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STORM DRAINAGE - PLAN NOTES

1. A pre-construction conference shall be held prior to the start of construction. The Contractor shall be responsible for securing all necessary permits prior to construction.
2. Before any construction may occur, the contractor shall have plans which have been signed and approved by the City of Kirkland Public Works Department, obtained all City, county, state, federal and other required permits, and have posted all required bonds.
3. All storm drainage improvements shall be designed and constructed in accordance with the latest edition of the City of Kirkland Public Works Pre-Approved Plans and Policies and the Standard Specifications for Road, Bridge and Municipal Construction, prepared by WSDOT and the American Public Works Association (APWA).
4. Any deviation from the approved plans will require written approval, all changes shall be submitted to the City.
5. A copy of the approved storm water plans must be on the job site whenever construction is in progress.
6. All disturbed areas shall be seeded and mulched or similarly stabilized to the satisfaction of the City of Kirkland Department of Public Works for the prevention of on-site erosion after the completion of construction.
7. Minimum cover over storm drainage pipes in ROW or vehicular path shall be subject to Pre-Approved Plan CK-D.01, unless other design is approved.

8. All catch basins shall be Type I unless otherwise noted. Catch basins with a depth of over five feet (5') to the pipe invert shall be a Type II catch basin. Type II catch basins exceeding five feet (5') in depth shall have a standard ladder installed, unless approved by City of Kirkland Engineer.
9. All storm drainage main extensions within the public right-of-way or in easements must be staked for line and grade prior to starting construction.
10. Rock for erosion protection of roadway ditches, where required, must be of sound quarry rock, placed to a depth of one foot (1') and must meet the following specifications: 4"-8" rock/40%-70% passing; 2"-4" rock/30%-40% passing; 2"-minus rock/10%-20% passing. Recycled concrete shall not be used for erosion protection, including for construction entrance or temporary stabilization elsewhere on site.
11. All pipe, manholes, catch basins, and appurtenances shall be laid on a properly prepared foundation in accordance with the current State of Washington Standard specifications for road and bridge construction (WSDOT). This shall include necessary leveling of the trench bottom or the top of the foundation material as well as placement and compaction of required bedding material to uniform grade so that the entire length of the pipe will be supported on a uniformly dense, unyielding base. If the native material in the bottom of the trench meets the requirements for "gravel backfill for pipe bedding," the first lift of pipe bedding may be omitted provided the material in the bottom of the trench is loosened, regraded, and compacted to form a dense unyielding base. All pipe bedding shall be APWA Class B, Type I, or better. Pipe shall not be installed on sod, frozen earth, large boulders, or rock. Pipe bedding for flexible pipes shall be pea gravel to the springline of the pipe.
12. Construction of dewatering discharges shall always meet water quality guidelines listed in COK Policy E-1. Specifically, discharges to the public stormwater drainage system must be below 25ntu, and not considered a prohibited discharge (per KMC 15.52.090). Temporary discharges to sanitary sewer require prior authorization and permit from King County Industrial Waste Program (206-477-5300) and notification to the Public Works Construction Inspector.
13. Issuance of a Building or Land Surface Modification permit by the City of Kirkland does not relieve the owner of the continuing legal obligation and/or liability connected with storm surface water disposition. Further, the City of Kirkland does not accept any obligation for the proper functioning and maintenance of the system during or following construction except as outlined in the City of Kirkland Public Works Standards.
14. All trench backfill shall be compacted to 95 percent density in roadways, roadway shoulders, roadway prism and driveways, and 85 percent density in unpaved areas. All pipe zone compaction shall be 95 percent.
15. The Contractor shall be responsible for providing adequate safeguards, safety devices, protective equipment, confined space protection, flaggers, and any other needed actions to protect the life, health, and safety of the public, and to protect property in connection with the performance of work covered by the contract. Any work within the traveled right-of-way that may interrupt normal traffic flow shall require a Traffic Control Plan approved by the City of Kirkland. All sections of the WSDOT Standard Specifications, Traffic Control, and the Manual of Uniform Traffic Control Devices (MUTCD) shall apply.
16. No final cut or fill slope shall exceed slopes of two (2) horizontal to one (1) vertical without stabilization by rockery or by a structural retaining wall.

17 All manhole ladders shall be firmly attached and extend to within 1' of the bottom of the Storm Drainage – Plan notes (continued)

18. Approximate locations of existing utilities have been obtained from available records and are shown for convenience. The Contractor shall be responsible for verification of existing utility locations whether or not these utilities are shown on the plans. The Contractor shall exercise all care to avoid damage to any utility. If conflicts with existing utilities arise during construction, the contractor shall notify the City Construction Inspector and any changes required shall be approved by the Development Engineer prior to commencement of related construction on the project.
19. The underground utility location service shall be contacted for field location of existing utilities prior to any construction. The owner or their representative shall be contacted if a utility conflict exists. For utility location in King County, call 1-800-424-5555. The Contractor is responsible to ensure that utility locates are maintained throughout the life of the project.
20. The Contractor shall verify the locations, widths, thicknesses, and elevations of all existing pavements and structures that are to interface with new work. Provide all trimming, cutting, saw cutting, grading, leveling, sloping, coating, and other work, including materials as necessary, to cause the interface with existing works to be proper, acceptable to the Engineer and the City of Kirkland, complete in place and ready to use.
21. All inlet, manhole, and catch basin frames and grates shall not be adjusted to grade until immediately prior to final paving. All catch basin grates shall be set 0.10' below pavement level.
22. Open cut road crossings for utility trenches on existing traveled roadway shall be backfilled only with 5/8" minus crushed rock and mechanically compacted (unless otherwise approved by the City). For streets classified as arterials or collectors, backfill for crossings shall be CDF. Cuts into the existing asphalt shall be neat line cut with saw or jackhammer in a continuous line. A temporary cold mix patch must be placed immediately after backfill and compaction. A permanent hot mix patch shall be placed within 30 days and shall be a minimum of 1" thicker than the original asphalt with a minimum thickness of 2". See Standard D.02.
23. All damages incurred to public and/or private property by the contractor during the course of construction shall be promptly repaired to the satisfaction of the City Construction Inspector before project approval and/or the release of the project's performance bond.
24. Grout all seams and openings in all inlets, catch basins, and manholes. Jetset or speed crete red line grout is NOT allowed.
25. When widening an existing roadway where an existing Type I catch basin will remain in the travel lane, the existing frame and cover shall be replaced with a round, locking frame and cover.
26. For other than single-family dwellings, all exposed or readily exposed indoor storm drainage piping/plumbing shall be labeled with the words "STORM DRAIN" with minimum 2 inch high letters.
27. Recycled concrete shall not be used around stormwater facilities.

28. All fasteners (bolts, nuts, washers, etc.) on manhole and catch basin lids to be standard size. No metric fasteners allowed.
29. A special inspection using CCTV by a PACP (Pipeline Assessment Certification Program) or equivalent certified vendor is required for new storm segments that are publicly owned and maintained before inspector sign off.
30. Special Construction Note for Filterra Tree Boxes Only: At the time of planting, in addition to Filterra manufacturer specifications, trees must be a minimum 51 inches tall (4.25 feet) above the tree grate surface and .75 inch diameter at the grate opening. Pending design of the Filterra system, it is expected that in order to achieve this height above grate, the tree should measure at least 5.25 feet from the root collar of the tree.

STORM DRAINAGE - DESIGN CRITERIA

I. DESIGN

- A. To comply with the National Pollutant Discharge Elimination System (NPDES) municipal stormwater permit, Kirkland adopted the 2021 King County Surface Water Design Manual. All development proposals are required to comply with the design standards in this manual.

II. PIPE

A. Materials

1. Acceptable Types

a. Publicly owned and maintained conveyance systems

- i. PVC 3034
- ii. Ductile Iron
- iii. C900/C905
- iv. HDPE for elevated (above ground) use only with approval from Public Works (not ADS N-12)

b. Privately owned and maintained conveyance systems, and Publicly and privately owned and maintained detention tanks

- i. PVC 3034
- ii. CPEP (ADS N-12 or equal)
- iii. Hancor High Q
- iv. Treatment 1 Steel
- v. Aluminum CMP: Pipe thickness shall be 0.060" (16 ga.) unless minimum bury cannot be obtained.
- vi. Concrete: Pipe must be steel reinforced type for sizes larger than 12" diameter.
- vii. Ductile Iron
- viii. C900/C905

- 2. All pipes shall have a minimum 18" of pipe cover in the ROW or private drives exposed to vehicular traffic. If pipe cover is less than 18 inches the pipe shall be ductile iron (Class 50) or C-900. Also, any pipes proposed to be installed in the load bearing zone of structural walls must be protected by a ductile iron (Class 50) sleeve. The design or use of DI sleeves must be approved by the City of Kirkland Department of Public Works.

3. Storm drainage pipes laid 16 feet and deeper must be cement lined, ductile iron pipe, Class 50.

B. Sizing

1. Size of the required pipe will be based on the Manning Equation with a minimum slope of 0.02 ft/ft for 6" pipe, 0.01 ft/ft for 8" pipe and 0.005 ft/ft for 12" pipe. Minimum velocity at full flow shall be 3.0 feet per second.
2. The following is a list of the minimum pipe diameter size for the listed pipe type:
 - a. Main Line 12"
 - b. Curb Inlet Crossing 12"
 - c. Side Line 6"
 - d. Perf Drain Line 6"
 - e. Rockery/Retaining Wall Drain 6"
3. Downstream pipe shall be the same size or larger than the upstream pipe.

C. Jointing

1. Aluminum CMP shall be band and gasket at all joints except in areas where a high water table problem exists.
2. Concrete pipe joints shall be styrene butadiene rubber (SBR) ring gasket.
3. PVC pipe shall be SBR gasket slide jointing.

D. Horizontal and Vertical Clearance

1. Minimum Horizontal Clearance between storm drainage, sanitary sewer, and water pipes shall be 5 feet, unless another design alternative has been specifically approved by the Development Engineer.
2. Minimum Vertical Clearance where storm drainage, sanitary sewers and water mains cross shall be 18 inches between the pipes, unless an alternative design has been specifically approved by the Development Engineer.

E. General

1. Bends are not allowed in main lines.
2. A catch basin is required for the following conditions:
 - a. A change in the flow-line slope.
 - b. At a maximum distance of 300' in a main line.

- c. A change in the pipe size.
 - d. For the jointing of two or more main lines.
 - e. For a side-line service.
 - f. A change in pipe-material type.
3. Tapping Tees are acceptable for side services where structures cannot be installed due to other structure conflicts, but only if a yard drain is located within 10' of the property line.

Blind tee connections to the City's storm system may be allowed on a case-by-case basis as determined by the City Public Works Department. Installation and examples of prohibited connections are found in Pre-Approved Plan No. CK-D.03A. *Hot saw cutting of the City's storm main is prohibited.*

- a. In areas having an existing piped conveyance system, the stormwater outfalls for single family roof, footing, and yard drains may be made by the two methods mentioned above or by the following (in order of preference),
 - i. Catch basin or manhole
 - ii. Cut-in Tee
 - iii. Core and Saddle Tap (Romac Sewer Saddle Model CB, or Equal, limited to 4" and 6" private connections)
 - iv. Inserta Tee (cored per manufacturer instructions)
 - b. Styrene butadiene rubber (SBR) sleeve and gasket to seal
 - c. Stainless steel metal parts to clamp.
4. All driveway culverts located within City of Kirkland rights-of-way shall be of sufficient length to provide a minimum 3:1 slope from the edge of the driveway to the bottom of the ditch. Culverts shall have beveled end sections to match the side slope.
5. Public Storm drains are to be centered in easements with a minimum width of 15 feet or two times the depth of the utility, whichever is greater. Reduction of the easement width may be allowed on a case-by-case basis.
6. Drainage outlets (stub-outs) shall be provided for each individual lot, except for those lots approved for infiltration by City of Kirkland Department of Public Works. Stub-outs shall conform to the following:
- a. Each outlet shall be suitably located at the lowest elevation on the lot, so as to service all future roof downspouts, footing drains, driveways, yard drains, and any other surface or subsurface drains necessary to render the lots suitable for their intended use. Each outlet shall have free-flowing positive drainage to an approved storm water conveyance system or to an approved outfall location.

- b. Outlets on each lot shall be located with a 5' high, white 2" x 4" stake marked "STORM" or "DRAIN." The stub-out shall visibly extend above surface level and be secured to the stake.
 - c. Pipe material shall conform to City of Kirkland standards.
 - d. Drainage easements are required for drainage systems designed to convey flows across more than one lot.
 - e. The Developer and/or Contractor is responsible for coordinating the locations of all stub-out conveyance lines with respect to the utilities (e.g., power, gas, telephone, television).
 - f. All individual stub-outs shall be privately owned and maintained by the respective property owner.
7. Building structures shall not be permitted within 10' of the outside of any storm drainage pipe, or 15' from the top of any channel bank.
 8. All building downspouts, footing drains, and lot drains on commercial sites shall be connected to the storm drainage system, unless otherwise approved by the Department of Public Works.
 9. Projects proposing to construct or replace onsite conveyance system elements that receive runoff from non-roof-top pollution generating impervious surface area must provide a spill control device as detailed in Section 4.2.1.1 of the 2021 King County Surface Water Design Manual prior to discharge from the site or into a natural onsite drainage feature. The intent of this device is to temporarily detain oil or other floatable pollutants before they enter the downstream drainage system in the event of an accidental spill or illegal dumping. It may consist of a tee section in a manhole or catch basin, or an equivalent alternative as specified in Section 4.2.1.1.

III. CATCH BASINS/INLETS

A. Material

1. Shall be precast concrete steel reinforced construction.
2. Adjustment rings shall be precast concrete.
3. Grates and covers shall be ductile iron and frames shall be cast iron. Alternate plans are acceptable provided that they conform to shop drawings approved by the City of Kirkland. Covers shall be marked "STORM".

B. Sizing

1. Acceptable pipe sizes used with specific drainage structures shall conform to the following table:

Table 1: Pipe Sizes and Drainage Structures

Basin Type	Pipe Size								
	6"	8"	12"	15"	18"	24"	30"	36"	48"
Yard Drain	X								
Curb Inlet	X	X							
Type I CB	X	X	X	X					
Type I-L CB	X	X	X	X	X				
Type II-48" CB	X	X	X	X	X	X	X		
Type II-54" CB	X	X	X	X	X	X	X	X	
Type II-72" CB	X	X	X	X	X	X	X	X	X

2. Type II CB shall be used for all pipes larger than 18" and shall be sized at 1-1/2 times the largest connected pipe's diameter.
3. Public drainage structures easements on private property shall be channelized structures.

C. Depth

1. All catch basins with 5' or less between the top of grate and the pipe invert can be Type I CBs.
2. All catch basins with more than 5' between the top of grate and the pipe invert must be Type II CB's.

D. Spacing

1. For grades less than 8 percent, catch basin spacing shall be a maximum of 300 feet.
2. For grades from 8 to 12 percent, catch basin spacing shall be a maximum of 200 feet.
3. For grades greater than 12 percent, catch basin spacing shall be a maximum of 150 feet.

E. Grate Selection

1. Vaned or BI-Vaned grates only.
2. Through-curb frames with vaned grates shall be used for grade change points where the slope changes from a 6 percent or greater slope to a 2 percent or less slope.
3. Solid lids for Type II catch basins shall be round traffic-bearing and marked "STORM" or "DRAINAGE". Type I shall be traffic-bearing steel plates. Any solid lid in the public right-of-way shall be a round frame and cover that is referred to in the specifications.

4. All frame and covers shall be lockable with a standard 5/8" hex drive bolt (except Ergo frame and cover).

F. Joints

1. Type I joints shall be non-shrink grout.
2. Type II and larger manholes shall have gasketed joints and shall be watertight sealed.
3. Existing concrete pipe and CMP pipe shall be joined to the catch basin with non-shrink grout between the pipe and the structure.
4. PVC and other plastic pipes require a coupling adapter made for the pipe type and concrete joining and shall be installed with non-shrink grout to seal the connection.

G. Construction

1. Catch basins shall be bedded in pea gravel when:
 - a. The catch basin is a Type II or larger manhole assembly.
 - b. The placement is in a water table and the soil is unstable.
 - c. The base soils are over-excavated.
2. Adjustments over 2" to grade shall be with concrete adjustment rings. This should apply to all drawings.
3. Adjustments under 2" shall be with concrete or non-shrink grout. This should apply to all drawings.
4. For Type II CB's with eccentric cone top-section, the maximum adjustment distance is 12", not including casting.
5. For Type II CB's with flat-top, the maximum adjustment distance is 12", not including casting.
6. All connections to structures shall use sand collars with non-shrink grout (no Jet Set allowed).
7. Wood, rock, expansion joint or red brick shall not be used at any time. If standard grey concrete 2"x4"x8" bricks are used they shall be totally encapsulated with concrete or grout. This should apply to all drawings.
8. All adjustment risers shall be grouted down with non-shrink grout or some type of Portland and sand mixture. Dry stacking is not allowed.
9. In City approved circumstances where paved access cannot be provided to a catch basin, the catch basin shall be within 50 ft of paved access and pedestrian access must be maintained, i.e., fences shall have gates, etc. If paved access cannot be provided within 50ft of a catch basin, then the catch basin shall not have a sump and shall be channeled. In cases where a channeled catch basin is used there must

be a standard catch basin with paved access at least 200 ft upstream. In addition, the pipe slope downstream of the standard catch basin shall be 2% minimum.

H. Privately Owned Catch Basins, Area Drains, and Inlets.

1. Parking lots for three or more vehicles must have a catch basin to collect storm water.
2. All stormwater conveyance systems along Lake Washington shall pass through a structure, appropriate to the catch basin service area, with a floatable material separator, prior to discharging into the lake.
3. The service areas for all private Catch Basins and Area Drains shall conform to the following table:

CATCH BASIN SERVICE AREAS (This table does not apply to catch basins located in public streets)	
Catch Basin/Area Drain Size	Maximum Impervious Area Served
<u>Area/ Yard Drains</u> Yard Drain Standard Plan CK-D.05. The minimum sump is 1 foot in diameter and 18-inches-deep below the invert of the outlet pipe.	500 square feet
<u>Type 1 Catch Basins or Type 40</u> Catch Basin Standard Plan CK-D.07 or CK-D.05A. The sump is approximately 22 inches by 26 inches and 17 inches-deep below the outlet.	with a 4 inch outlet, 7,500 square feet with a 6 inch outlet, 15,000 square feet
<u>Type 2 Catch Basins</u> Catch Basin Standard Plan CK-D.09. The sump is a minimum of 4 feet in diameter and 2 feet deep below the outlet.	30,000 square feet

IV. PUBLICLY MAINTAINED DETENTION TANK

1. Coated Corrugated Metal Pipe (CMP):
 - a. Standard Specification: WSDOT 9-05.10
 - b. Exterior Protective Coating: Aluminum (Al Type 2) WSDOT / AASHTO M36 /M274
 - c. Alternate Exterior Protective Coating: Polymer per WSDOT / AASHTO M36 /M246
 - d. Interior Design: smooth or shallow corrugation; Manning’s range, n = 0.012 to 0.015
 - e. Maximum Diameter = 10 feet

f. Named Product: Contech ULTRA FLO, or Equal

2. Aluminum Alloy Pipe:

a. Standard Specification: WSDOT 9.05.5 and 9-05.11

b. Protective Polymer Coating: WSDOT / AASHTO M36 /M246

c. Interior Design: smooth or shallow corrugation; Manning's range, $n = 0.012$ to 0.015

d. Maximum Diameter = 10 feet

e. Named Product: Contech CORLIX, or Equal

3. Steel-Reinforced Polyethylene Pipe (SRPE):

a. Standard Specification: WSDOT 9-05.21 and 9-05.22

b. Interior: smooth or shallow corrugation; Manning's range, $n = 0.012$ to 0.015

c. Maximum Diameter = 10 feet

d. Named Product: Contech DuroMaxx, or Equal

DEPARTMENT OF PUBLIC WORKS PRE-APPROVED PLANS POLICY

Policy D-2: BASIC AND SIMPLIFIED PROJECT DRAINAGE REVIEW REQUIREMENTS

Kirkland Municipal Code (KMC) Chapter 15.52 requires a storm drainage design for all projects that trigger a drainage review per KMC 15.52.050. All projects must collect and convey stormwater runoff in a manner that does not create a drainage problem (or aggravate an existing problem) on adjacent properties. Kirkland has adopted the 2021 King County Surface Water Design Manual (KCSWDM) and the Kirkland Addendum to the 2021 KCSWDM (Pre-Approved Plans Policy D-10) for development in Kirkland, effective July 1, 2022.

