dump materials from vehicles. Avoid drying or damaging plants and sod being moved from the nursery or storage area to the planting site. Handle balled and burlapped plants carefully to avoid cracking or breaking the earth ball. Do not handle plants by the trunk or stems. Protect plants from freezing or drying by a covering of burlap, tarpaulin, or mulching material during transportation from the heeling-in bed to the planting site. Damaged plants will be rejected and shall be removed from the site.

## 1.11 GUARANTEE

- A. General: All plant material shall be guaranteed by the Contractor for a period of one year from the date of final acceptance, to be in healthy condition.
  - 1. Inspections: Make periodic inspections, at no extra cost to Owner, during guarantee period. Determine what changes if any should be made in Owner's maintenance program.
  - 2. Replacement at guarantee period conclusion: Replace, at no cost to the Owner, and as soon as weather conditions permit, dead plants and plants not in vigorous, thriving condition. Replacements to be of same species and to be subject to all indicated requirements.
  - 3. Lawn Repair: Fertilize and re-sod areas not in a normal healthy growing condition.
- B. Letter of Guarantee: Provide a signed letter stating that the Contractor will conform to the guarantee requirements stated in the specifications.

#### 1.12 CODES AND REGULATIONS

Α. General: Comply with all applicable city, county, state and federal codes and regulations.

## PART 2 - PRODUCTS

#### 2.1 FERTILIZER

- Α. Trees, Shrubs, Groundcover, and Perennials: Agriform planting tablets 20-10-5, 21 gram size, 5 gram size, or granular as approved.
- Β. Bulbs, Corms, and Tubers: Granular 10-15-10 slow release bulb fertilizer as approved.
- C. All Sodded Areas:

1.	Installation Fertilizer "A": Total available Nitrogen (of which 50% is derived from controlled ylene Urea). Total available Phosphorus Total available Potassium	10% by weight release sources including Ureaform or Meth- 20% by weight 20% by weight
2.	Initial Maintenance Fertilizer "B": Initial Fertilizer (Fertilizer 'B')	
	Total available Nitrogen (of which 50% if derived from controlled Urea)	21% by weight release sources including Ureaform or Methylene
	Total available Phosphorous	0% by weight
	Total available Potassium	0% by weight
3.	Follow-up Maintenance Fertilizer "C":	
	Total available Nitrogen	18% by weight
	(of which 50% if derived from controlled Urea)	release sources including Ureaform or Methylene
	Total available Phosphorous	3% by weight
	Total available Potassium	16% by weight
	Total iron content	1% to 3% by weight

#### 2.2 LIMESTONE

Α. General: Dolomite or 'Neutra-Nuggets' by Essential Minerals.

#### 2.3 ANTIDESICCANTS

A. General: "Wiltpruf" as manufactured by Wiltpruf Products, Inc., PO Box 4280, Greenwich, CT 06830, 203.531.4740, or accepted equal.

#### 2.4 WATER

A. General: Free of substances harmful to plant growth.

### 2.5 MULCH

- A. General: Free from weeds, weed seed, mold or other noxious materials.
- B. Organic Mulch: Fine shredded fir or hemlock of uniform color for plant beds and raised planters shall be free from weed seed, sawdust, and splinters and shall not contain resin, tannin, wood fiber, or other compounds detrimental to plant life. Bagged mulch shall have moisture content not in excess of 22%. Bulk mulch shall have a size range of one-half inch to one and one-quarter inch (1/2"-1 1/4") with a maximum of 20% passing a 1/2" screen. Submit sample for approval.

#### 2.6 PLANT MATERIAL

- A. General: Plants to be nursery grown with size at least equal to size specified, prior to pruning. Do not prune prior to site delivery. Measurements, caliper, branching, grading, quality, balling and burlapping per Code of Standards of American Association of Nurserymen. Substitutions of smaller plant sizes will not be permitted, however, substitutions of larger sizes of the same type are acceptable, with approval, at no extra cost to the Owner.
- B. Container Stock: Provide container stock plants which have grown in container in which delivered for a minimum of 6 months, but not over 2 years. Do not handle container stock by tops, stems or trunks. Carefully loosen roots around outside of root balls prior to planting. Containers shall be weed free.
- C. Balled and Burlapped Stock (B&B): Dug with firm, natural balls of soil around roots; ball diameter and depth sufficient to encompass fibrous and feeding roots. Wrap with burlap and bind with twine, cord or wire mesh in accordance with ANSI Z60.0. Handle by ball only. Take care to protect ball and plant. Cracked, broken or dry-to-the-center balls will not be acceptable. Root balls shall be weed free.
- D. Bulbs, Tubers and Corms: All bulbs, tubers, and corms shall be dormant, firm and healthy, free of mold, soft areas, cuts, slices, bruises or other damage.
- E. Pruning: Do not prune before delivery. Prune or limb new and existing plants only as directed by Owner's Representative. Trees with bark sunscalds, broken leaders, disfiguring knots or fresh cuts of limbs over 3/4 inch not completely calloused will be rejected.

- F. Form: Trees and shrubs are to have overall form typical of the species, with a uniformly branched, symmetrical crown. "Specimen" designation indicates plant materials of the highest quality and form.
- G. Quality: Trees with bark sunscalds, broken leaders or disfiguring knots will be rejected. Root balls shall be free of circling, kinked or truncated roots and free of roots protruding above the soil.

# 2.7 CHEMICALS

A. General: Herbicide, insecticide and fungicide shall not be used on this project.

## 2.8 LAWN/ SOD

A. Sod shall have the following characteristics: a mature root system, maximum two years old, free of weeds, machine cut to a pad thickness of 3/4" excluding top growth, vigorous top growth, no mesh, and shall not be dormant. Broken and unevenly cut sod pads will not be accepted. Sod pads must be uniform in size and must support their own weight when held vertically. Transport flat, not rolled. Submit supplier for approval prior to delivery to site. Seed mixture shall be perennial rye grass with minimum three different grass species. Submit grass species names and characteristics for approval.

## PART 3 - EXECUTION

## 3.1 PLANTING

- A. See Section 32 91 13 for plant bed and lawn area preparation.
- B. Timing of Planting: All plant material to be placed between October 15 and May 1, or as approved by Owner's Representative. Do not plant when ground is frozen, snow covered or muddy.
- C. Location: Prior to commencement of planting operations, stake outline of shrub and groundcover and bulb areas. Mark name of variety on stake where different varieties are massed. Obtain approval of Owner's Representative prior to planting.
- D. Excavation of Plant Pits: Completely rip soils and scarify sides and bottom of all plant pits to dimensions shown on the plans. Remove any impervious or otherwise unsuitable soils or material to a minimum of 12" below bottom of plant pit and minimum 12" beyond sides of plant pit around each tree and shrub.

- E. Planting Soil Backfill: Place minimum 6" depth of a blend of 50% topsoil, 50% native soil in bottom of plant pit and compact. Place plant material as noted below. Backfill with a well blended 50/50 mix and proceed as noted below.
- F. Placement of Plants (Trees, shrubs, groundcovers, perennials, and ornamental grasses): Place at normal planting season, unless otherwise approved. Orient as directed for best appearance. Set in center of pits, on amended on site soil backfill. Set plantings to bear same relationship with finish grade after settlement as they bore to natural grade. Hold firmly in position while backfill mixture is being placed. Break down any smooth walls of the plant pit during this backfill process. Place backfill mixture carefully, avoiding root damage and filling all voids. Compact fill by jetting to avoid air pockets. Allow to soak away and continue adding more backfill mixture as required. Add fertilizer tablets, as specified below, near top of root ball during backfill:
  - 1. For container stock: Cut 2 sides with approved type cutter, taking care to avoid any root damage.
  - 2. For balled stock: Cut string and remove fasteners. Remove burlap.
  - 3. For wire baskets: Cut wire and remove wire basket.
- G. Placement of bulbs, corms and tubers: Place in holes two times the size of bulb, corm or tuber at a depth two times the diameter of the bulb, corm or tuber with roots down **or** per nursery directions. Incorporate granular slow release bulb fertilizer near top of bulb, corm, and tuber during backfill at rate and as per manufacturer directions.
- H. Fertilizer: Space tablets evenly at upper outer edges of root system during backfilling, 6-8" below the surface of the soil. Provide (8) 21-gram tablets per tree, (4) 21-gram tablets per shrub and (1) 5-gram tablet per groundcover and perennial.
- I. Organic Mulch: Spread 2" minimum depth as indicated in all shrub and groundcover plant beds. Do not cover crowns of trees or plants with mulch.

## 3.2 SOD PLACEMENT

- A. Sod Installation:
  - 1. Sod Bed Installation: Finish surfaces by raking smooth and even. Level out surface undulations and irregularities to tolerances specified in See Section 329113 for lawn area preparation.
  - 2. Apply Installation fertilizer "A" at the rate of 10lbs. per 1,000 square feet, and dolomite limestone at the rate of 30 lbs. per 1,000 square feet. Rake to incorporate. Finish surfaces by raking smooth and even; lightly compact with roller. Level out surface undulations and irregularities to tolerances specified in Section 32 91 13 and re-compact as necessary. Drive no heavy equipment over sod bed after this operation.
  - 3. Sodding: In placing sod, layers shall place sod from the sod side and kneel on plywood to prevent rutting of the new surface. Lay sod over graded and moistened soil, lightly raking the soil ahead of each sod strip and laying sod with all joints tightly butted and staggered.