Below are the levels of drainage review used in Kirkland (based on project and site characteristics):

- Basic drainage review
- Simplified drainage review
- Targeted drainage review
- Full drainage review

This policy includes the drainage review criteria and applicable submittal requirements for projects requiring Basic and Simplified drainage review. See Pre-Approved Plans Policy D-3 for details on Targeted and Full drainage reviews.

A. Basic Drainage Review

A project resulting in between 500ft² to 1,999ft² of *new impervious surface*¹ plus *replaced impervious surface*² areas.

B. Simplified Drainage Review

A single family residential project resulting in 2,000 sf or more of new plus replaced impervious surface, OR 7,000ft² or more of land disturbing activity (activity resulting in a change in the existing soil cover), **AND** ALL of the following:

1. Results in less than 5,000 sf of new plus replaced pollution generating impervious surface (PGIS), and
2. Results in less than ¾ acre of pollution generating pervious surfaces (PGPS), and
3. a. Projects predominantly on till soils: results in less than 7,947 sf of target impervious surface AND proposed pervious area is equal to or less than 14,941 – 1.88 x (total target impervious surface, OR
b. Projects predominantly on outwash soils: results in less than 6,872 sf of target impervious surfaces AND proposed pervious area is equal to or less than 20,343 – 2.96 x (total target impervious surfaces), and
4. Does **not** contain (or is not adjacent to) a flood, erosion, steep slope, or landslide hazard areas, and
5. Does **not** contain (or is not adjacent to) surface water critical areas such as wetlands, streams, and lakes, and
6. Does **not** propose to construct or modify a drainage pipe/ditch that is 12in or more in size/depth, or receives surface and stormwater runoff from a drainage pipe/ditch that is 12in or more in size/depth.

NOTE: If the project does not qualify for either basic or simplified drainage review, please see Pre-Approved Plans Policy D-3 for details on Targeted and Full drainage reviews.

¹**New impervious surface** means the addition of a hard or compacted surface like roofs, pavement, gravel, or dirt; or the addition of a more compacted surface, like paving over pre-existing dirt or gravel.

²**Replaced impervious surface** means any existing impervious surface on the project site that is proposed to be removed (removal of building/concrete/asphalt down to foundation) and re-established as impervious surface.

³**New pervious surface** means the conversion of a native vegetated surface or other surface to a non-native pervious surface (i.e., conversion of forest to lawn or bare soil), or any alteration of existing non-native pervious surface that significantly increases surface and storm water runoff.

DRAINAGE REVIEW SUBMITTALS		
Permit or Project Type	Drainage Review Level	Submittals Required for Drainage Review
Single Family Residential	If a part of a subdivision	<ul style="list-style-type: none"> • Drainage Plan for individual site/lot (as shown on approved LSM) • Soil Report (if required) • ESC Plan
	Basic	<ul style="list-style-type: none"> • Site Plan • Drainage Plan • Soil Report (if required) • ESC Plan
	Simplified	<ul style="list-style-type: none"> • Drainage Plan • Drainage TIR with supporting documentation • Soil Report (if required) • Small Site CSWPP Plan
Commercial and Multi-Family	Basic	<ul style="list-style-type: none"> • Site Plan • Drainage Plan • Soil Report (if required) • ESC Plan
<p>Notes:</p> <ol style="list-style-type: none"> 1. Drainage Plans must be prepared by a professional engineer or architect. 2. Soil Report is required for infiltration facilities and infiltrating flow control BMPs. For additional information on the soil report requirements, see Chapter 5.2 (2021 KCSWDM) for infiltration facilities, and Pre-Approved Plans Policy D-8 for flow control BMPs. 3. Erosion and Sediment Control (ESC) Plan includes erosion control measures to prevent the transport of sediment from the site. For examples of erosion control measures, see Appendix C.3 (2021 KCSWDM). 4. Site Plan must show that the project meets the requirements of KMC 21.41.507 & 15.52. Plan must be prepared by a professional engineer or architect. 5. Drainage Technical Information Report (TIR) for details see the 2021 KCSWDM, section 2.3.1.1. 6. 7. Small Site CSWPP Plan is a modified version of the CSWPP Plan for projects subject to Simplified Drainage Review. See Pre-Approved Plans Policy D-12. 8. For terminology clarifications, see definitions in the 2021 KCSWDM. 		

CITY OF KIRKLAND

123 FIFTH AVENUE • KIRKLAND, WASHINGTON 98033-6189 • (425) 587-3800

DEPARTMENT OF PUBLIC WORKS PRE-APPROVED PLANS POLICY

Policy D-3: TARGETED AND FULL DRAINAGE REVIEW REQUIREMENTS

Kirkland Municipal Code (KMC) Chapter 15.52 requires a storm drainage design for all projects that trigger a drainage review per KMC 15.52.050. All projects must collect and convey stormwater runoff in a manner that does not create a drainage problem (or aggravate an existing problem) on adjacent properties. Kirkland has adopted the 2021 King County Surface Water Design Manual (KCSWDM) and the Kirkland Addendum to the 2021 KCSWDM (Pre-Approved Plans Policy D-10) for development in Kirkland, effective July 1, 2022.

Below are the levels of drainage review used in Kirkland (based on project and site characteristics):

- Basic drainage review
- Simplified drainage review
- Targeted drainage review
- Full drainage review

This policy includes the drainage review criteria and applicable submittal requirements for projects requiring Targeted and Full drainage review. See Pre-Approved Plans Policy D-2 for details on Basic and Simplified drainage reviews.

A. Basic and Simplified Drainage Review

Typical **Basic** projects create between 500 and 1,999ft² *new impervious¹ plus replaced impervious² surface areas* and **Simplified** projects are single family residential creating 2,000ft² or more of new plus replaced impervious surface area, and do not contain critical areas. See Policy D-2 for details on Basic and Simplified drainage review criteria and requirements.

B. Targeted Drainage Review

Targeted drainage review is required for projects that meet the new/replaced impervious area criteria for Basic or Simplified, and/or have characteristics that require a more in-depth level of review, such as:

- Projects containing or adjacent to a flood, erosion, steep slope, or landslide hazard areas,
- Projects containing or adjacent to surface water critical areas such as wetlands, streams, and lakes,
- Projects proposing to construct or modify a drainage pipe/ditch that is 12 in or more in size/depth, or receives runoff from a drainage pipe/ditch that is 12 in or more in size/depth,
- Projects are a redevelopment project proposing \$100,000 or more of improvements to an existing high-use site.

C. Full Project Drainage Review

Full drainage review is required for the following proposed projects (new or redevelopment):

- All non-single family residential projects that result in 2,000ft² or more of new plus replaced impervious surface area, OR
- Single family residential projects that exceed the Simplified drainage review level. For example:
 - Project results in 5,000ft² or more new plus replaced pollution generating impervious surface (PGIS) area,
 - Project results in ¾ acre or more pollution generating pervious surface (PGPS) area (like lawn, landscaped areas, grassed modular grid pavement, parks, and sports fields).

¹**New impervious surface** means the addition of a hard or compacted surface like roofs, pavement, gravel, or dirt; or the addition of a more compacted surface, like paving over pre-existing dirt or gravel.

²**Replaced impervious surface** means any existing impervious surface on the project site that is proposed to be removed (removal of building/concrete/asphalt down to bare soil) and re-established as impervious surface.

D. Drainage Submittal Requirements Table

DRAINAGE REVIEW SUBMITTALS		
Permit or Project	Drainage Review Level	Required for Drainage Review
Single Family Residential	If part of a subdivision	<ul style="list-style-type: none"> • Drainage Plan for individual site/lot (as shown on approved LSM) • Soil Report (if required) • CSWPP Plan
	Targeted	<ul style="list-style-type: none"> • Engineering Plans • Drainage TIR • Soil Report (if required) • CSWPP Plan
	Full	<ul style="list-style-type: none"> • Engineering Plans • Drainage TIR addressing ALL core requirements • Soil Report • CSWPP Plan
Commercial and Multi-Family	Targeted	<ul style="list-style-type: none"> • Engineering Plans • Drainage TIR • Soil Report (if required) • CSWPP Plan
	Full	<ul style="list-style-type: none"> • Engineering Plans • Drainage TIR addressing ALL core requirements • Soil Report (if required) • CSWPP Plan
Other Projects	Targeted or Full	<ul style="list-style-type: none"> • Engineering Plans • Drainage TIR • Soil Report (if required) • CSWPP Plan
<p>Notes:</p> <ol style="list-style-type: none"> 1. Engineering plans must be signed and stamped by a professional engineer registered in the state of Washington. 2. Drainage Technical Information Report (TIR) for additional information on TIR requirements, see the 2021 KCSWDM, section 2.3.1.1. 3. Soil Report is required for infiltration facilities and infiltrating flow control BMPs. For additional information on the soil report requirements, see Chapter 5.2 (2021 KCSWDM) for infiltration facilities, and Pre-Approved Plans Policy D-8 for flow control BMPs. 4. Construction Stormwater Pollution Prevention (CSWPP) Plan includes both erosion control measures and stormwater pollution prevention and spill measures. For more information, see Pre-Approved Plans Policy D-12. 5. For terminology clarifications, see definitions in the 2021 KCSWDM. 		

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**DEPARTMENT OF PUBLIC WORKS
PRE-APPROVED PLANS POLICY**

Policy D-4: Construction Stormwater General Permit, Industrial Stormwater General Permit, and Underground Injection Control (UIC) Well Requirements

When Construction Stormwater General Permits Are Required:

For projects 1 acre or larger, applicants are required to submit a Notice of Intent (NOI) to the Department of Ecology (Ecology) and obtain coverage under Ecology’s Construction Stormwater General Permit (CSGP). This permit is issued by Ecology as part of the Federal Clean Water Act. Among other requirements, the CSGP will require a more detailed Construction Stormwater Pollution Prevention (CSWPP) Plan, in their format. Applicants must submit a draft Ecology CSWPP Plan at COK permit submittal, and final Ecology CSWPP Plan at the COK Per-Construction Meeting. For additional information, see the following Ecology website:

<https://ecology.wa.gov/regulations-permits/permits-certifications/stormwater-general-permits/construction-stormwater-permit>

When Industrial Stormwater General Permits Are Required:

Certain industrial sites or activities require coverage under the Industrial Stormwater General Permit (ISGP). This permit is issued by Ecology as part of the Federal Clean Water Act. New permittees must submit a complete Notice of Intent (NOI) at least 60 days before discharging stormwater from the facility. Additional information, including a list of applicable industrial activities, can be found at the following Ecology website:

<https://ecology.wa.gov/regulations-permits/permits-certifications/stormwater-general-permits/industrial-stormwater-permit>

When Underground Injection Control Wells Are Required:

Register Infiltration /Drywell Systems: Ecology requires registration of infiltration trenches and drywells that receive runoff from impervious areas other than roofs of single-family homes; as part of the Underground Injection Control (UIC) Program. For additional information, view <https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Underground-injection-control-program>. It is the applicant's responsibility to follow through with the registration process. Failure to do so may result in enforcement of WAC 173-218-130 by Ecology.

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DEPARTMENT OF PUBLIC WORKS PRE-APPROVED PLANS POLICY

Policy D-5: REQUIRED STORM SYSTEM EXTENSION PRIOR TO CONNECTION

Prior to the connection or reconnection of any property, new development, and redevelopment projects to the public storm system, the storm main system must be extended to the subject property's farthest property line by way of public right-of-way or easement. The purpose of the storm system extension is to serve the property/development and provide for future extensions and connections as development and building projects occur upstream/upslope of the subject property. The Public Works Department requires storm system extensions as follows:

- If there is a need to collect and convey storm water from properties and rights-of-way upstream/upslope from the subject property, the Public Works Department shall determine the length and number of storm drain extensions required of the subject property. Depending on the characteristics of the upstream/upslope properties and right-of-way, more than one storm line extension may be necessary.
- The storm system must traverse along or through the subject property within a right-of-way or a recorded public storm drainage easement.
- If the property proposed for connection or reconnection has a public storm system fronting the property and the storm system extends to the farthest property line, and no other storm drain extensions are required either along another right-of-way frontage or through an easement, then the applicant may connect with an approved method as outlined in the current edition of the Public Works Department Pre-Approved Plans.
- If ground water is present on the property and it will be collected and directed to the ROW, it must be connected to the city storm system. Curb discharge will not be allowed. A storm extension will be required if no storm connection is available.

Exemptions for single family infill projects only.

If the property is over 330 feet from any approved storm system connection point, the property may be exempted from this policy if approved by the Public Works Department. The single-family home must manage storm water on site if feasible. If managing storm water on site is not feasible, contact Public Works to evaluate possible alternatives.

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DEPARTMENT OF PUBLIC WORKS PRE-APPROVED PLANS POLICY

Policy D-6: DRAINAGE DITCH FILL-IN

Any request to fill in an existing drainage ditch located within the City of Kirkland (COK) public right-of-way must comply with the requirements of this policy and the COK [Public Works Department Pre-Approved Plans](#). All costs associated with the required work will be borne by the applicant. Applicant is required to contact WA Dept. of Fish and Wildlife and US Army Corps of Engineers to determine if other permits are needed.

Upon receiving an inquiry to fill in a drainage ditch, Public Works staff will review the request and determine conditions on the subsequent work. Each request to fill in a ditch will be reviewed on a case-by-case basis, and will be conditioned accordingly. Public Works staff will review the application for completeness, review record drawings, and will conduct a site visit. Planning and Community Development staff will check for sensitive areas and possible stream determination. After reviewing this information, staff will either approve or deny the request. A request may be denied depending on potential stream impacts or if the ditch provides required water quality treatment.

PROCESS TO FILL-IN A DRAINAGE DITCH

Staff will create a permit and add conditions if approved; or let applicant know why request was denied.

If approved:

- 1) The property owner must obtain a [right-of-way permit](#) from Public Works.
- 2) Print and fill out the permit application and apply at the Public Works counter at City Hall.
- 3) The property owner must hire a state-licensed general contractor to perform the work.
- 4) The contractor must meet with the public works inspector at the site to review the scope of work to be performed.
- 5) Include a site plan of the proposed project with the application (see below for requirements).
- 6) Include a profile plan of the storm drain extension.
- 7) Include an Erosion and Sediment Control Plan for the land-disturbing project.
- 8) The property owner must post a right-of-way security deposit, based on the dollar value of the work to be performed. After completion of the work and acceptance by the Public Works Department, the City will then retain the right-of-way security deposit for 90 days. After the 90 days have elapsed, the Public Works Department will re-inspect the work. Once this has been completed, the security will be released.

The following are typical design requirements for a ditch fill-in:

- 1) Design of the storm drainage system by a civil engineer.
- 2) Installation of pipe in the ditch to continue conveyance of surface water.
- 3) Installation of 12" diameter PVC gravity pipe (ASTM D-3034), ductile iron pipe when minimum cover cannot be obtained.
- 4) Installation of a catch basin at both or one end of the ditch.

- 5) Installation of a catch basin to connect with existing pipes.
- 6) Saw-cutting, removal, and replacement of asphalt when the work encroaches into the pavement.
- 7) Applicant must determine if a US Army Corps of Engineers permit is needed (may be covered under Nationwide Permit #18 if fill is less than 25 cubic yards or 675 cubic feet, USACE requires notification if greater than 10 cubic yards or 270 cubic feet).
- 8) Applicant must determine if a Washington Department of Fish and Wildlife (WDFW) Hydraulic Project Approval (HPA) is needed (typically if the project is identified as a water of the state)

Please know that the Army Corps of Engineers (COE) and Department of Fish and Wildlife have asserted jurisdiction over upland ditches draining to streams. Either an existing Nationwide COE permit or an Individual COE permit and/or an HPA may be necessary for work within ditches, depending on the project activities. Applicants shall obtain the applicable COE and WDFW permits; information about COE permits can be found at: U.S. Army Corps of Engineers, Seattle District Regulatory Branch <http://www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits.aspx> Specific questions can be directed to: Seattle District, Corps of Engineers, Regulatory Branch, CENWS-OD-RG, Post Office Box 3755, Seattle, WA 98124-3755, Phone: (206) 764-3495

Information about WDFW HPA permit can be found at:
<http://wdfw.wa.gov/licensing/hpa/>

References:

[Storm Drainage Index and Notes](#)

City of Kirkland Pre-Approved Plans [D.07](#) and [D.14](#)

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**DEPARTMENT OF PUBLIC WORKS
PRE-APPROVED PLANS POLICY**

**Policy D-7: PRIVATE MAINTENANCE AGREEMENT
AND LICENSE TO ENTER FOR A STORMWATER FACILITY**

The Private Maintenance Agreement and License to Enter will be recorded on all projects that construct a stormwater and/or LID facility.

The applicant must provide the City with an original signed copy of the maintenance agreement and license to enter prior to issuance of a Building or Land Surface Modification permit.

Maintenance Standards

The Maintenance Standards for the following flow control BMPs are included in this policy:

1. Permeable Pavement (permeable asphalt/concrete, and interlocking concrete paver blocks)
2. Bioretention and Rain Gardens
3. Infiltration Systems (including drywells and infiltration trenches)
4. Infiltration Vaults
5. Basic Dispersion Systems (including dispersion trenches, splash blocks, rock pads, and vegetated dispersion areas)
6. Vegetated Roofs
7. Rainwater Harvesting Systems
8. Native Growth Retention Area (NGRA)

Additional maintenance standards for these and other stormwater facilities can be found in the King County Surface Water Design Manual, and KMC 15.52.120.

General Maintenance Requirements for Permeable Pavement

Maintenance Components	Required Inspection Frequency ¹	Condition When Maintenance is Required	Action Required
Surface (address applicable components)			
Permeable Asphalt or Concrete	Ongoing	Proactive measures.	Prohibit use of sand and sealant application and protect surface from adjacent runoff.
	A	Infiltration capacity of surface is restricted due to clogging.	Remove sediment and debris using brushes or sidewalk sweepers equipped with vacuums. After sediment removal, use an industrial pressure washer to restore permeability.
	A	Major cracks or trip hazards, and concrete spalling and raveling.	Fill with patching mixes. Large cracks and settlement may require cutting and replacing the pavement section.
Interlocking Concrete Paver Blocks	A	Infiltration capacity of surface is restricted due to clogging.	Remove sediment and debris using brushes or sidewalk sweepers equipped with vacuums.
	A	Paver block is missing or damaged.	Replace or repair damaged paver block.
	A	Settlement of surface.	May require resetting of blocks.
	A	Loss of void material between paver blocks.	Refill per manufacturer's recommendations.
Spill Response	As needed	Release of pollutants.	Clean up spills as soon as possible to prevent contamination of stormwater.

¹Inspection Frequency: **A** = Annually; **B** = Biannually (twice per year); **S**= Additional inspections should be performed after major storm events. For debris/clog related maintenance, inspection should occur in the early fall, after deciduous trees have lost their leaves.

General Maintenance Requirements for Bioretention and Rain Gardens

Maintenance Components	Required Inspection Frequency ¹	Condition When Maintenance is Required	Action Required
Ponding Area			
Earthen reservoir (berms, weirs, and side slopes)	B, S	Erosion (gullies/rills) greater than 2 inches deep around inlets, outlet, and side slopes	Eliminate cause of erosion and stabilize damaged area (regrade, rock, vegetation, erosion control blanket)
	A, S	Settlement greater than 3 in.	Restore to design height
	A, S	Downstream face of berm or embankment wet, seeps or leaks evident	Plug holes. Contact geotechnical engineer ASAP.
Sediment or debris accumulation	B	Accumulated sediment or debris significantly impacting rain garden infiltration rate or surface storage capacity	Remove excess sediment, bioretention soil, or debris. Identify and control the sediment source.
Inlet via surface flow	A, S	Soil is exposed, signs of erosion are visible	Repair and control erosion sources
Inlet via concentrated flow (curb cuts or pipe)	A, S	Sediment, vegetation, or debris partially or fully blocking inlet structure. Pipe is damaged or clogged.	Clear the blockage. Identify source of blockage and take actions to prevent future blockages. Repair or replace pipe if needed.
	A, S	Water disrupts soil media	Reconfigure inlet, add plants/rock
Outlet pipe/structure	A, S	Sediment, vegetation, or debris partially or fully blocking outlet structure. Pipe is damaged or clogged.	Clear the blockage. Identify source of blockage and take actions to prevent future blockages. Repair or replace pipe if needed.
Trash rack	A, S	Trash or other debris present	Remove and dispose trash/debris
	A	Bar screen damaged or missing	Repair or replace bar screen
Check dams and weirs	A, S	Sediment, vegetation, or debris blocking flow control weir or check dam	Clear the blockage
	A, S	Erosion and/or undercutting is present	Repair and take preventative measures to prevent future erosion or undercutting
	A	Grade board or top of weir damaged or not level	Restore to level position
Overflow or emergency spillway	A, S	Overflow spillway is 50% plugged with sediment or debris	Remove and dispose sediment/debris
	A, S	Native soil is exposed or other signs of erosion damage	Repair erosion and stabilize surface of spillway
Bioretention soil	As Needed	Water remains in the basin 48 hours or longer after the end of a storm	Check underdrain and remove clogs. If soil is clogged, remove upper 3" of soil and replace with imported bioretention soil. Identify clogging sources and correct.

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General Maintenance Requirements for Bioretention and Rain Gardens (continued)

Vegetation			
Vegetation along cell bottom	Monthly	Poor vegetation growth (less than 75% coverage) or weeds cover more than 15% of area	Determine cause of poor vegetation growth and correct. Remove weeds and replant with native species as necessary to obtain coverage.
Vegetation along cell upland slope	Monthly	Poor vegetation growth (less than 75% coverage) or weeds cover more than 15% of area	Determine cause of poor vegetation growth and correct. Remove weeds and replant with native species as necessary to obtain coverage.
Trees and shrubs	A	Large trees and shrubs interfere with operation of the basin or access for maintenance	Prune or remove large trees and shrubs. Replace with other native species as necessary to obtain coverage.
	A	Standing dead vegetation is present	Remove dead vegetation when covering greater than 10% of basin area. Replace dead vegetation annually or immediately if necessary to control erosion. Determine cause for dead vegetation and correct problem.
Mulch	A	Bare spots (without mulch cover) are present or mulch depth is less than 2 inches	Replenish mulch to cover bare spots and augment to minimum depth of 3 inches.
Weeds	Monthly (March-September)	Weeds are present. See King County noxious weed list: www.dnr.metrokc.gov/wlr/lands/weeds/laws.htm	Remove weeds. To protect water quality, do not use herbicides or pesticides. Class A & B noxious weeds must be removed, bagged, and disposed of as garbage immediately. Reasonable attempts must be made to remove class C.
Line of sight	A	Vegetation causes visibility or driver safety issues.	Prune or remove if continual safety hazard
Irrigation			
Irrigation system (if any)	Monthly (May-Sept)	Irrigation system is present but not functioning properly	Follow manufacturer's instructions for operation, maintenance, and troubleshooting
Plant Watering	Weekly or as required (May-Sept)	Plant establishment period (2-3 years)	Water weekly during periods of no rain to ensure plant establishment
	As Needed	Longer term period (3+ years)	Water during drought conditions or more often if necessary to maintain plant cover
Pest Control			
Mosquitoes	B, S	Standing water remains for 3 days following storms.	Manually remove standing water, identify cause and take appropriate actions to improve the drainage.
Rodents	As Needed	Rodent holes present	Fill and compact soil around the holes
Other			
Spill Response	As Needed	Release of pollutant into rain garden	Clean up spill as soon as possible to prevent contamination of stormwater. Replace vegetation if needed.

¹Inspection Frequency: **A** = Annually; **B** = Biannually (twice per year); **S** = Additional inspections should be performed after major storm events. For debris/clog related maintenance, inspection should occur in the early fall, after deciduous trees have lost their leaves.

General Maintenance Requirements for Infiltration Systems (Drywells and Infiltration Trenches)

Maintenance Components	Required Inspection Frequency ¹	Condition When Maintenance is Required	Action Required
Rock Trench / Well			
Surface of trench/well (i.e, water enters through exposed aggregate)	Fall, Spring	Accumulated trash, debris, or sediment on drain rock surface impedes sheet flow into facility	Remove/dispose in accordance with local solid waste requirements
	A, W	Vegetation/moss present on drain rock surface impedes sheet flow into facility	Maintain open, freely draining drain rock surface
Drain Rock	Fall, Spring	If water enters the facility from the surface, inspect to see if water is ponding at the surface during storm event	Clear piping through facility when ponding occurs Replaced rock/sand reservoirs as necessary
		If buried drain rock, observe drawdown through observation port or cleanout	Tilling of subgrade below reservoir may be necessary (for trenches) prior to backfill
Inlet/Outlet Pipe Conveyance			
Pipes(s)	A, W	Accumulation of trash, debris, or sediment in roof drains, gutters, driveway drains, area drains, etc.	Remove/dispose
	A, W	Pipe from sump to trench or drywell has accumulated sediment or is plugged	Clear sediment from inlet/outlet pipe screen and inlet/outlet pipe
	A, W	Cracked, collapsed, broken, or misaligned drain pipes	Repair/seal cracks Replace where repair is insufficient
Roof Downspout	B, W	Splash pad missing or damaged	Replace/replace
	A, W	Leaves or other debris plugging downspout	Remove/dispose
Storage Sump			
Sump	A	Sediment in the sump should be removed annually	Remove/dispose in accordance with local solid waste requirements
Access Lid	A	Cannot be easily opened	Repair/replace
	A	Buried	Refer to record drawings for design intent. If the access lid was designed to be exposed, expose and restore to surface grade
	A	Cover missing	Replace

¹Inspection Frequency: **A** = Annually; **B** = Biannually (twice per year); **W** = At least one visit should occur during the wet season (for debris/clog related maintenance)

General Maintenance Requirements for Infiltration Vaults

Maintenance Components	Required Inspection Frequency ¹	Condition When Maintenance is Required	Action Required
Site			
Trash and debris		Any trash and debris which exceed 1 cubic foot per 1,000 square feet (this is about equal to the amount of trash it would take to fill up one standard size office garbage can). In general, there should be no visual evidence of dumping	Remove trash and debris from site
Noxious Weeds		Any noxious or nuisance vegetation which may constitute a hazard to City personnel or the public.	Noxious and nuisance vegetation removed according to applicable regulations.
Contaminants and pollution		Any evidence of contaminants or pollution such as oil, gasoline, concrete slurries or paint	Materials removed and disposed of according to applicable regulations.
Grass/ groundcover		Grass or groundcover exceeds 18 inches in height	Mow grass to a height no greater than 6 inches.
Infiltration Vault Storage Area			
Sediment accumulation		If two inches or more sediment is present or a percolation test indicates facility is working at or less than 90% of design	Remove sediment and reestablish infiltration to infiltrate as designed
Inlet/Outlet Pipes			
Sediment Accumulation		Sediment filling 20% or more of the pipe.	Remove sediment from inlet/outlet pipes so the system is clear of sediment.
Trash and Debris		Trash and debris accumulated in inlet/outlet pipes (includes floatables and non-floatables).	Remove trash or debris in pipe
Damaged		Cracks wider than 1/2-inch at the joint of the inlet/outlet pipes or any evidence or soil entering at the joints of the inlet/outlet pipes.	Repair cracks so that no cracks are more than 1/4-inch wide at the joint of the inlet/outlet pipe. Replace where repair is insufficient.
Access Manhole			
Cover/lid not in place		Cover/lid is missing or only partially in place. Any open manhole requires IMMEDIATE maintenance.	Replace or reposition cover/lid.
Locking mechanism not working		Mechanism cannot be opened by one maintenance person with proper tools. Bolts cannot be seated. Self-locking cover/lid does not work.	Repair mechanisms, bolts, or cover/lid. If cannot be repaired, replace the lid so that it can be opened with proper tools.
Cover/lid difficult to remove		One maintenance person cannot remove cover/lid after applying 80 lbs of lift.	
Ladder rungs unsafe		Missing rungs, misalignment, rust, or cracks	

General Maintenance Requirements for Infiltration Vaults (continued)

Large Access doors/plate			
Damage or difficult to open		Large access doors or plates cannot be opened/removed using normal equipment	Replace or repair access door so it can open as designed
Gaps, doesn't cover completely		Large access doors not flat and/or access opening not completely covered.	
Lifting Rings missing, rusted		Lifting rings not capable or listing weight of door or plate	Repair/replace rings.
Infiltration Vault Filter Bag			
Plugged		Filter bag more than ½ full	Replace filter bag or redesign system
Infiltration Vault			
Sediment accumulation		6" or more of sediment has accumulated	Remove sediment and dispose.
Damage to wall, frame, bottom, and/or top slab		Cracks wider than ½-inch, any evidence of soil entering the structure through cracks or qualified inspection personnel determines that the vault is not structurally sound	Seal vault so that it is structurally sound.

¹Inspection Frequency: **A** = Annually; **B** = Biannually (twice per year); **W** = At least one visit should occur during the wet season (for debris/clog related maintenance)

General Maintenance Requirements for Basic Dispersion Systems

Maintenance Components	Required Inspection Frequency ¹	Condition When Maintenance is Required	Action Required
Dispersion Trench			
Dispersion trench	A	Visual evidence of water discharging at concentrated points along trench	Remove debris, realign notched grade board, or rebuild trench to standards
Surface of trench	Fall and Spring	Accumulated trash/debris or sediment on drain rock surface impedes sheet flow	Remove trash/debris, sediment
	A, W	Vegetation/moss present on drain rock surface impedes sheet flow from facility	Maintain open, freely draining drain rock surface
Pipe(s) to trench	A, W	Accumulation of trash/debris or sediment in roof drains, gutters, driveway drains, area drains, etc.	Remove trash/debris, sediment
	A, W	Pipe from sump to trench or drywell has accumulated sediment or is plugged	Clear sediment from inlet/outlet pipe screen and pipe
	A, W	Cracked, collapsed, broken, or misaligned drain pipes	Repair/seal cracks, or replace pipe
Sump	A	Sediment in sump	Remove sediment. Clear sediment from inlet/outlet pipe screen and pipe.
Access lid	A	Lid cannot be easily opened	Repair or replace lid
	A	Lid is buried	Expose and restore to surface grade
	A	Cover is missing	Replace cover
Splash Block (Downspout Dispersion)			
Splash block	B	Water is directed towards building structure	Reconfigure/repair blocks to direct water away from building structure
	B	Water disrupts soil media	Reconfigure/repair blocks
Rock Pad (Concentrated Flow Dispersion)			
Rock pad	A	Thin layer of rock above native soil in area 6 square feet or larger, or any exposure of native soil	Replace/repair rock pad to meet design standards. Enlarge pad size or add additional courses of rock.
	A	Soil erosion in or adjacent to rock pad	Eliminate cause of erosion, repair/replace rock
Vegetated Dispersion Area (Sheet Flow Dispersion)			
General dispersion area	B, S	Erosion (gullies/rills) greater than 2 inches deep	Eliminate cause of erosion and regrade, rock, and revegetate
	B, S	Accumulated sediment/debris blocks or channelizes flow path	Remove excess sediment or debris, identify and control sediment source
Ponded water	B, S	Standing surface water more than 3 days after storm event	Regrade to eliminate depressions or aerate/amend soils to increase infiltration
Plant establishment	Weekly (May-Sept)	Plant establishment period (2-3 years)	Water weekly during periods of no rain to ensure plant establishment
Vegetation	As needed	Poor vegetation such that erosion is occurring	Water, amend soils, replant with species for existing soil/moisture conditions
	B, S	Vegetation inhibits flow along flowpath	Trim, weed, or replant to restore dispersed flow path

¹Inspection Frequency: **A** = Annually; **B** = Biannually (twice per year); **W** = At least once during the wet season; **S** = Additional inspections should be performed after major storm events. For debris/clog related maintenance, inspection should occur in the early fall, after deciduous trees have lost their leaves.

General Maintenance Requirements for Vegetated Roofs

Maintenance Components	Inspection Frequency ¹	Condition When Maintenance is Required	Action Required
Structural			
Drain pipes	B, S	Soil, vegetation, pebbles, or other debris partially or fully blocking drain pipe.	Clear roof drains of any debris. Identify source of blockage and take actions to prevent future blockages.
	B, S	Pipe is damaged with cracks, settling, improper alignment.	Repair or replace pipe if needed, and re-compact soils or fill materials surrounding the pipe.
Access	B	Egress and ingress routes obstructed or unsafe.	Clear all obstructions from access routes, and follow applicable safety procedures.
Fire ventilation (if part of design)	B, S	Plugged ventilation points.	Remove blockage and take corrective action to insure proper operation.
Vegetation			
Vegetation	Monthly	Poor vegetation growth, bare areas (less than 90% plant coverage)	Determine cause of poor vegetation growth and correct. Replant with manufacturer recommended plant species, typically succulents adapted to harsh conditions.
Weeds and Dead Heading	Twice Monthly (Mar-Sept)	Invasive, nuisance, or woody plants are present.	Remove all weeds and dead head manually and without herbicide applications. Remove all woody plants as their roots can damage roof membranes.
Leaf removal	Twice Monthly (Aug –Oct)	Tree leaves present covering succulents.	Remove matted tree leaves to prevent smothering.
Soil	Monthly	Displaced soil, typically due to nesting birds.	Replace displaced soil immediately.
Fertilization	April	Lack of plant growth	Use manufacturer's recommendation or an encapsulated, organic slow release fertilizer. Verify first with manufacturer that membrane is resistant to fertilizer,
Irrigation			
Irrigation system	B	Irrigation system is not functioning properly	Follow manufacturer's instructions for operation, maintenance, and troubleshooting
Plant Watering	As needed	Early plant establishment and during drought conditions.	Saturate to the base of the soil substrate and allow soil to dry completely. Water monthly during first growing season.
	Winter	Do not water in winter.	Do NOT water 4 weeks before expected frost (late Fall) or during the winter.
Pest Control			
Mosquitoes	B, S	Standing water remains for 3 days following storms.	Remove standing water, identify cause and take appropriate actions to improve the drainage. Do not use pesticides.
Birds	As needed	Seeds removed, plants dug up	Replant, tie streamers (or other) to keep birds away
Other			
Contaminants	As Needed	Release of pollutant onto vegetated roof	Remove pollutant immediately and contact the manufacturer to prevent potential damage to the membrane. Replace vegetation if needed.

¹Inspection Frequency: **A** = Annually; **B** = Biannually (twice per year); **S**= Additional inspections should be performed after major storm events.

General Maintenance Requirements for Rainwater Harvesting System

Maintenance Components	Required Inspection Frequency ¹	Condition When Maintenance is Required	Action Required
Rainwater Harvesting System			
Access Manhole	A	Manhole is blocked by obstruction or debris.	Remove obstruction or debris.
Cistern tank	A	Sediment depth in cistern is 4" or greater.	Remove sediment from cistern when there is little or no water in it. Use standard power washer and vacuum/vactor truck.
Inlet/outlet pipe	A	Inlet/outlet pipes are blocked with sediment or debris.	Remove sediment or debris from inlet/outlet pipes.
Pump	A	Sediment depth in pump sump is 4" or greater.	Remove sediment from pump sump.
	A	Pump does not work properly.	Refer to pump instruction manual.

¹Inspection Frequency: **A** = Annually; **B** = Biannually (twice per year); **S**= Additional inspections should be performed after major storm events. For debris/clog related maintenance, inspection should occur in the early fall, after deciduous trees have lost their leaves.

General Maintenance Requirements for Native Growth Retention Area (NGRA)

Maintenance Components	Required Inspection Frequency ¹	Condition When Maintenance is Required	Action Required
Native Growth Retention Area			
Non-native, invasive and noxious plants	Monthly (March-September)	Non-native, invasive and noxious plants are present. See King County noxious weed list: www.dnr.metrokc.gov/wlr/lands/weeds/laws.htm	Remove non-native, invasive and noxious plants. To protect water quality, do not use herbicides or pesticides. Class A & B noxious weeds must be removed, bagged, and disposed of as garbage immediately (do not place in yard waste).
Trees	A	Dangerous or diseased trees.	All trees shall be retained, unless dangerous or diseased. Remove dangerous or diseased trees, and replace with similar native species.

¹Inspection Frequency: **A** = Annually; **B** = Biannually (twice per year); **S**= Additional inspections should be performed after major storm events. For debris/clog related maintenance, inspection should occur in the early fall, after deciduous trees have lost their leaves.