Water thoroughly and immediately after installation and roll with a light roller. Water frequently until roots knit with soil. Sod soil surface shall be flush with adjacent surfacing.

- 4. Protection: Protect against harm from wind, stormwater and trespassing. Re-sod damaged portions as required. Provide fencing and/or signage as necessary to prevent trespassing on new sod installation.
- 5. Initial Maintenance Fertilization (Fertilizer "B"): Apply fertilizer at the rate of 2 lbs. per 1,000 square feet after the first mowing. Apply once each week through the third mowing, minimum three applications. Apply only in areas with automatic irrigation. Do not apply Fertilizer "B" between October 1 and March 30.
- 6. Follow-up Maintenance Fertilization (Fertilizer "C"): Apply fertilizer at the rate of 6 lbs. per 1,000 square feet four weeks after the third mowing.

## 3.3 ESTABLISHMENT OF NEW LAWN - SODDED AREAS

- A. Protection: Protect against harm from wind, storm water and trespassing. Treat and re-sod damaged portions as required.
- B. Mowing: When grass in sod areas reaches a height of 3" the Contractor shall mow with a reel type mower to a height of 2" and remove clippings. Establishment mowing is to be continued for a minimum of three mowings.
- C. Watering: Watering: Irrigate turf areas thoroughly immediately after each application of Fertilizer 'B' and 'C'. Schedule irrigation applications minimum twice daily during maintenance period, duration based on daily weather conditions. Make necessary adjustments to watering schedule to accommodate seasonal changes. Water frequently until roots knit with soil and so that they receive adequate water for survival of the sod in a healthy condition.
- D. Re-sodding: 30 days after initial sodding, all bare spots larger than 4 sq. in., and any areas of turf which fail to establish a healthy uniform stand of specified grasses shall be re-sodded.
- E. Initial Maintenance Fertilizer (Fertilizer "B"): Apply fertilizer at the rate of 2 lbs. per 1,000 square feet after the first mowing. Apply once each week through the third mowing, minimum three applications. Do not apply Fertilizer "B" between October 1 and March 30.
- F. Follow-up Maintenance Fertilizer (Fertilizer "C"): Apply fertilizer at the rate of 6 lbs. per 1,000 square feet four weeks after the third mowing.

# 3.4 CLEAN UP

A. General: Remove from site all cans, surplus materials and other debris resulting from planting operations. Neatly dress and finish landscaping areas.

### 3.5 PLANT ESTABLISHMENT AND FINAL ACCEPTANCE

- A. Preliminary Inspection and Acceptance: When the work specified in this section has been completed, an inspection will be made within seven (7) days of the Contractor's request. The Owner will generate a "punch list" of items that will require revisions or completion to comply with the contract documents. Preliminary acceptance of the landscaping will be given when items on the punch list have been completed to the satisfaction of the Owner.
- B. Establishment Period and Maintenance: The Establishment Period will commence at the time of first planting and will extend until Final Acceptance of the entire project. Maintenance during this period shall include:
  - 1. Watering: New plant bed and lawn areas do not include an automatic irrigation system. Hand watering of plant material in these areas is required. Water areas of new lawn and plants so that they receive adequate water for survival of the plants in a healthy condition. Make necessary adjustments to watering schedule to accommodate seasonal changes.
  - 2. Mowing: Mow lawn areas to a height of 2" when the average height reaches 3". Remove clippings. Mow weekly until Final Acceptance, minimum 3 times.
  - 3. Re-sodding: Re-sod spots larger than 4 inches square not having a uniform stand of grass.
  - 4. Fertilization: Should the establishment period extend to 12 months beyond the time of first planting, fertilize all trees, shrubs, and groundcover at the rates specified.
  - 5. Weeding: Remove all weeds before they reach 6" in height from all plant beds.
- C. Final Inspection and Acceptance: Final inspection of the work in this section will be made at the time of the Final Inspection of the entire project. A final "punch list" will be issued. Final Acceptance of the landscaping will be contingent upon Final Acceptance of the entire project.