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**DEPARTMENT OF PUBLIC WORKS
PRE-APPROVED PLANS POLICY****Policy D-8: SOIL INFORMATION FOR STORMWATER DEVELOPMENT TO MEET FLOW CONTROL BMP REQUIREMENTS**

The soil information requirements below (i.e., Flow Control BMP Soil Report and Special Inspection for Soils) are necessary for designing flow control Best Management Practices (BMPs) per 2021 King County Surface Water Design Manual (KCSWDM). There are many other reasons a soil report is necessary for a project (e.g., steep slopes, sensitive areas, etc.). The requirements below do not replace any requirements from other City departments. If proposing to do an infiltration facility to meet Core Requirement #3: Flow Control Facility in the 2021 KCSWDM, you do not need to meet the requirements of this policy. Instead, you must meet Chapter 5.2 requirements of the 2021 KCSWDM and review City of Kirkland Addendum to the KCSWDM (Pre-Approved Plans, Policy D-10) for soil report requirements and analysis.

A. Flow Control BMP Soil Report***When is a Flow Control BMP Soil Report required?***

A Flow Control BMP Soil Report is required any time a project triggers flow control BMPs per the 2021 KCSWDM and can't meet the criteria for full dispersion, is located within a steep slope hazard area (>40% slope) or landslide hazard area OR does not trigger flow control BMPs but is planning to fully infiltrate all the stormwater runoff on the project site (i.e. there is no overflow for the infiltration BMP).

Who can prepare a Flow Control BMP Soil Report?

The Flow Control BMP Soil Report must be prepared by either a licensed onsite sewage system designer or a licensed engineer with geotechnical and/or hydrogeologic experience, licensed hydrogeologist, or licensed engineering geologist.

What information is required in a Flow Control BMP Soil Report?

At minimum, the Flow Control BMP Soil Report shall include:

- A sufficient number of soil logs to establish the type and limits of soil on project site. At minimum, identify the limits of any outwash type soils.
- At least 1 soil log for each proposed infiltration location on individual lots. The soil log should be a minimum of 4 feet below expected finished grade and at least 1 foot below the expected bottom elevation of the flow control BMP.
- No soil log or infiltration testing shall be completed within the drip line of any tree.
- Elevation of anticipated seasonal high groundwater level.
- A description of the SCS series of the soil and textural class of each horizon through the depth of the log, noting high groundwater level or evidence of it, such as mottling.
- A grain size analysis in accordance with ASTM standards is required, unless infiltration is infeasible and proven with an infiltration test (measured rate less than 0.3 inches per hour). If the measured infiltration rate is greater than 0.3 inches per hour, the BMP shall be designed using the SCS series and Appendix C sizing associated with the series.
- Groundwater Protection testing per Chapter 5.2.1 (page 5-51 of the 2021 KCSWDM) if proposing to infiltrate pollution generating impervious surfaces (PGIS).
- Infiltration testing is required for projects that do not have an overflow connection to the City storm system. An infiltration rate(s) must be reported. The flow control BMP must be designed to fully infiltrate the 100-year storm event on site and must meet minimum

measured infiltration rate standards set within Policy D-10. The following information shall be included in the Flow Control BMP Soil Report:

- The infiltration test shall occur at the bottom elevation of the proposed infiltration BMP. The following test procedures are allowed. The lowest measured infiltration rate must be used to determine the design infiltration rate. If the measured infiltration rate is less than 0.3 in/hr, infiltration is not feasible on this site and other stormwater designs must be evaluated.
 - EPA falling head percolation test procedure – 3 infiltration tests (arrayed in a triangle) is required.
 - Double ring infiltrometer test - 3 infiltration tests (arrayed in a triangle) are required.
 - Single ring percolation test - 3 infiltration tests (arrayed in a triangle) are required.
 - Small or large scale pilot infiltration test (PIT) – 1 infiltration test required.

NOTE: If infiltrating more than 1 lot OR 10,000 sf or more of impervious, OR $\frac{3}{4}$ acre pervious surface, OR 5,000 sf or more of PGIS, OR meeting LID performance criteria, Policy D-8 does not apply. Follow Chapter 5.2 of the 2021 KCSWDM and the City of Kirkland Addendum to the KCSWDM (Pre-Approved Plans, Policy D-10) for requirements.

B. Special Inspection for Soils

What Triggers a Special Inspection for Soils?

Any time a project uses an infiltration system (including, but not limited to, infiltration trench, drywell, rain garden, or infiltration vault) to meet a flow control exemption, reduce the size of the flow control facility, as a flow control facility, or to fully infiltrate the 100-year storm event on site due to no overflow, a stamped special inspection memorandum will be required. The design engineer is responsible for identifying on plans when the project will require a special inspection.

What information is gathered in a Special Inspection for Soils?

Depending on how the infiltration system was sized, the special inspection shall include:

- Sized per small site BMPs in Appendix C:
 - The licensed engineer with geotechnical and/or hydrogeologic experience, licensed hydrogeologist, or licensed engineering geologist on record shall be present when the subsurface is exposed by the contractor, verifying the soils will function as designed.
 - A stamped technical memorandum submitted to the City's inspector or development engineer by the geotechnical engineer or geologist, including findings during site visit and a location map. The stamped technical memorandum shall be submitted for review and approval prior to finaling the permit.
- Sized using an infiltration rate:
 - The licensed engineer with geotechnical and/or hydrogeologic experience, licensed hydrogeologist, or licensed engineering geologist on record shall be present when the subsurface is exposed by the contractor to do the performance testing. Performance testing shall meet the same infiltration test requirements noted above to verify the measured infiltration rate used in design.
 - A stamped technical memorandum submitted to the City's inspector or development engineer by the geotechnical engineer or geologist that includes infiltration test results and recommendations, field notes from testing, and location of the tests in relation to the infiltration system. The stamped technical memorandum shall be submitted for review and approval prior to finaling the permit.

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DEPARTMENT OF PUBLIC WORKS PRE-APPROVED PLANS POLICY

Policy D-9: STORMWATER PUMP SYSTEM REQUIREMENTS

Pump systems may be used for conveyance of stormwater flows from a project site, if no other feasible option exists. Pumping should be used only as a last resort. Before proposing a pump system, it must be demonstrated that all other feasible gravity discharge options have been thoroughly evaluated and found infeasible. As part of this evaluation, the applicant shall pursue potential gravity discharge through adjoining properties. This includes requesting easements from neighboring property owners and offering fair market value compensation for such easements (actual dollar value with supporting appraisal). At minimum, a certified letter and receipt of the letter must be provided to show documentation that the offer has been made and received by the property owner. If all neighboring property owners declined, the applicant must provide documentation of the request, offers, and responses.

If the Public Works Department approves the use of a pump system, it shall meet the following minimum requirements:

- 1) Surface Water Adjustment will be required and shall discuss and justify Core requirements 1, 2, and 4 regardless of the level of the review.
- 2) The pump system must be privately owned and maintained. The pump system must have a dual pump (alternating), unless otherwise approved by the Public Works Department.
- 3) The pump system shall be used to convey water from one location or elevation to another within the project site, prior to gravity discharge to the public storm drainage system.
- 4) The pump system shall be connected to an emergency backup natural gas generator system. For all other alternatives, such as battery powered systems, may be proposed for review as a stormwater adjustment (see Policy D-11). A minimum of 48 hours of backup power is required onsite. Show the location of the generator pad on the site plan See 115.115.3p of KZC for location requirements and confirm with the Planning/Building Department prior to installation
- 5) To determine the flow to size the pump, use an approved model per the 2021 King County Surface Water Design Manual at a 15-minute time step.
- 6) All pumps shall be equipped with an external visual and audible alarm system.
- 7) The pump system shall not violate any City ordinances or codes.
- 8) The gravity-flow components of the drainage system to and from the pump system must be designed so that pump failure does not result in flooding of a building or emergency access, or overflow to a location other than the natural discharge point for the project site. An overflow/flooding hold-harmless agreement may be required at the discretion of Public Works.

- 9) The pump system shall be designed by a licensed Civil Engineer. At a minimum, the civil plans should specify the catch basin structure size/type (minimum Type 2 – 48in catch basin), pump size/type, rim and invert elevations, and a plan view of the force main and the transition to gravity sewer.
- 10) No forced main system shall be directly connected to the City's storm conveyance. All forced main from pump systems shall connect to a CB or yard drain on site and gravity to the storm system in the right-of-way.

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**DEPARTMENT OF PUBLIC WORKS
PRE-APPROVED PLANS POLICY**

**Policy D-10: ADDENDUM TO THE 2021 KING COUNTY
SURFACE WATER DESIGN MANUAL**

This addendum to the 2021 King County Surface Water Design Manual (KCSWDM) applies to development and redevelopment proposals within the City of Kirkland. This Addendum includes minor revisions to the KCSWDM to address the differences between King County’s and the City’s organization and processes. No major substantive changes have been made to the KCSWDM in order to maintain equivalency in review requirements and level of protection provided by the manual. It is our intent to maintain equivalency with the 2019 Ecology Stormwater Management Manual for Western WA.

The 2021 KCSWDM and the Addendum contained in this policy D-10 were adopted by Council in June 2022, with an effective date of July 1, 2022. If King County issues addendums to the 2021 KCSWDM, these are automatically adopted by Kirkland unless otherwise stated. The City Council must approve adoption of any version of the KCSWDM other than the 2021 KCSWDM.



Addendum to the 2021 King County Surface Water Design Manual

Effective date: July 1, 2022

Updated: January 1, 2026

Introduction

This addendum to the 2021 King County Surface Water Design Manual (KCSWDM) applies to development and redevelopment proposals within the City of Kirkland. The KCSWDM has adopted requirements of the Clean Water Act, the Endangered Species Act, and the State Growth Management Act. This addendum includes minor revisions to the KCSWDM to address the differences between King County's and the City's organization and processes. No major substantive changes have been made to the KCSWDM in order to maintain equivalency in review requirements and level of protection provided by the manual. It is the City of Kirkland's intent to maintain equivalency with the 2019 Ecology Stormwater Management Manual for Western WA (Ecology Manual).

Addendum Organization

The information presented in this addendum is organized as follows:

I. Terminology: At times King County and the City of Kirkland use different terminology to describe or to refer to equivalent subject matter. This section identifies these terms and the City of Kirkland's equivalent terminology.

II. Key Revisions: This section specifically identifies the minor revisions the City has made to the KCSWDM.

III. Code Reference Tables: King County code is referenced in many places throughout the KCSWDM. This section identifies these county code references and states the equivalent city code where applicable.

IV. Mapping: The City of Kirkland equivalents to the Flow Control Applications map, Landslide Hazard Drainage Areas map, and Sensitive/Critical Areas map are available online at:

http://www.kirklandwa.gov/depart/Information_Technology/GIS.htm

V. Reference Materials: This section identifies which reference materials provided in the KCSWDM are applicable and which are not. It also identifies equivalent City of Kirkland reference materials available.

Note: Clarifications and interpretations to the KCSWDM or this addendum are documented and made available through City Regulatory Code and the Public Works Pre-Approved Plans.

I. Terminology

At times King County and the City of Kirkland use different terminology to describe or to refer to equivalent subject matter. This section identifies these terms and the City of Kirkland's equivalent terminology.

- **Critical Drainage Area (CDA).** This definition does not apply in the City of Kirkland.
- **Department of Permitting and Environmental Review (DPER).** All references to DPER conducting drainage reviews or determinations shall refer to City of Kirkland Development Services.
- **Department of Natural Resources and Parks (DNRP).** All references to DNRP shall refer to City of Kirkland Parks, Planning and Community Development and/or Public Works Departments.
- **Director.** All references to the Director shall refer to the City of Kirkland Public Works Director.
- **Industrial Waste Program.** All references to the Industrial Waste Program shall refer to the City of Kirkland Wastewater Division or Northshore Utility District (depending on location within the city).
- **King County.** All references to King County shall refer to the City of Kirkland (COK).
- **King County Code (KCC).** All references to the KCC shall refer to the City of Kirkland Municipal Code (KMC). Check code reference table for equivalent code sections.
- **King County Designated/Identified Water Quality Problem.** This determination is made on a case-by-case basis in the City of Kirkland.**King County Road Standards.** All references to the King County Road Standards shall refer to the City of Kirkland Public Works Pre-Approved Plans.
- **Local Services Permitting Division.** All references to the Local Services Permitting Division shall refer to the City of Kirkland Development Group.
- **Overflow Pipe:** A pipe shall be considered an overflow if sufficient storage is provided below the invert of the pipe to meet flow control BMP requirements. In these situations, the flow control BMP will be allowed the credit associated with the BMP. Per the new impervious surface definition in the 2021 KCSWDM, if the pipe is used as an underdrain, the area will be counted as new or replaced impervious surface area.
- **Project Size.** The project size is based on the parcel(s) and/or right-of-way included in the project scope. It will be assumed the area disturbed by development will encompass the entire parcel(s) and right-of-way, unless there is an easement, defined stream/wetland and buffer, NGPE, or other condition which limits the amount of developable area.
- **Sensitive Area Folio.** Refer to City of Kirkland Sensitive Areas Map at: http://www.kirklandwa.gov/depart/Information_Technology/GIS.htm
- **Solid Waste Division.** All references to Solid Waste Division shall refer to the City of Kirkland Solid Waste Program.
- **Stormwater Services.** All references to Stormwater Services shall refer to the City of Kirkland Surface Water Management Group.
- **Utility Inspection Program.** All references to the Utility Inspection Program shall refer to the City of Kirkland Development Group.
- **Wastewater Treatment Division Industrial Waste Section.** All references to the Wastewater Treatment Division Industrial Waste Sections shall refer to City of Kirkland Development Group.
- **Water and Land Resources (WLR) Division.** All references to the WLR Division shall refer to the City of Kirkland Surface Water Management Group.
- **Zoning Classifications: Where the KCSWDM references Agricultural (A) Zoning, Forest (F) Zoning, or Rural (R) Zoning.** These zoning classifications are

intended for areas outside of the Urban Growth Boundary, therefore the City of Kirkland contains no equivalent zoning. Refer to city zoning maps to determine which zoning classifications apply to your project. The City of Kirkland Land Use Map can be found at: http://www.kirklandwa.gov/depart/Information_Technology/GIS.htm

II. Key Revisions

This section includes minor revisions and clarifications to the 2021 KCSWDM to address the differences between King County's and the City of Kirkland's organization and processes, as well as to ensure equivalency with the 2019 Ecology Manual. Unless specifically noted as a clarification, the items below are minor revisions.

Chapter 1: Drainage Review and Requirements

Applies with the revisions stated below:

If a project uses multi-family zoning and density, then multi-family stormwater requirements apply to the entire project even if the project includes detached single family homes.

1.1 Drainage Review

Criteria for review levels are defined in the COK Public Works Pre-Approved Plans, Policies D-2 and D-3. Drainage review levels used in the City of Kirkland are listed below:

- Basic drainage review
- Simplified drainage review
- Targeted drainage review
- Full drainage review

When determining the level of drainage review, the following items apply:

- Clarification: Areas that change from existing gravel to paved surface will be counted as new impervious surface area, not replaced impervious area.
- Clarification: Flow control BMPs cannot be used to reduce the level of drainage review, but can be used to meet a flow control exemption or exception. For example, proposed driveways and roads will always be counted as fully impervious for the drainage review level, but permeable pavement can be used to meet a flow control exemption or exception.
- Clarification: Target impervious surfaces for the determination of drainage review (found in section 1.1.2.1) are different than target impervious surfaces that require mitigation under a simplified drainage review in Appendix C. After determining drainage review, if the project falls under a simplified drainage review, target impervious surfaces = all new and replaced impervious surfaces and must evaluate flow control BMPs to the maximum extent feasible.
- Projects that are solely utility projects (ex: replace water or sewer main, upsize water or sewer main, or similar) that replace the ground surface with in-kind material or materials with similar runoff characteristics are only subject to Core Requirement #5, Construction Stormwater Pollution Prevention.
- KCSWDM triggers a full drainage review for non-single family residential projects that create more than 2,000 sf of new plus replaced impervious surface. The City has the ability to reduce the drainage review to a simplified review if the City classifies the work as maintenance activity (ex: structural repair to pavement, sidewalk maintenance. etc) and the following criteria for the project can be met:
 - Creates less than 5,000 sf of replaced impervious surface
 - Does not create any new impervious surface

1.2 Core Requirements

1.2.2 Core Requirement #2: Offsite Analysis

Offsite analysis requires photos taken onsite (not Google Street View) to within 1/4-mile downstream of site discharge point to assess downstream condition.

1.2.2.1.1 Downstream Drainage Problems Requiring Special Attention

For item 4, Potential Impacts to Wetland Hydrology problem, refer to COK Public Works Pre-Approved Plans, Policy D-13, to determine the level of review needed for the wetland, reporting information required, and potential modelling to determine impacts.

1.2.2.3 Water Quality Project Impact Mitigation

Exclude Bacteria from mitigation. Bacteria problems are addressed through educational programs and source control.

Phosphorus Problem – Forbes Lake is listed as a Category 5 water body for phosphorus. All projects that drain to Forbes Lake that trigger water quality treatment shall be assumed to be located within a designated Sensitive Lake WQ Treatment Area for the purposes of applying area-specific water quality treatment requirement in Section 1.2.8.1.

1.2.3 Core Requirement #3: Flow Control

Clarification: Historic (forested) conditions will be used for pre-developed runoff modeling of all projects in Level 2 flow control areas.

A City of Kirkland flow control map is located at:

http://www.kirklandwa.gov/depart/Information_Technology/GIS.htm

Projects triggering a Full Project Drainage Review proposing infiltration/bioretenion facilities or pervious pavement to meet Level 1 or 2 flow control or for onsite flow control BMPs require a soils report per COK Pre-Approved Plans, Policy D-8.

Pumping systems are not allowed downstream of flow control unless approved. Steady state pump systems do not meet duration discharge requirement of flow control.

1.2.3.1 Area-Specific Flow Control Facility Requirement

For projects that trigger Core Requirement #3: Flow Control Facilities, facility design shall be as follows:

- Projects shall start with a maximum impervious coverage permitted by the Kirkland Zoning Code (KZC) plus an additional 10% as referenced in Section 3.2.2.1 in this Policy.
- If a project can't meet an exemption or exception within this section and a detention facility is required, flow control BMP credits per 1.2.3.2 D are not allowed to reduce the size of the vault unless a project can meet full dispersion as outlined in 1.2.3.2 C or full infiltration. Refer to Table 1.2.9.A in this Policy for additional criteria for full infiltration. Projects are still required to meet Core Requirement #9: Flow Control BMPs to the maximum extent feasible.

- Flow control BMP credits per 1.2.3.2.D are allowed to be used if a project can meet an exemption or exception within this section. In addition, refer to Table 1.2.9.A in this Policy for additional criteria for full infiltration.

Regarding Exceptions to Flow Control Requirements in both Basic (#1) and Conservation (#2) Flow Control Areas, flow control can be waived if a threshold discharge area generates less than a 0.15 cfs increase in 100-yr peak flows using a 15-minute time step. The intent to still allow the 0.10 cfs increase at the 100-yr peak flow with a 1-hour time step were for areas that do not include a 15-minute time step in the approved model. All areas in Kirkland have a 15-minute time step, and therefore must use 15-minute time step for the exception.

Commercial and industrial redevelopment projects within conservation flow control areas must include calculations within the TIR to show how the assessed value of the existing project site improvements was determined.

Clarification: Areas that are proposed to be protected through planning easements (grove easements, PNAs, etc.) may only be modeled as forest if an NGRA is also placed over the areas. Planning easements either do not protect the land (such as grove easements) or do not require monitoring (PNAs). NGRA easements shall not overlap NGPEs. Below is a table for modeling allowances:

Easement Type/Land Use	Modeled As:
Native Growth Retention Area (NGRA)	Forest
Native Growth Protection Easement (NGPE)	Forest
Preserved Grove Easement	Grass
Landscape Easement	Grass
Protective Native Areas (PNA)	Grass
Shoreline Planting	Grass
Preserved Grove Easement + NGRA Overlap	Forest
Landscape Easement + NGRA Overlap	Forest
PNA + NGRA Overlap	Forest
Shoreline Planting + NGRA Overlap	Forest
Paddock	Grass
Turf without underdrain	Grass

Clarification: Only BMPs listed on Table 1.2.9.A (page 1-95) can be used on a threshold discharge area to meet the 0.15 cfs limit unless otherwise approved through the adjustment process, Policy D-11. For example, products like infiltrator chambers are not equivalent to gravel filled infiltration trenches in Appendix C and shall submit an adjustment to the manual per Policy D-11 in the COK Public Works Pre-Approved Plans to show equivalence.

Clarification: To meet the requirements of the 0.15 cfs exception, total pre-developed and post-developed areas must match (unless full infiltration is used).

Clarification: Regarding Target Surfaces in Conservation Flow Control Areas to be mitigated, vegetated areas in easements and/or tracts must be modeled from forested

in the pre-developed condition to lawn in the developed condition, unless the area is placed in a tract or easement that will preserve the native vegetation during and after construction.

Clarification: Threshold and modeling calculations of pervious and impervious areas, turf areas, including lawn or synthetic turf, that do not have an underdrain are considered 100% pervious. Areas that have an underdrain are considered 100% impervious.

Clarification: Wheel strip driveways shall not be used for Flow Control BMP credit. See C.2.9.3 in this policy for more information.

1.2.3.2 Flow Control Facility Implementation Requirements

G. Mitigation Trade

Projects that would like to use the mitigation trade option (area swap) must use an area that is within the public right of way. Mitigation trade areas can't be from private property.

1.2.4 Core Requirement #4: Conveyance System

1.2.4.3 Conveyance System Implementation Requirements

G. Spill Control

City of Kirkland will only require spill control requirements on commercial and multifamily projects that do not require flow control. Single family residential will install a tee per City Pre-Approved Plan CK-D.45.

1.2.6 Core Requirement #6: Maintenance and Operations

Refer to KMC 15.52.070 for City Acceptance of new drainage facilities.

If the project proposes a propriety system not covered in the 2021 KCSWDM, the applicant shall submit an adjustment to the manual per Policy D-11 in the COK Public Works Pre-Approved Plans. The adjustment should include inspection and maintenance standards, including frequency of inspections and a log of maintenance activity.

If the underlying zoning for the cottage project is **single family residential**, the detention and water quality system would be publicly maintained (with public easements and access if needed).

If the underlying zoning for the project is **multifamily**, all stormwater infrastructure (detention vault, water quality, catch basins, etc.) on the property will be privately maintained.

1.2.7 Core Requirement #7: Financial Guarantees and Liability

This section is replaced by KMC 15.52.080, Bonds.

1.2.8 Core Requirement #8: Water Quality

1.2.8.1 A. Basic WQ Treatment Areas

Reductions of water quality treatment level from Enhanced to Basic, Exception #4, is not allowed in the City of Kirkland. Projects in Kirkland cannot reduce the level of required water quality treatment by prohibiting the use of leachable metals on the property.

For a bioretention to meet enhanced basic water quality treatment, it must be designed, using an approved continuous runoff model, to infiltrate 91% of the influent runoff, consistent with the 2019 Ecology Manual, and designed per 2019 Ecology Manual BMP T7.30. Bioretention facilities that will be drain to Forbes Lake must be designed with no underdrain.

The City will accept all water quality treatment facility-types identified in the 2019 Ecology Manual, with the following additions and alterations:

- Emerging technologies will be considered on a case-by-case basis, via adjustment process, Policy D-11 in the COK Public Works Pre-Approved Plans, provided the product has received a level of use designation from WA State Dept. of Ecology (see the following website):
<http://www.ecy.wa.gov/programs/wq/stormwater/newtech/index.html>
- Only Filterra systems are pre-approved in addition to the approved King County Water Quality facilities for publicly maintained enhanced basic systems and do not need an adjustment process. The City's preference is to have a system without a Filterra tree. However, if Filterra tree is proposed, it shall meet COK Policy R-10.
- Water quality facilities proposed to be publicly maintained shall provide configuration that allows drawdown of permanent pool(s) for maintenance access.

1.2.8.1 C. Sphagnum Bog WQ Treatment Areas

This section does not apply to the City of Kirkland.

1.2.8.2 Water Quality Implementation Requirements

C. Treatment Trade

Projects that would like to use the treatment trade option (area swap) must use an area that is within the public right of way. Treatment trade areas can't be from private property.

1.2.9 Core Requirement #9: Flow Control BMPs

Clarification: All proposed projects that are subject to clearing and grading that have not been covered by impervious surface, incorporated into a drainage facility or engineered as structural fill or slope shall, at project completion, meet soil amendment requirements per Pre-Approved Plan COK.E-12. [Any project that is subject to Core Requirement #9 will be required to provide soils that meet Pre-Approved Plan E.12 within the clearing limits, i.e. in all disturbed areas.] Note that the definition of New Pervious Surface includes areas where alteration of soil characteristics has occurred. In Kirkland this will include all areas within the clearing limits of a site.

When evaluating BMPs within the right of way to the maximum extent feasible, the BMPs must be evaluated in the following order for:

Sidewalk (that is a target surface):

1. Slope sidewalk (5') to landscape strip (4.5') – See Pre-Approved Plan CK-R.08 for implementation details
2. Bioretention
3. Pervious Concrete
4. Limited Infiltration

Road Widening (that is a target surface):

1. Bioretention
2. Porous Concrete Parking Strip (if applicable)
3. Limited Infiltration
4. Porous Asphalt

1.2.9.1 Flow Control BMP Requirements Overview

A. Target Surfaces

If a project or threshold discharge area of a project meets the Direct Discharge Exemption per Section 1.2.3.1, soil amendment is required for new pervious areas and flow control BMPs need to be evaluated in the following order for impervious areas:

1. Full Infiltration
2. Basic Dispersion

If basic dispersion is found to be a feasible BMP, limited infiltration, bioretention and/or permeable pavement may be used instead of basic dispersion to meet the flow control BMP requirement. If basic dispersion is found to be infeasible, perforated pipe connection is not required in the City and the flow control BMP requirement is considered met.

1.2.9.2 Individual Lot BMP Requirements

Requirement #5, implementation of Reduced Impervious Surface Credit and Native Growth Retention Credit, for both Small Lot BMP Requirements and Large Lot BMP Requirements is not required in the City of Kirkland. King County has high lot coverage so the reduction of 10% lot coverage to meet the flow control BMP requirement is achievable. The City of Kirkland justifies meeting this requirement for implementation with an already lower lot coverage than King County (typically 70% lot coverage in King County compared to 50% lot coverage in Kirkland).

Requirement #7, installation of perforated pipe connection, is not required in the City of Kirkland. If the applicant has reached this level, it is viewed that LID is infeasible on the site and do not want to introduce additional water into the ground.

1.2.9.2.3 Large Rural Lot BMP Requirements

This section does not apply to the City of Kirkland.

1.2.9.4.1 Use of Credit by Subdivision Projects

A. Subdivision Implementation of BMPs within Road Right-of-Way Item #3: If the road right-of-way will be maintained by the City of Kirkland, the flow control BMPs must be approved by the public works department. Refer to section 1.2.9.2, Requirement #3, in the Addendum for the order of BMP evaluation in the right-of-way.

1.2.9.4 Requirements for use of BMP Credits

Regarding Table 1.2.9.A Flow Control BMP Facility Sizing Credits:

For the purposes of facility sizing credit, grassed modular grid pavement shall be modeled as 50% impervious, 50% grass.

Footnote (3) regarding full infiltration – For any project subject to Basic or Simplified Drainage Review, and for any single family residential project subject to Directed, Full or Large Project Drainage Review, the design requirements and specifications in Appendix C, Section C.2.2 may be used for design of full infiltration on individual lots. In addition, refer to section C.1.3 in this Policy for additional criteria for full infiltration. For all other projects, including any project where full infiltration is proposed to serve more than one lot, full infiltration must be designed in accordance with infiltration facility standards in Section 5.2. In addition, to receive a full infiltration credit in the City of Kirkland, the geotechnical engineer must classify the soil as outwash conditions (medium sands or better) and provide an infiltration test per Section 5.2.1 the 2021 KCSWDM along with any additional requirements within this Policy to show a measured infiltration rate of 8 inches / hour or greater to qualify for the full infiltration credit.

Credits for Restricted Footprint – Restricted footprint shall include all surfaces that are impervious on the property, including eaves on rooftops over pervious surfaces. Also, impervious surface limit must be reduced by 5% or greater and the restricted footprint area shall be rounded up or down to the nearest 100 square feet, to receive the facility sizing credit. If additional restrictions are needed they shall be in 100 square foot increments.

Example:

If a lot has an area of 7200 SF and is situated in a 50% max lot coverage zone, then the maximum allowable impervious surface area for surface water mitigation purposes is $7200 \text{ SF} \times (0.50 + 0.10) = 4320 \text{ SF}$ (additional 10% per Section 3.2.2.1).

A 5% minimum reduction implies $7200 \text{ SF} \times 0.55 = 3960 \text{ SF}$ impervious surface. The Restricted Footprint shall be rounded up or down and recorded as 4000 SF, or additional reductions at 100 SF increments if so desired (3900 SF, 3800 SF, and so on).

1.3.1 Special Requirement #1: Other Adopted Area-Specific Requirements

Projects located in the Holmes Point Area must also comply with lot coverage and other standards included in the Kirkland Zoning Code, *Chapter 70 – Holmes Point Overlay Zone*.

1.3.3 Special Requirement #3: Flood Protection Facilities

This section does not apply to the City of Kirkland.

1.3.4 Special Requirement #4: Source Controls

With regard to threshold for triggering this requirement, if the proposed project requires a non-single family residential site development permit, then water quality source control is applicable. Required source control BMPs should be called out in TIR and

structural BMPs called out in plans. Some highlighted sections common to projects in Kirkland are:

- Cleaning and maintaining stormwater drainage system (A-1);
- Storage and use of pesticides and fertilizers (A-5);
- Storage of solid waste and food wastes (A-8);
- Parking Lots, Driveways and Outside Storage Areas (A-31);
- Animal Waste (A-34)
 - Covered waste containers and waste collection services required at properties with designated dog exercise areas.

1.4 Adjustment Process

Refer to the Surface Water Adjustment Process defined in COK Public Works Pre-Approved Plans, Policy D-11.

Chapter 2 Drainage Plan Submittal

Applies with the revisions stated below:

2.1 Plans Required for Drainage Review

Refer to the COK Public Works Pre-Approved Plans, Policies G-7, D-2, and D-3.

2.2 Plans Required with Initial Permit

Refer to the COK Public Works Pre-Approved Plans, Policies G-7, D-2, and D-3.

2.3 Drainage Review Plan Specifications

2.3.1.1 Technical Information Report

An Operation and Maintenance Manual is required for all privately maintained stormwater detention and water quality facilities, and is submitted as part of the permit application.

2.3.1.2 – Site Improvement Plan

Refer to the COK Public Works Pre-Approved Plans, Policies G-7, D-2, and D-3.

2.3.1.3 – ESC Plan Section

Refer to the COK Public Works Pre-Approved Plans, Policies G-7, D-2, and D-3.

2.3.1.4 – Stormwater Pollution Prevention and Spill (SWPPS) Plan

Refer to the COK Public Works Pre-Approved Plans, Policies G-7, D-12.

2.3.2 – Projects in Targeted Drainage Review (TDR)

Refer to the COK Public Works Pre-Approved Plans, Policies G-7, D-2, and D-3.

2.4 Plans Required After Drainage Review (pg 2-35)

Refer to the COK Public Works Pre-Approved Plans, policies G-7, D-2, and D-3.

Chapter 3 Hydrologic Analysis & Design

Applies with the revisions stated below:

3.2.2.1 Generating Time Series

Calculation of Impervious Area

For calculating impervious coverage for proposed residential and commercial development must be estimated for each specific proposal. Impervious coverage for frontage layouts – streets, sidewalks, trails, etc – shall be taken from the layouts of the proposal. House/driveway or building coverage shall be as follows:

- For residential development, the assumed impervious coverage shall be the maximum impervious coverage permitting by the Kirkland Zoning Code (KZC) plus an additional 10%.
- For stand alone SFR projects, the assumed impervious will be as shown as approved as part of the building permit
- For commercial or multi-family development, the impervious coverage shall either:
 - Assume the maximum impervious coverage permitted by the KZC plus an additional 10% OR
 - Estimate impervious coverage from layouts of the proposal. If estimated from the layouts of the proposal, the impervious coverage shall include calculations of all impervious surfaces, including eaves. This option may require a Reduced Impervious Surface Limit to be recorded on the property.

If an existing home is proposed to remain in this development, there are the following options to address the storm drainage from that house/lot:

1. Evaluate the proposed lot as new/replaced impervious at the required lot coverage as part of the project TIR, OR
2. Remove the undisturbed area from calculations as non-targeted surfaces. If this method is taken, the existing home and undisturbed area cannot be redeveloped for a minimum of 5 years.
 - a. For Subdivision Projects: The existing home and lot cannot be redeveloped for a minimum of 5 years after the recording of the short plat. If the existing home is redeveloped within that timeframe, a storm drainage analysis must be provided for the entire subdivision, including the lot at full lot coverage as part of the building permit. The following note must be included on the subdivision:

Redevelopment of Lot_: Since the home currently constructed on the existing parcel that is proposed to remain as Lot _ has not been evaluated as part of the storm drainage analysis, the existing home cannot be redeveloped within 5 years of the recording of this plat. If the home is redeveloped within that time period, a storm drainage analysis must be provided for the entire subdivisions including Lot __ at the redeveloped impervious coverage.

- b. For Single Parcel Projects: The existing home and undisturbed area on the parcel cannot be redeveloped for a minimum of 5 years after the project has been finalized. If the existing home and/or undisturbed area are redeveloped within that time period, a storm drainage analysis must be provided for the parcel including the lot at full lot coverage as part of the building permit. A parcel hold will be placed on the property for future development, and the following language shall be included in the approved TIR:

The home currently constructed on the existing parcel is proposed to remain with __sf additional area on the parcel undisturbed and has not been

evaluated as part of the storm drainage analysis. The existing home and undisturbed area cannot be redeveloped within 5 years of the project being finalized. If the home and/or undisturbed area is redeveloped within that time period, a storm drainage analysis must be provided for the entire parcel assuming full lot coverage as part of the permit. The project applicant has been notified and is aware of this requirement.

3.3.2 Flow Control Design Using the Runoff File Method Evaluating Flow Control Performance

Clarification: If having difficulties meeting the lower part of the duration curve (50% of the 2-year to the 2-year), refer to footnote 10 in the 2021 KCSWDM.

Chapter 4 Conveyance System Analysis & Design

Applies with the revisions stated below:

4.2.1 Route Design

Permanent drawdown pumping of the groundwater table, or groundwater collection, that would result in a continuous discharge to the City's stormwater system is not allowed within the City of Kirkland. No permanent groundwater discharge is allowed into the City's stormwater system.

4.2.1 Design Criteria

Pipe Cover

18-inch pipe cover minimum is allowed.

Chapter 5 Flow Control Design

Applies with the revisions stated below:

Refer to Policy R-16 for gate requirements to publicly maintained drainage systems.

5.1 Detention Facilities

Use details located in the COK Public Works Pre-Approved Plans, if available.

5.1.1.1 Construction of Access Roads

Maintenance access road(s) per Pre-Approved Plan CK-D.37 shall be provided to the control structure and other drainage structures associated with the detention facility (e.g., inlet, access openings, emergency overflow or bypass structures). Vehicular access to the drainage structures associated with the detention facility shall not be obstructed on a temporary or permanent basis without prior approval from the City. Location of parking stalls shall not obstruct maintenance access. Where maintenance access is required on a driveway that shares access to residential units, a min. 16' wide drive line is required to accommodate two-way traffic.

5.1.2 Detention Tanks

5.1.2.1 Design Criteria

Setbacks: Refer to Policy G-1 Easement Width Policy. For vaults and tanks deeper than 10' measured from finished grade to bottom of facility, a 1:1 easement width to facility

depth ratio is required (e.g., a 13' deep tank measured from finished grade to bottom of pipe would require a 13' easement).

Dead Storage: The maximum allowable dead storage within a detention tank is 1 foot, unless a gravity system can be provided to the sanitary sewer or stormwater system.

Riser: Maximum length on notch is 24 inches and minimum width is ¼-inch.

Materials: Bottomless pipe arches are not allowed within the public right of way. Pipe arches with a bottom must be approved by the City prior to being installed within the public right of way.

Materials: Pipe materials for publicly maintained detention tanks are restricted to the following:

1. Coated Corrugated Metal Pipe (CMP): Contech ULTRA FLO, or Equal
2. Aluminum Alloy Pipe: Contech CORLIX, or Equal
3. Steel-Reinforced Polyethylene Pipe (SRPE): Contech DuroMaxx, or Equal

See CK-D.34 and STORM DRAINAGE - DESIGN CRITERIA for more information.

Maximum depth for all detention tank systems shall be 15 feet from rim to tank invert.

5.1.3 Detention Vaults

5.1.3.1 Design Criteria

Setbacks: Refer to Policy G-1 Easement Width Policy

5.1.4.1 Control Structures Design Criteria

A removable screen is required when the bottom orifice size is 1" or less. The screen shall be made from stainless steel mesh, 8 inch depth, and attached with a minimum of 3 stainless steel screws. The size of the mesh openings must be less than the orifice diameter (0.25 inch mesh typical).

5.1.5 Parking Lot Detention

Parking lot detention is not allowed in the City of Kirkland.

5.2.1 General Requirements for Infiltration Facilities

Testing Procedure

In addition to the small and large PIT, EPA falling head percolation test (follow test procedure in 2021 KCSWDM, Reference 6-A) is an acceptable testing procedure for determining a design infiltration rate. The correction factor for determining the design infiltration rate is $F(\text{testing}) = 0.30$. Refer to the table below for what type of infiltration test is acceptable for meeting the LID Performance Standard or for designing infiltration facilities.

A large PIT will be required for infiltration facilities that will infiltrate more than 1 acre of impervious area.

Allowable Infiltration Testing Methods

	Small PIT	Large PIT	Single Ring Infiltrometer	EPA Falling Head

LID Performance Standard	Accepted	Accepted	Accepted	Accepted
Inf Facility serving < 1 acre of impervious area	Accepted	Accepted	Not Accepted	Accepted
Inf Facility serving > 1 acre of impervious area	Not Accepted	Accepted	Not Accepted	Not Accepted

The single ring infiltrometer and EPA falling head test will require a minimum of 3 tests (arrayed in a triangle) per infiltration BMP or facility location. The lowest measured rate shall be used in determining the design infiltration rate.