END OF SECTION 32 93 00

## SECTION 33 40 00 – STORM DRAINAGE

## PART 1 - GENERAL

### 1.1 DESCRIPTION

A. The work includes constructing drainage pipes, cleanouts, and area drains.

### 1.2 STANDARD SPECIFICATIONS

- A. All work to be performed and materials to be used shall be in accordance with City of Kirkland (COK) standards and specifications and the 2022 Standard Specifications and Standard Plans for Road, Bridge and Municipal Construction, as published by the Washington State Department of Transportation (WSDOT), unless otherwise indicated herein.
- B. The Contractor shall have one copy of the Standard Specifications and Standard Plans at the job site.
- C. The Standard Specifications apply only to performance and materials and how they are to be incorporated into the work. The legal/contractual relationship sections and the measurement and payment sections do not apply to this document.

# 1.3 SUBMITTALS

A. Submit product data for all materials to be used.

## PART 2 - PRODUCTS

### 2.1 PIPE AND FITTINGS

- A. Storm drain pipe shall be schedule 40 PVC and conform to Section 9-05.12(1) of the WSDOT Standard Specifications.
- B. Wall and planter drain pipe shall conform to Section 9-05.12(1) of the WSDOT Standard Specifications, and shall include Class 2 perforations as specified in Section 7-01.3(2) of the WSDOT Standard Specifications.

SECTION 33 40 00

STORM DRAINAGE

## 2.2 CLEANOUTS

A. Cleanouts shall be of the same material as the pipe and shall conform with Section 7-19.2 of the WSDOT Standard Specifications.

## 2.3 AREA DRAINS

- A. Area drains shall be a structure made out of PVC meeting ASTM D 1784. Joint tightness shall conform to ASTM D3212. Flexible elastomeric seals shall conform to ASTM F 477. ADS Nyloplast Drain Basin or approved equal.
- B. Frames and grates for area drains shall be ductile iron and made specifically for each basin so as to provide a round bottom flange that closely matches the diameter of the area drain. Grates shall be capable of supporting H-20 wheel loading for traffic areas or H-10 loading for pedestrian and landscape areas. Metal shall conform to ASTM A536 grade 70-50-05 for ductile iron and be painted black.

# PART 3 - EXECUTION

- 3.1 PIPE
  - A. Pipe shall be installed in conformance with Section 7-04.3 of the WSDOT Standard Specifications.

## 3.2 CLEANOUTS

A. Cleanouts shall be installed in conformance with Section 7-19.3 of the WSDOT Standard Specifications.

## 3.3 AREA DRAINS

A. Area drains shall be installed per manufacturer's recommendations.

## 3.4 CLEANING AND TESTING

A. All storm drains and appurtenances shall be cleaned and tested in accordance with the lowpressure air method specified in Section 7-04.3(1) of the WSDOT standard specifications.

SECTION 33 40 00

STORM DRAINAGE

END OF SECTION

## SECTION 33 46 16 - SUBDRAIN SYSTEM

## PART 1 - GENERAL

### 1.1 DESCRIPTION

A. The work includes constructing perimeter foundation drains system.

### 1.2 STANDARD SPECIFICATIONS

- A. All work to be performed and materials to be used shall be in accordance with the 2022 Standard Specifications and Standard Plans for Road, Bridge and Municipal Construction, as published by the Washington State Department of Transportation (WSDOT), unless otherwise indicated herein.
- B. The Contractor shall have one copy of the Standard Specifications and Standard Plans at the job site.
- C. The Standard Specifications apply only to performance and materials and how they are to be incorporated into the work. The legal/contractual relationship sections, and the measurement and payment sections do not apply to this document.

## PART 2 - PRODUCTS

### 2.1 PIPE

A. Pipe shall be schedule 40 and conform to Section 9-05.2(6) of the WSDOT Standard Specifications. Perforated pipe shall have either round or slotted perforations. Perforations shall be shop drilled.

### 2.2 FOOTING DRAINAGE

A. Composite drainage board shall be Miradrain 6000, unless otherwise noted on the contract drawings.

### 2.3 FILTER FABRIC

A. Filter fabric shall be a nonwoven geotextile conforming to Tables 1 and 2 of Section 9-33(2)1 of the WSDOT Standard Specifications for Class A geotextile with Moderate Survivability.

### 2.4 GRAVEL BACKFILL FOR DRAINS

A. Gravel backfill for drains shall conform to Section 9-03.12(4) of the WSDOT Standard Specifications.

### 2.5 CLEANOUTS

A. Cleanouts shall be of the same material as the pipe, without perforations and shall conform with Section 7-19.2 of the WSDOT Standard Specifications.

### PART 3 - EXECUTION

- 3.1 PIPE
  - A. Pipe shall be installed in conformance with Section 7-01.3 of the WSDOT Standard Specifications. Except that pipe trench shall be excavated as shown on the drawings.

## 3.2 CLEANOUTS

A. Cleanouts shall be installed in conformance with Section 7-19.3 of the WSDOT Standard Specifications.

### END OF SECTION