NOTE: Grain size analysis is not an allowable method for determining an infiltration rate for the LID Performance Standard and infiltration facility sizing.

5.2.6 Alternative Infiltration System

For publicly maintained systems, Policy D-11, Surface Water Adjustment, will be required for any alternative infiltration system proposed. This adjustment will include constructability of the system, how the system will be inspected and maintained, and life cycle for the system for consideration

Chapter 6 Water Quality Design

Applies with the revisions stated below:

Refer to Policy R-16 for gate requirements to publicly maintained drainage systems.

Use details located in the COK Public Works Pre-Approved Plans, if available.

6.1.2 Enhanced Basic Water Quality Menu

For a bioretention to meet enhanced basic water quality treatment, it must be designed, using an approved continuous runoff model (WWHM 2012) to infiltrate 91% of the influent runoff per Ecology Manual BMP T7.30. Bioretention facilities that will be located within the Forbes Lake subbasin must be designed with no underdrain.

Appendix A: Maintenance Requirements for Flow Control, Conveyance, and Water Quality Facilities

If the project proposes a propriety system not covered in the 2021 KCSWDM, the applicant shall submit and adjustment to the manual per Policy D-11 in the COK Public Works Pre-Approved Plans. The adjustment should include inspection and maintenance standards, including frequency of inspections and a log of maintenance activity.

Appendix B: Master Drainage Plan Objective, Criteria and Components, and Review Process

This Appendix does not apply to projects in the City of Kirkland.

Appendix C: Small project Drainage Requirements

Applies with the revisions stated below:

C.1.3 Application of Flow Control BMPs

For any soil investigation or reporting information, refer to COK Public Works Pre-Approved Plans, Policy D-8.

In addition to Policy D-8, if a project would like to claim full infiltration in the City of Kirkland, the geotechnical engineer must classify the soil as outwash conditions (medium sands or better) and provide an infiltration test per Section 5.2.1 of the 2021 KCSWDM along with any additional requirements within this Policy to show a measured infiltration of 4 inches / hour or greater to qualify.

C.2.2.3 Use of Gravel Filled Trenches for Full Infiltration

Products like infiltrator chambers are not equivalent to gravel filled infiltration trenches in Appendix C. If the project would like to use proprietary items, the applicant shall submit an adjustment to the manual per Policy D-11 in the COK Public Works Pre-Approved Plans.

C.2.3.3 & C.2.3.4 – Use of Gravel Filled Trenches for Limited Infiltration

Clarification: The minimum length requirement per 1,000 sf of tributary surface must be met regardless of width of trench.

Drywells have a maximum surface area of 100 sf, minimum 4' per side.

C.2.4.1 Minimum Design Requirements for Basic Dispersion

Basic dispersion is not allowed to discharge or sheet flow directly onto adjacent private property parcels. Runoff downstream of limited dispersion facilities shall be either collected and directed to storm conveyance or prevented from contributing to neighboring parcels and kept onsite.

Basic dispersion over paddock is acceptable if the dispersion is discharge or sheet flow directly over vegetation.

C.2.6 Requirements for Use of Bioretention

Cells shall be designed to drain within 24 hours. Water storage volume in cubic feet shall be equal to 0.25 times the square footage of the impervious surface or per Section C.2.6.4 of the 2021 KCSWDM, whichever is greater, or sized using WWHM 2012 or another approved continuous runoff model.

Do not place geotextile fabric between the Bioretention Soil Mix (BSM) layer and the subgrade. Geotextile fabric for non-woven soil separation may be used with City approval. Wrapping an optional under-drain pipe with filter fabric is not permitted.

C.2.7.2 – C.2.7.4 Permeable Pavement: Pervious Concrete, Porous Asphalt, Permeable Pavers

Permeable pavement shall not be located over cisterns, utility vaults, underground parking, in high volume intersections, under solid waste dumpsters, or where there is a high risk of chemical spillage.

Groundwater must be at least 3 feet below the aggregate base course layer if designing with an infiltration rate. One foot of separation may be used to meet Core Requirement #9 in the 2021 KCSWDM.

Protect pervious pavement from fines and other sediment during construction by covering with visqueen or similar impervious material.

For areas that transition from pervious concrete or porous asphalt to traditional impervious concrete or asphalt, install a concrete divider or extend the pervious reservoir base course under the impervious surface to account for settling.

Sand is not allowed in between or below permeable pavers in the City of Kirkland. See permeable paver detail CK-L.09 for aggregate size approved for use between and below pavers.

For additional requirements of this BMP, refer to the COK Public Works Pre-Approved Plans, Detail CK-L.09. Other proprietary systems may be allowed with Surface Water Engineer approval.

C.2.7.6 Grassed Modular Grid Pavement

Modular grid pavement with grass planted in the openings or in a thin layer of soil over the grid material cannot be used for single family residential driveways that are used on a daily basis in the City of Kirkland. Past performance shows the grass does not grow well when subject to vehicular traffic on a daily basis.

Modular grid pavement must be designed to meet H-20 loading.

C.2.9 Reduced Impervious Surface Credit

C2.9.2 Restricted Footprint

In addition to the criteria listed, impervious surface limit must be reduced by 5% or greater and the restricted footprint area shall be rounded up or down to the nearest 100 square feet, to receive the facility sizing credit.

Example:

If a lot has an area of 7200 SF and is situated in a 50% max lot coverage zone, then the maximum allowable impervious surface area for surface water mitigation purposes is $7200 \text{ SF} \times (0.50 + 0.10) = 4320 \text{ SF}$ (additional 10% per Section 3.2.2.1).

A 5% minimum reduction implies $7200 \text{ SF} \times 0.55 = 3960 \text{ SF}$ impervious surface. The Restricted Footprint shall be rounded up or down and recorded as 4000 SF, or additional reductions at 100 SF increments if so desired (3900 SF, 3800 SF, and so on).

C.2.9.3 Wheel Strip Driveways

Wheel strips may only be used to meet Core Requirement #9, maximum extent feasible, and may not be used for Flow Control BMP credit to meet Core Requirement #3. Actual impervious surface limits of wheel strips shall be used

to estimate impervious surface coverage. See Policy R-1 for additional requirements on wheel strip driveways.

C.2.10 Native Growth Retention Credit

For additional implementation requirements of this BMP, refer to COK Public Works Pre-Approved Plans, Policy D-15.

Appendix D: Construction Stormwater Pollution Prevention Standards

Use details located in the COK Public Works Pre-Approved Plans, if available.

D.2.4.2 Wet Season Requirements

Refer to ESC Notes in the COK Public Works Pre-Approved Plans.

III. Code Reference Tables

King County Code is referenced in many places throughout the KCSWDM. The following table identifies the county code references and states the equivalent City of Kirkland code where applicable (Kirkland Municipal Code is KMC and Kirkland Zoning Code is KZC). Policies are located in the Public Works (PW) Pre-Approved Plans.

King County Code Reference	Subject of Reference	COK Code/Policy Equivalent	Comment
KCC 2.98	Adoption procedures and Critical Drainage Areas	KZC Chapter 90	
Title 9	Surface Water Management	KMC 15.52	
KCC 9.04	Surface Water Run-off policy	KMC 15.52	
KCC 9.04.020	Definitions	KMC 15.04	
KCC 9.04.030	Drainage Review	PW Pre-Approved Plans	Policy D-2, D-3
KCC 9.04.050	Drainage Review-requirements	PW Pre-Approved Plans	Policy D-2, D-3
KCC 9.04.060	Critical drainage and/or erosion areas	KZC 85, KZC 90	
KCC 9.04.070	Engineering plans for the purposes of drainage review	KMC 15.52.050, KMC15.52.060 and PW Pre-Approved Plans	Policy D-2, D-3, D-11
KCC 9.04.090	Construction timing and final approval	KMC 15.52.060	Policy D-12
KCC 9.04.095	Vesting for lots in final short plats	KMC 22.20.370	
KCC 9.04.100	Liability Requirements	KMC 15.52.080	
KCC 9.04.115	Drainage Facilities accepted by King County	KMC 15.52.070	
KCC 9.04.120	Drainage Facilities NOT accepted by King County	KMC 15.52.070	
KCC 9.12.025	Prohibited discharges in the water quality section	KMC 15.52.090	Policy D-4
KCC 9.12	Water Quality	KMC 15.52.090 – 15.52.110	
KCC 9.12.035	Water Quality: Stormwater Pollution Prevention Manual Adoption	KMC, 15.52.090, KMC 15.52.100	Policy D-4

KCC 16.82	Erosion and Sediment Control, Clearing and Grading	KMC 15.52.060	
KCC 16.82.095(A)	ESC standards: seasonal limitation period	PW Pre-Approved Plans	Erosion/Sediment Control Plan Notes
KCC 16.82.100(F)	Grading standards: preservation of duff layer	KZC Chapter 95	
KCC 16.82.100(G)	Grading Standards: soil amendments	KZC Chapter 95, Pre-approved Plans	
KCC 16.82.150	Clearing standards in rural zone	Not applicable	COK does not contain rural zones
KCC 17	Fire Code	KMC 21.33	
KCC 20.70.020	Critical Aquifer recharge area	Not applicable	No critical aquifer recharge areas in COK
KCC 21A.24	Critical Areas Requirements	KZC Chapters 85 and 90	
21A.30	Animals in Residential Zones	KZC 115.20	
KCC 21A.14.180.D	On-site recreation space required	No equivalent City code exists	On-site recreation space is not required
KCC 21A.24	Critical Areas Code	KZC Chapter 90	
KCC 21A.38	Property specific development standards or special district overlays	KZC Chapter 70, KZC Chapter 90	
KCC 23.20	Code compliance: citations	KMC 1.12.030	
KCC 23.24	Code compliance: notice and orders	KMC 1.12.040	
KCC 23.28	Code compliance: stop work orders	KMC 1.12.070	
KCC 23.40	Code compliance: liens references on declaration of covenants form	KMC Title 15	

IV. Mapping

Below is a list of City of Kirkland maps to be used during drainage design. The maps can be viewed on-line or viewed at the Public Works counter at City Hall.

The maps are available on the following website:

http://www.kirklandwa.gov/depart/Information_Technology/GIS.htm

1. Base Map
2. Flow Control Map
3. Sensitive Areas Map
4. Land Use Map

V. Reference Materials

This section identifies which reference materials provided in the 2021 KCSWDM are applicable and which are not. Reference materials that have been struck through (i.e., ~~struck through~~) are not applicable to projects in the City of Kirkland.

- ~~1. KCC 9.04 — Surface Water Runoff Policy~~
- ~~2. Adopted Critical Drainage Areas~~
- ~~3. Other Adopted Area Specific Drainage Requirements~~
 - ~~A. RA Zone Clearing Restrictions~~

4. Other Drainage Related Regulations and Guidelines
 - A Grading Code Soil Amendment Standard
 - B Clearing & Grading Seasonal Limitations
 - C Landscape Management Plan Guidelines
 - ~~D Shared Facility Maintenance Responsibility Guidance~~
5. Wetland Hydrology Protection Guidelines
6. Hydrologic/Hydraulic Design Methods
 - A Infiltration Rate Test Methods
 - B Pond Geometry Equations
 - C Introduction to Level Pool Routing
 - D Supplemental Modeling Guidelines
- ~~7. Engineering Plan Support~~
 - ~~A King County Standard Map Symbols~~
 - ~~B Standard Plan Notes and Example Construction Sequence~~
 - ~~C Stormfilter Facility Access and Cartridge Configuration~~
8. Forms and Worksheets
 - ~~A Technical Information Report (TIR) Worksheet~~
 - B Offsite Analysis Drainage System Table
 - C Water Quality Facility Sizing Worksheets
 - D Flow Control and Water Quality Facility Summary Sheet and Sketch
 - E CSWPP Worksheet Forms
 - ~~F Adjustment Application Form and Process Guidelines~~
 - ~~G Dedication and Indemnification Clause—Final Recording~~
 - ~~H Bond Quantities Worksheet~~
 - ~~I Maintenance and Defect Agreement~~
 - ~~J Drainage Facility Covenant~~
 - ~~K Drainage Release Covenant~~
 - ~~L Drainage Easement~~
 - ~~M Flow Control BMP Covenant and BMP Maintenance Instructions (Recordable format)~~
 - ~~N Impervious Surface Limit Covenant~~
 - ~~O Clearing Limit Covenant~~
 - ~~P River Protection Easement~~
 - ~~Q Leachable Metals Covenant~~
- ~~9. Interim Changes to Requirements~~
 - ~~A Blanket Adjustments~~
 - ~~B Administrative Changes~~
- ~~10. King County Identified Water Quality Problems~~
11. Materials
 - ~~A (VACANT)~~
 - ~~B (VACANT)~~
 - C Bioretention Soil Media Standard Specifications
 - ~~D (VACANT)~~
 - E Roofing Erodible or Leachable Materials
- ~~12. (VACANT)~~
- ~~13. (VACANT)~~
14. Supplemental Approved Facilities
 - A Approved Proprietary Facilities
 - B Approved Public Domain Facilities

CITY OF KIRKLAND

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DEPARTMENT OF PUBLIC WORKS PRE-APPROVED PLANS POLICY

Policy D-11: SURFACE WATER ADJUSTMENT PROCESS

This process is provided for the occasions when site conditions dictate or a project applicant requests modifications to one of the surface water core or special requirements, or any other specific requirement or standard contained in the King County Surface Water Design Manual or the City of Kirkland Public Works Pre-Approved Plans. A fee will be required for review of an adjustment request. For projects with complex drainage issues (such as extensive modeling or review of modeling results), review by a third party may be required at the applicant's expense. Proposed adjustments must be approved prior to final permit approval.

Adjustment Process

1. Complete a Surface Water Standards Adjustment Request form (see page 2 of this policy).
2. Submit the request form and additional materials, including fee, to the Public Works Department. Include all materials that may assist in a complete review and consideration of the request. Failure to provide all pertinent information may result in delayed processing or denial of request.
3. The request will be reviewed, and the applicant will be notified of approval/denial.

Adjustment Criteria

Adjustments to the surface water design requirements may be granted provided that granting the adjustment will achieve ALL of the following:

1. The adjustment will produce a compensating or comparable result that is in the public interest, AND
2. The adjustment meets the objectives of safety, function, appearance, environmental protection, and maintainability based on sound engineering judgment, AND
3. Granting the adjustment for the individual property in question will not create a significant adverse impact to public health, welfare, water quality, and properties downstream or nearby, AND
4. The adjustment requires the best practicable alternative for achieving the spirit and intent of the requirements in question, AND,
5. The granting of any adjustment that would be in conflict with the requirements of any other department will require review with that department.

The City of Kirkland recognizes there are special circumstances or conditions affecting property such that strict application of the criteria for producing a compensating or comparable result would deprive the applicant of all reasonable use of the parcel of land in question. In these cases Public Works staff will work with the applicant, and every effort will be made to find creative ways to meet the intent of the requirement and to achieve a mutually satisfactory result.

Adjustment Reconsideration Process

The applicant may request reconsideration of the denial or conditions of approval of an adjustment request by submitting a formal letter to the Public Works Director within 15 working days of the decision. This letter must include justification for reconsideration of the decision, along with a copy of the adjustment request. The director shall respond to the applicant in writing within 15 working days. The director's decision on the reconsideration request shall be final. A per-hour review fee will be charged to the applicant for review of a reconsideration request.

Exceptions/Variations

For applicants requesting a formal exception/variance from the minimum requirements, see the City of Kirkland Western Washington Phase II Municipal Stormwater Permit (Appendix I, Section 6).



SURFACE WATER DESIGN STANDARDS ADJUSTMENT REQUEST

Instructions to Applicant/Design Engineer:

Please complete this form and submit to the COK Public Works Department. Include all materials that may assist in a complete review and consideration of the adjustment request. Failure to provide all pertinent information may result in delayed processing or denial of request.

COK Permit Number:		Request date:
Project Name:		
Project Address:		
Applicant Name:	Design Engineer Name and Firm:	
Applicant Phone:	Design Engineer Phone:	
Applicant Signature:	Design Engineer Signature:	

Description of Adjustment Request:

Justification for Adjustment Request:

Applicable KC Surface Water Design Manual: 2009 or 2016 or 2021

Applicable Section(s) of Standards:

COK Determination: **Approved** **Denied**

Conditions (if applicable):

COK Staff Signature: _____ **Date:** _____

CITY OF KIRKLAND

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DEPARTMENT OF PUBLIC WORKS PRE-APPROVED PLANS POLICY

Policy D-12: CONSTRUCTION STORM WATER POLLUTION PREVENTION PLAN

All proposed projects that will conduct construction activities onsite, or offsite must provide stormwater pollution prevention and spill controls to prevent, reduce, or eliminate the discharge of pollutants (including sediment) to onsite or adjacent stormwater systems or watercourses.

If the project is a simplified drainage review (refer to COK Policy D-2), the project must meet the following conditions per the 2021 King County Surface Water Design Manual (KCSWDM), Appendix C, Section C.1.4.

The project must submit a Simplified Construction Stormwater Pollution Prevention Plan (SCSWPP) which contains a narrative explaining how each category below is addressed in the site specific SCSWPP Plan. Additional information can be found in Section C.1.4.1 of the 2021 KCSWDM.

1. Mark Clearing Limits / Minimize Clearing
2. Minimize Sediment Tracked Offsite
3. Control Sediment
4. Stabilize Exposed Soils
5. Control Runoff
6. Control Dewatering
7. Control Other Pollutants (SWPPS)
8. Protect Existing and Proposed Flow Control BMPs
9. Maintain BMPs During Construction and Final Site Stabilization

If the project is a targeted or full drainage review (refer to COK Policy D-3), the project must meet the following conditions per the 2021 KCSWDM, Section 1.2.5.

The project must submit a Construction Stormwater Pollution Prevention (CSWPP) Plan which contains both:

- Erosion and sediment control measures (see section A below), and
- Stormwater pollution prevention and spill control measures (see section B below).

A. Erosion Sediment Control (ESC) Measures

Each category below must be addressed in the site specific CSWPP Plan. Additional information can be found in the 2021 KCSWDM (Appendix D) and the Kirkland Pre-Approved Plans.

1. Clearing Limits
2. Cover Measures
3. Perimeter Protection
4. Traffic Area Stabilization
5. Sediment Retention
6. Surface Water Collection
7. Dewatering Control
8. Dust Control
9. Flow Control
10. Control of Pollutants
11. Protect Existing and Proposed Flow Control BMPs

12. Maintain BMPs
13. Manage the Project

B. Stormwater Pollution Prevention and Spill (SWPPS) measures:

Each category below must be addressed in the site specific CSWPP Plan. Additional information can be found in the 2021 KCSWDM (Appendix D) and the Kirkland Pre-Approved Plans.

1. Follow effective pollutant handling and disposal procedures.
2. Provide cover and containment for materials, fuel and other pollutants.
3. Manage the project site to maximize pollutant control and minimize pollutant sources.
4. Protect from spills and drips of petroleum products and other pollutants.
5. Avoid over-application or untimely application of chemicals and fertilizers.
6. Prevent or treat contamination of stormwater runoff by pH modifying sources.

Note: For **projects 1 acre or larger**, applicants are required to submit a Notice of Intent (NOI) to Ecology and obtain coverage under Ecology's Construction Stormwater General Permit (CSWGP); issued by the WA State Department of Ecology, as part of the Federal Clean Water Act. The Ecology permit will require a more detailed CSWPP Plan in their format. Applicants must submit a draft Ecology CSWPP Plan at COK permit submittal, and final Ecology CSWPP Plan at the COK Pre-Construction Meeting. The Ecology CSWPP Plan meets Section 1.2.5 of the 2021 KCSWDM and is an approved method to meet this Policy. For additional information, see the following Ecology website:

<http://www.ecy.wa.gov/programs/wq/stormwater/construction/index.html>

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DEPARTMENT OF PUBLIC WORKS**PRE-APPROVED PLANS POLICY****Policy D-13: WETLAND HYDROLOGY STUDY GUIDELINES**

This policy is in place to provide guidance on requirements regarding offsite analysis, specifically related to potential impacts to wetland hydrology. If a project triggers Core Requirement #2: Offsite Analysis and has a wetland on the property, see requirements below for *A. Onsite Wetlands*. If the project triggers Core Requirement #2: Offsite Analysis, locates a wetland within ¼ mile downstream, AND is not exempt from Core Requirement #3: Flow Control Facilities, see requirements below for *B. Offsite Wetlands*.

A. Onsite Wetlands

The project identified a wetland on the property and is required by Kirkland Zoning Code (KZC) Chapter 90 to create a Critical Area Report. Refer to the Planning Department for additional information on the Critical Area Report.

In addition to the Critical Area Report, an Onsite Wetland Hydrology Study is required by the Public Works Department. This Onsite Wetland Hydrology Study must describe:

- The change in flow rate from existing to developed conditions (if there is a vault onsite, use the flow release from the detention system).
- Hydrologic report analysis of the hydroperiod of the wetland and the fluctuation in water level due to the increase/decrease in flows (use WWHM 2012) modeled for individual days or on a monthly basis based on the criterion outlines in the Department of Ecology 2014 Stormwater Management Manual for Western Washington, Volume I, Appendix I-D, Guide Sheet 3B.
- Memorandum from a wetland qualified critical area professional (as defined in KZC Chapter 90) stating whether the proposed project will have adverse impacts on wetland functions, including but not limited to amphibian reproduction and potential changes in vegetation composition or structure, as a result of effects of changes to the hydroperiod.
- If the memorandum indicates there will be adverse impacts, include how the project proposes to mitigate for these impacts.

B. Offsite Wetlands

The project identified a wetland ¼ mile downstream of the property. The Public Works Department will determine on a case-by-case basis what elements of the Wetland Hydrology Study, above, and the Critical Area Report, KZC 90.110, are required for an Offsite Wetland Hydrology Study.

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DEPARTMENT OF PUBLIC WORKS

PRE-APPROVED PLANS POLICY

Policy D-14: SPECIAL STORMWATER REQUIREMENT

This policy is required for the parcels located within Figure 1. Projects located within Figure 1 are subject to the following requirements:

1. All projects are required to meet the 2021 King County Surface Water Design Manual and the City of Kirkland Addendum (Policy D-10)
2. In addition, projects must fully infiltrate the 100-year storm event for areas that currently do not have a direct connection to the City's stormwater system.
 - a. If infiltration is not feasible on site, a detention system is required. The 2, 10 and 100-year developed peak flow must match the existing 2, 10 and 100-year peak flow for the area currently connected to the City's stormwater system.
3. If the project triggers flow control, the flow control facility must meet Level 2 flow control AND the 100-year developed peak flow must match the existing 100-year peak flow for the area currently connected to the City's stormwater system.

Below is an example:

Project Description

An existing house is looking to add an addition to the house. In existing conditions, 1,000 sf of impervious area is currently connected to the City's stormwater system, and 1,000 sf of impervious area disperses on the site. The project proposed tear down and rebuild 3,000 sf of impervious surface on the lot.

Drainage Requirements

In addition to meeting the 2021 KCSWDM and COK Addendum, this project must fully infiltrate 2,000 sf of impervious area. Only 1,000 sf was in existing conditions was connected to the City's stormwater system. If infiltration is not feasible, a detention system must be designed. The detention system release rate shall match the 2, 10, and 100 year peak flow for 1,000 sf of impervious area.

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DEPARTMENT OF PUBLIC WORKS

PRE-APPROVED PLANS POLICY

Policy D-15: NATIVE GROWTH RETENTION AREA (NGRA) ADDITIONAL REQUIREMENTS

In addition to the requirements identified in the 2021 King County Surface Water Design Manual (KCSWDM) in Appendix C, Section 2.10 - NGRA, the following criteria apply.

Design/Construction

- The minimum allowable area to set aside for a NGRA shall be 10% of the lot and under no circumstances shall be less than 2,000 sf. NGRAs that are contiguous with NGPE's may reduce size to 500 sf if 10% coverage is achieved.
- The Native Growth Retention Area (NGRA) needs to be contiguous on the lot and not separated by fencing. Projects that propose to create NGRAs on multiple lots should make the NGRA contiguous between lots.
- With a subdivision, the NGRA can be on one or multiple lots. (ex: in a 2 lot short plat, the entire NGRA could be on one lot to meet the 0.15 c.f.s. exception in the 2021 KCSWDM).
- A NGRA cannot be created over a native growth protection easement (NGPE). The NGPE is a requirement of planning and the sensitive area and the buffer must be mitigated for through the zoning code. The NGRA intent is to preserve or create additional forested areas outside of buffer requirements.
- A minimum width of 25 feet is required for the native growth retention area.
- Special inspection by a third party or internal staff will be required to document the type and quantity of plants are meeting the approved design.
- Public utilities and access to public utilities are not allowed within the NGRA
- NGRA shall be fenced using a split-rail. A sign designating the area a a NGRA shall be installed on the split-rail. (One sign on each property). Gate access is allowed.
- The following language must be recorded on the plat: NGRAs that are contiguous with a NGPE shall not fence between NGRA and NGPE, only between NGRA and developed area.

"The owners of the land herein short subdivided hereby grants to the City of Kirkland a municipal corporation, a native growth retention area easement over, across, under and on that area shown hereon as Native Growth Retention Area (NGRA). The City shall have a license to enter the property to access the easement area for the purposes of monitoring for compliance with the terms of this easement as outlined in the 2021 King County Surface Water Design Manual.

It is the responsibility of the property owner(s) to maintain the NGRA. Maintenance shall include removing non-native, invasive and noxious plants; and planting native plants and trees as determined by the City of Kirkland.

All trees within the NGRA shall be retained, aside from approved timber harvest activities and the removal of dangerous or diseased trees. The NGRA may be used for passive recreation; provided temporary structures with or without foundation (tree houses, sheds, etc) are not installed and any cleared and compacted areas do not exceed eight percent (8%) of the NGRA. All improvements within NGRA shall require written approval by the City of Kirkland Public Works Department Stormwater Engineering staff. It shall be the responsibility of the property owner to gain all permits and approvals.

Each of the undersigned owners agree to defend, pay, and save harmless the City of Kirkland, its officials, agents, and employees from any and all claims of every nature whatsoever, real or imaginary, which may be made against the City, its officers, agents, or employees for any damage to the property or injury to any person arising out of the existence of said native growth retention area over said owner's property or the actions of the undersigned owners in carrying out the responsibilities under this agreement, including all costs and expenses, and recover attorney's fees as may be incurred by the City of Kirkland in defense thereof; excepting therefrom only such claims as may arise solely out of the negligence of the City of Kirkland, its officers, agents, or employees.

This easement is given to satisfy a condition of the development permit approved by the City of Kirkland under Kirkland file/permit no. SUBXX-XXXXX.

This easement shall be binding upon the parties hereto, their successors and assigns, and shall run with the land."

0-3 Years after Construction

- The City may contract with a third party to monitor the native growth retention area for the first 3 years. Minimum plant survival after 3 years is 90%. Maximum aerial cover by invasive weed species is 10%. The developer will be responsible for paying for the monitoring and reporting. The monitoring report shall include:
 - A minimum of 3 photo points
 - Plant counts
 - Type and amount of invasive species (maintenance is required after 5% invasive species)
 - Recommendation for maintenance needs, if any
- The developer will be responsible for the maintenance of the native growth retention area. The maintenance shall include irrigation / watering of the plants for survival and implementing the maintenance recommendations from the monitoring report.
- The developer shall be responsible for posting a maintenance security for the first 3 years (value equal to \$30 per square foot of NGRA, Min = \$15,000 to Max = \$60,000). The maintenance security will be used if the developer does not implement the maintenance recommendations from the monitoring report in a timely manner.

- If native plant survival and invasive species cover standards are not achieved, the City has the ability to extend the monitoring period an additional year to ensure plant survival prior to handing over to the responsibility of maintenance to the homeowners.
- The developer shall be responsible for paying a monitoring fee (fees will be determined at time of review, and are expected to be similar to \$11,200 for NGRA areas from 500 to 2499 sf; \$15,169 for areas from 2500 sf to 10,000 sf.

> 3 years after Construction

- Following the approval of the maintenance / monitoring requirements of the construction mentioned above, maintenance will be the responsibility of the homeowner.
- The City will inspect the native growth retention area on an annual basis if the area is used to meet a flow control exception or reduce the size of a detention system.

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DEPARTMENT OF PUBLIC WORKS
PRE-APPROVED PLANS POLICY

Policy D-16: RECYCLED CONCRETE AND CEMENT TREATMENT USE WITHIN CITY LIMITS

Recycled Concrete:

Recycled concrete is not allowed within the City of Kirkland. See special provisions for capital improvement projects.

Cement Treatment:

Soil amendments are sometimes used to stabilize construction sites in order to stabilize the ground for building. The applicant may apply for use of soil amendments allowed under this policy. Additional conditions may vary from site to site, but the conditions below must be followed.

Soil Amendment Conditions:

- 1) Fly ash or kiln dust are not allowed within the City of Kirkland. Only Portland Cement Type II (cement treatment) as the soil amendment additive is allowed.
- 2) Cement treatment is only allowed under impervious areas and under the following types of impervious areas:
 - a. Within the City right-of-way, cement treatment is only allowed under the road prism.
 - b. Shared access private driveways
 - c. Commercial properties
 - d. Cement treatment is not allowed within any utility trenching.
- 3) Cement treatment is not allowed within the buffer of a wetland, stream or lake.
- 4) If cement treatment is placed near low impact development (LID), a geotechnical engineer shall be on site to verify permeability of soil

Conditions for Implementation of Soil Amendment:

- 1) The contractor shall hold a preconstruction meeting with the assigned inspector to discuss potential application of cement treatment.
- 2) The application rate shall be determined by the geotechnical engineer. The geotechnical engineer must be present during application.
- 3) Cement treatment shall not be mixed or placed while the temperature is at or below 40 degrees or while raining.

- 4) The contractor shall be prepared to implement dust control, as needed, to prevent fugitive dust during the treatment process.
- 5) Cement treatment to be placed in a uniform layer over the subgrade by the use of an approved, large-wheeled, mechanical spreader capable of measure the rate of cement application
- 6) Cement treatment will be mixed in to the top 12 inches or as recommended by geotechnical engineer using skirted rototilling equipment.
- 7) Treated areas to be regraded and compacted within 1 hour of application.
- 8) Treated area should be left undisturbed for at least 24 hours after compaction. After 24 hours, the treated subgrade shall be proof rolled. The proof roll shall be conducted under observation of the geotechnical engineer.
- 9) In the event the treated areas degrade due to equipment traffic or do not pass the proof roll test, the areas should be re-excavated and import shall be used to meet compaction requirements.

The following erosion control BMPs must be in place until the cement treated base is covered with an impervious surface:

- 1) Stormwater from the application area shall be kept separate from uncontaminated stormwater
- 2) During application, stormwater runoff shall be collected in a permanent system that is not connected to the City storm system (Capping storm is not allowed. Temporary collection systems may be required). Ponds are not an allowable method to store runoff from the cement treatment area.
- 3) Stormwater runoff shall be disposed to either sanitary sewer (must obtain a King County Industrial Waste Water Permit) or transported offsite to an approved site.
- 4) An emergency backup plan must be prepared and ready to implement to handle large quantities of stormwater sized for the developed condition 10-year peak discharge using the approved model with 15-minute time steps as computed in the hydrologic analysis.

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DEPARTMENT OF PUBLIC WORKS
PRE-APPROVED PLANS POLICY

**Policy D-17: CONDITION OF STORM SYSTEM FOR RELEASE OF
2-YEAR MAINTENANCE SECURITY**

When a short plat development permit receives Final Inspection status, a 2-year maintenance security is collected for the improvements. Prior to releasing the maintenance security (typically a bond) after the 2-year maintenance period, the storm system shall be cleaned as directed by the Public Works Department Construction Inspector, and as follows:

Catch Basins:

The PW Inspector will inspect each catch basin for both maintenance defects and cleanliness. If sediment has accumulated in the catch basin, the developer shall hire a vactor truck to clean the catch basin.

Detention Vault/Pond/Tank:

The PW Inspector will inspect the vault/pond/tank for sediment deposition. If sediment has accumulated, the PW Inspector will require the developer to clean the vault.

Cartridge System:

The PW Inspector will require the developer to replace the cartridge system prior to releasing the maintenance security.

Filtterra:

The PW Inspector will require the mulch layer to be replaced prior to releasing the maintenance security.

Wetvault:

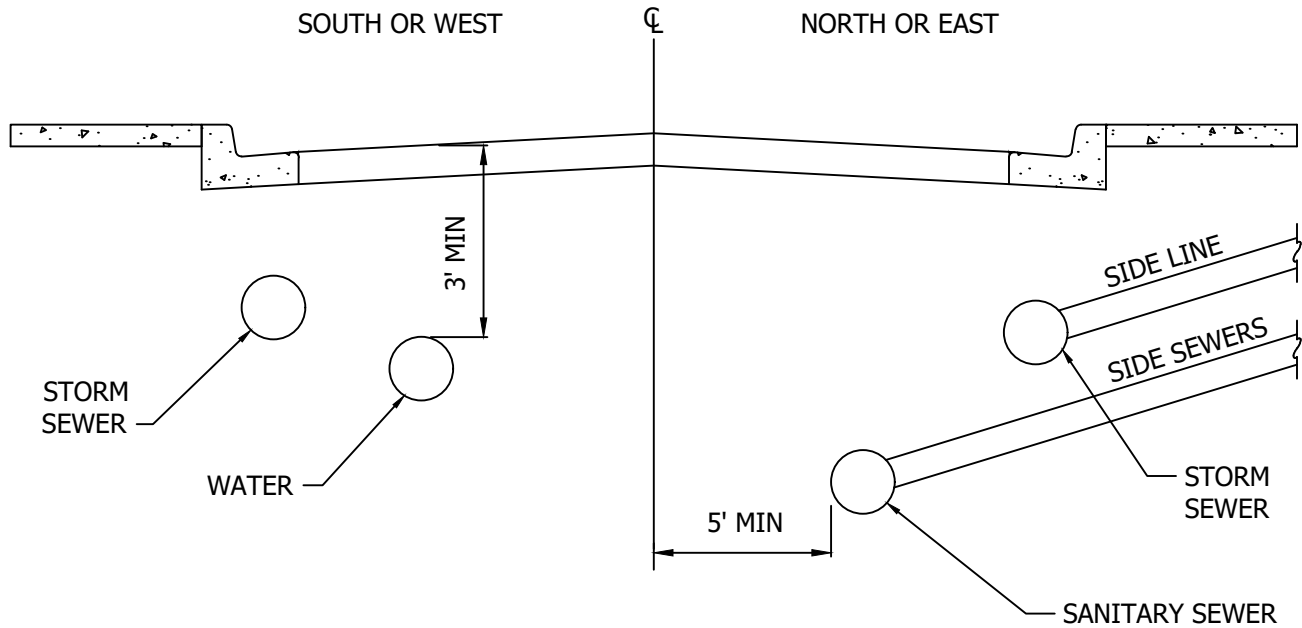
If not clearly visible that the wetvault is clean, the PW Inspector will require to the developer to pump the wetvault and clean it prior to releasing the maintenance security.

Rain Garden:

The PW Inspector will require the developer to remove any sediment that has entered the rain garden and replace any plants that died prior to releasing the maintenance security.


Infiltration System:

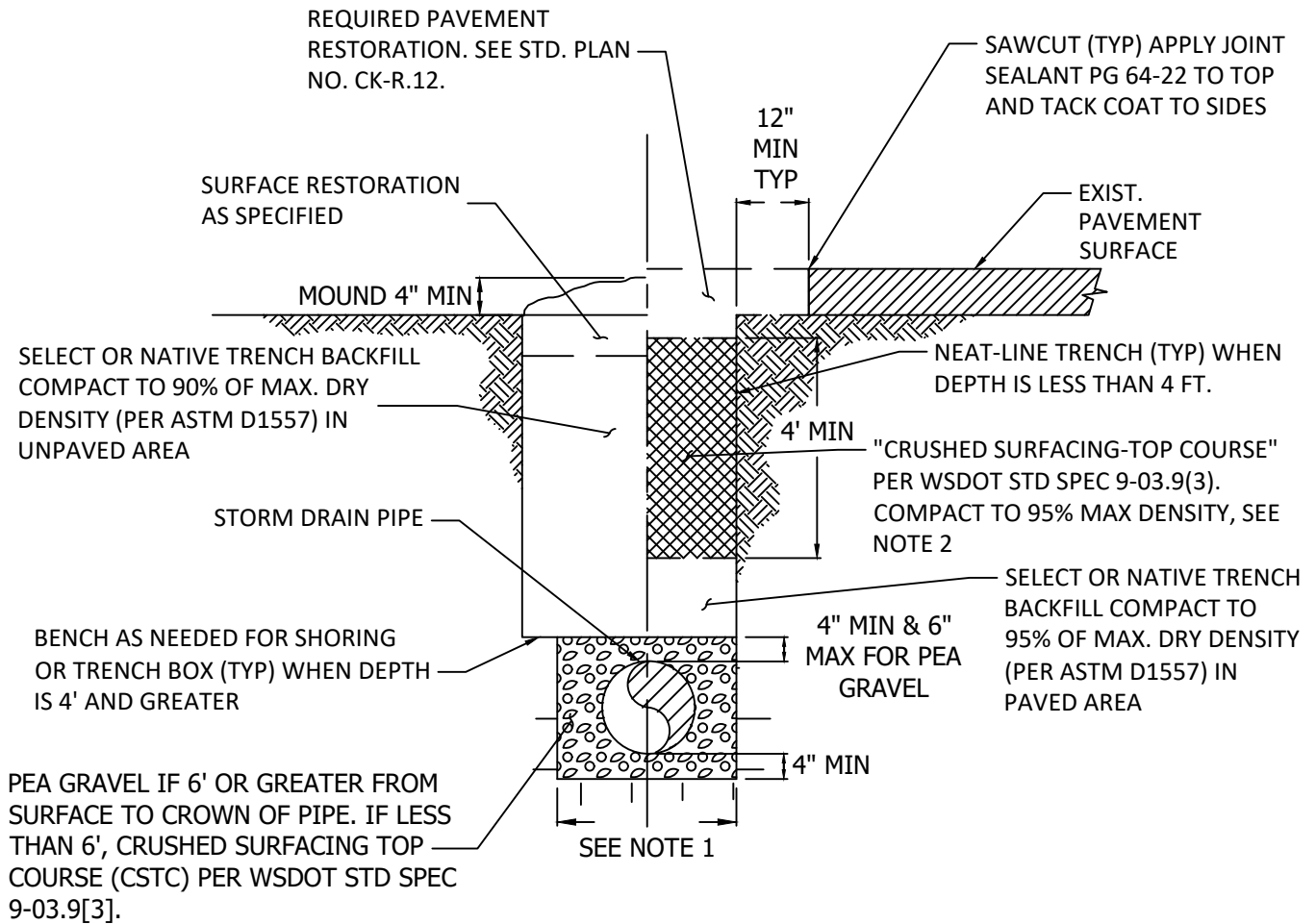
The PW Inspector will require the developer to clean the presettling system prior to releasing the maintenance security.



NOTES:

1. UNLESS STATED OTHERWISE, OR APPROVED BY THE CITY, ALL UTILITIES SHALL HAVE 2 FEET MINIMUM COVER IN AREAS SUBJECT TO VEHICULAR LOADS. IF MINIMUM COVER CANNOT BE PROVIDED, DUCTILE IRON OR SDC-900 MATERIAL SHALL BE USED FOLLOWING APPROVAL BY THE CITY.
2. UTILITIES MAY HAVE 1.5 FOOT MINIMUM COVER IN AREAS NOT SUBJECT TO VEHICULAR LOADS.
3. FOR JOINT OCCUPANCY TRENCH, SEE CK-R.06.

CITY OF KIRKLAND	
PLAN NO. CK - D.01	
	TYPICAL UTILITY LOCATIONS




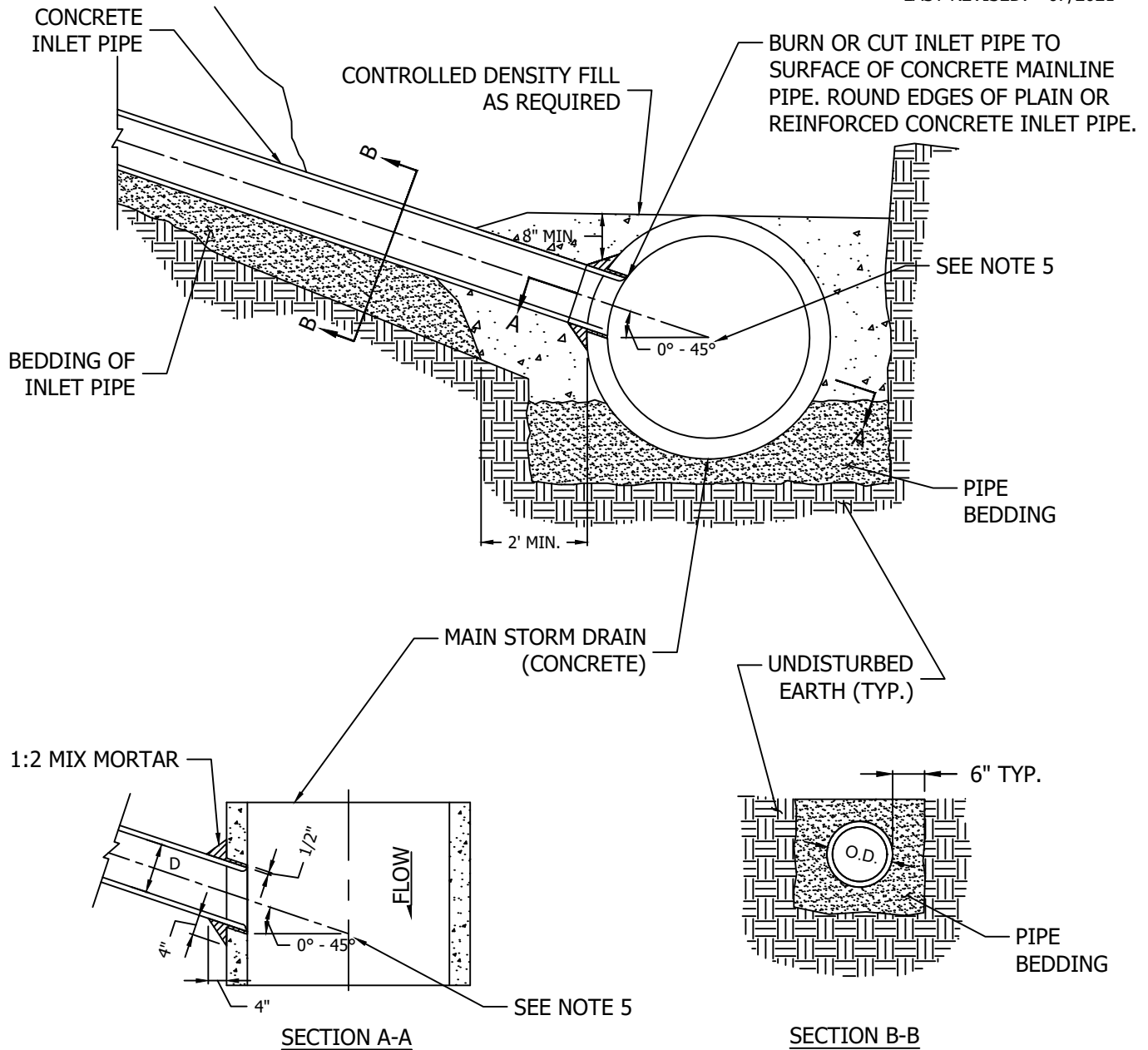
UNPAVED AREAS

PAVED AREAS

NOTES:


1. MAXIMUM WIDTH OF TRENCH AT TOP OF PIPE
 * 30" FOR PIPE UP TO AND INCLUDING 12" NOMINAL DIAMETER.
 * OD PLUS 16" FOR PIPE LARGER THAN 12" NOMINAL DIAMETER.
2. WHERE TRENCH IS PERPENDICULAR TO TRAVELED LANES, BACKFILL FULL DEPTH WITH CRUSHED SURFACING-TOP COURSE. WHERE TRENCH IS PARALLEL TO TRAVELED LANES, BACKFILL THE TOP 4' OF TRENCH TO SUBGRADE WITH CRUSHED SURFACING-TOP COURSE. SUITABLE EXCAVATED MATERIAL MAY BE USED PROVIDED 95% MAX. COMPACTION DENSITY (ASTM D1557) CAN BE ACHIEVED.
3. SEE OVERLAY POLICY R-7.
4. USE OF RECYCLED CONCRETE IS PROHIBITED, UNLESS APPROVED BY THE CITY. SEE POLICY D-16.

CITY OF KIRKLAND	
PLAN NO. CK - D.02	
	STORM TRENCH DETAIL



NOTES:

1. "D", THE INSIDE DIAM. OF THE INLET PIPE, SHALL BE 6" OR LESS. FOR LARGER VALUES OF "D", USE A MANHOLE OR CATCH BASIN.
2. IN NO CASE SHALL THE OUTSIDE DIAM. OF THE INLET PIPE EXCEED ONE-HALF THE INSIDE DIAM. OF THE MAIN STORM DRAIN PIPE.
3. $\frac{1}{4}$ OF INLET PIPE SHALL BE ON RADIUS OF MAIN STORM DRAIN.
4. THE MIN. OPENING INTO THE EXISTING STORM DRAIN SHALL BE THE OUTSIDE DIAM. OF THE INLET PIPE PLUS 1".
5. IF ANGLE IS GREATER THAN 45° FIELD TAPPING IS NOT ALLOWED.
6. MAINLINE SHALL HAVE 12" MIN. DIAM.
7. FOR THERMOPLASTIC AND D.I. INLET PIPES, CORE DRILL MAIN AND CONNECT WITH SADDLE TEE OR INSERTA TEE. SEE CK-D.03A.
8. FOR CONCRETE INLET PIPES CORE DRILL AND GROUT.

CITY OF KIRKLAND	
PLAN NO. CK - D.03	
	FIELD-TAPPING OF CONCRETE PIPE

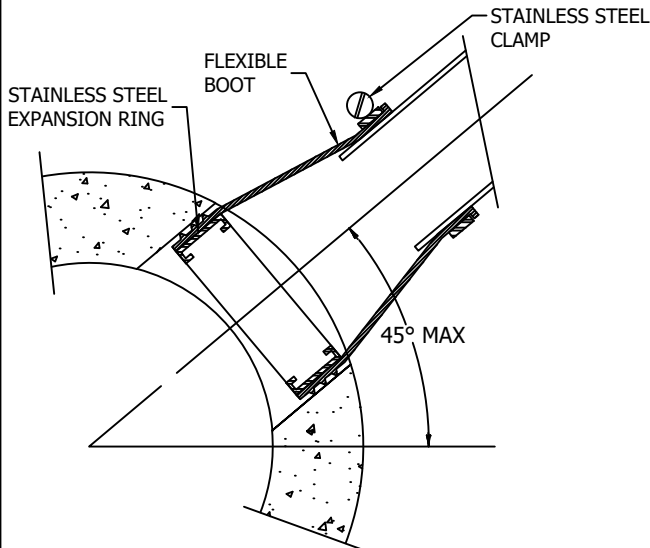
STORM DRAIN CONNECTIONS SHALL BE BY:

LAST REVISED: 07/2021

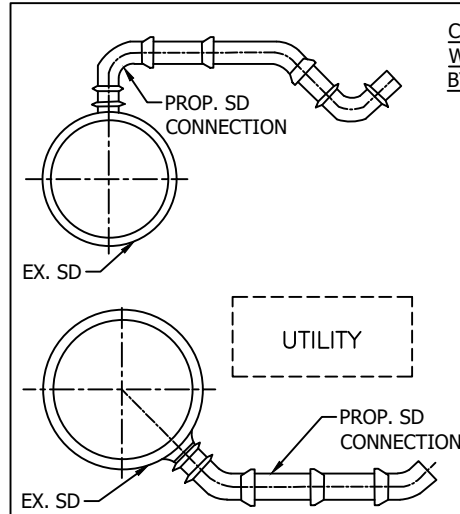
- CONNECTING TO AN EXISTING CATCH BASIN OR MANHOLE
- CONSTRUCTING A NEW CATCH BASIN OR MANHOLE ON THE EXISTING STORM DRAINAGE PIPELINE AND CONNECTING THE CONVEYANCE PIPELINE TO THIS STRUCTURE

ALTERNATIVE CONNECTIONS MAY ONLY BE ALLOWED WITH PRIOR APPROVAL BY THE CITY PUBLIC WORKS INSPECTOR:

- CUT-IN TEE
- INSERTA TEE (CORED PER MANUFACTURERS INSTRUCTIONS, SBR RUBBER SLEEVE AND GASKET TO SEAL AND SS METAL PARTS TO CLAMP)
- CORE AND SADDLE TAP (ROMAC SEWER SADDLE, OR EQUAL. LIMITED TO 4-INCH AND 6-INCH PRIVATE CONNECTIONS)



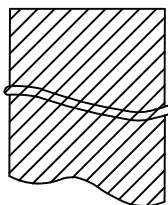
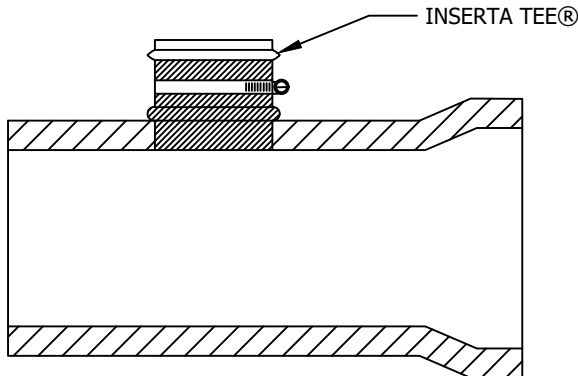
CORES TO CONCRETE MAINS SHALL BE DONE BY HOLE SAW. DRILL HOLES SHALL BE MADE BASED ON GIVEN TEE OPENING. SQUARE CUTS BY JIGSAW OR CIRCULAR SAW SHALL BE PROHIBITED.



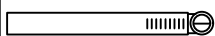
CONNECTIONS THAT WILL NOT BE APPROVED BY THE CITY INCLUDE:

- CONNECTIONS TO FORCE MAINS.
- CONNECTIONS OF LATERAL PIPES WITH A DIAMETER LARGER THAN THE MAINLINE PIPE.
- CONNECTIONS THAT RESEMBLE FIGURES TO THE LEFT.

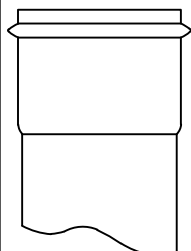
SERVICE LATERALS MUST BE AT LEAST ONE STANDARD PIPE SIZE SMALLER THAN THE MAINLINE PIPE INSIDE DIAMETER.



COMPLETE RUBBER SLEEVE (ASTM C-443) INCLUDES A MOLDED SEGMENT THAT HOLDS IT IN PLACE.



STAINLESS STEEL BAND (9/16" SERIES 300) SECURES UPPER HALF OF RUBBER SLEEVE TO THE PVC HUB



PVC HUB (ASTM 3034 SDR 35) DRIVE INTO CENTER OF RUBBER SLEEVE AFTER SLEEVE IS PLACED IN HOLE.

NOTES:

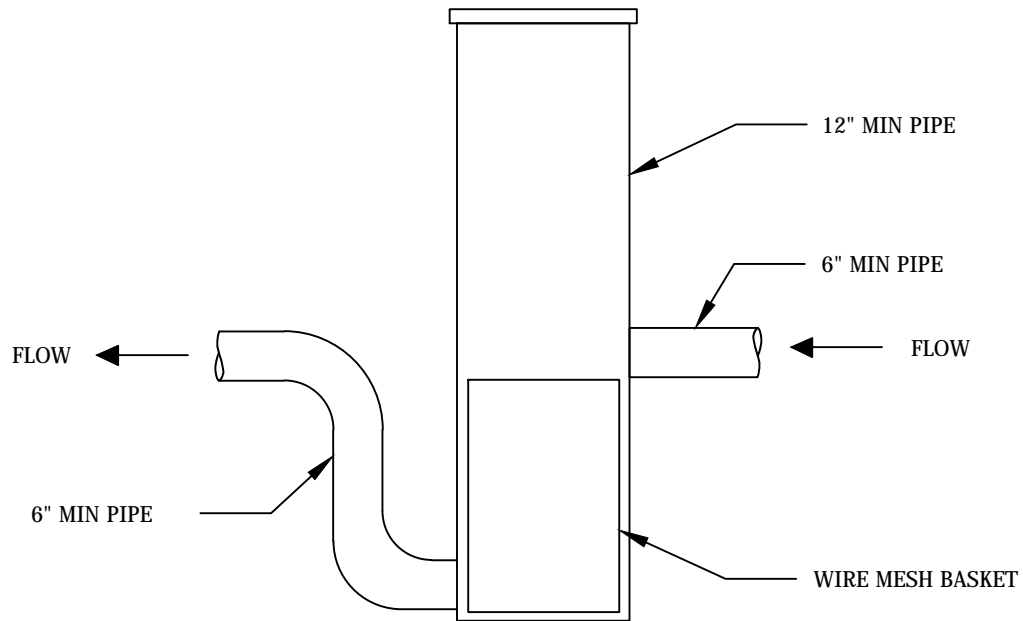
- 1.) ALL INSERTA-TEE HOLES SHALL BE MACHINE DRILLED.
- 2.) INSERTA-TEES ARE NOT APPROVED FOR NEW MAIN / LATERAL CONNECTION.

CITY OF KIRKLAND

PLAN NO. CK - D.03A



BLIND TEE CONNECTION



INFILTRATION FILTER
SECTION
NTS

NOTES:

1. PRODUCT SHALL BE ORENCO SCB1236-6L STORMWATER CATCH BASIN OR EQUIVALENT.

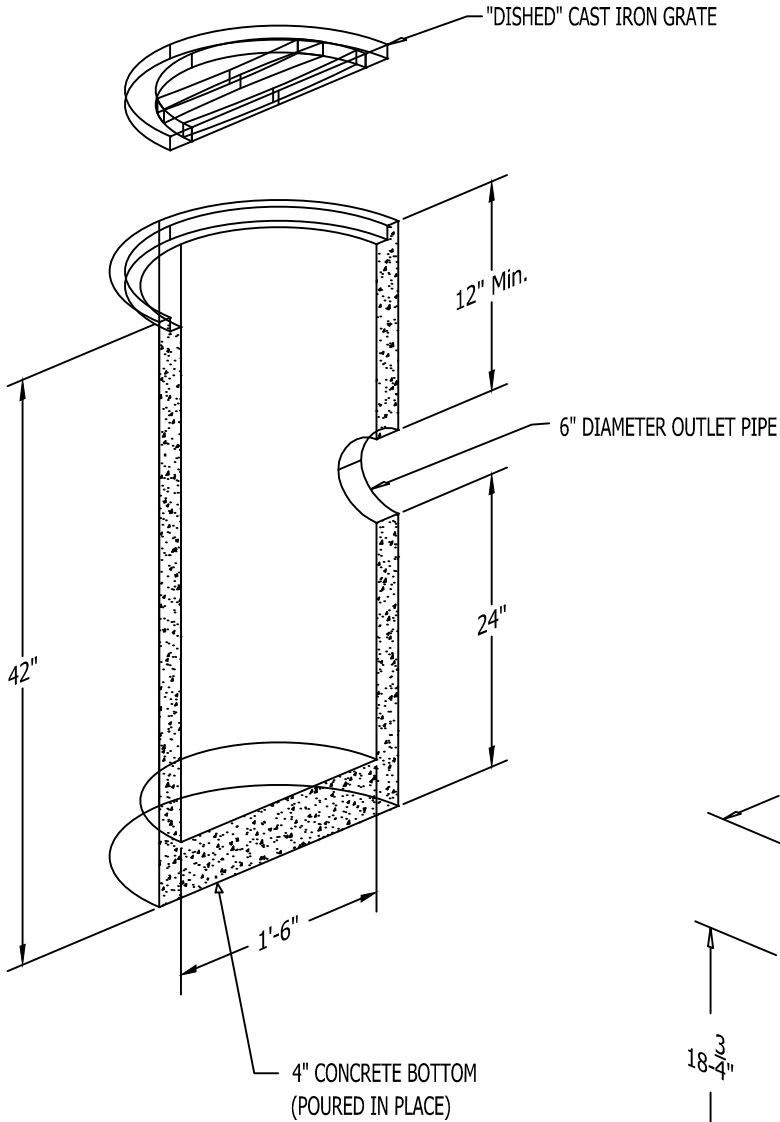
2. PLACE THE INFILTRATION FILTER UPSTREAM OF THE INFILTRATION SYSTEM (EX: DRYWELL, INFILTRATION TRENCH, ETC). SEE DETAIL CK-D.22B FOR PLACEMENT LOCATION.

CITY OF KIRKLAND

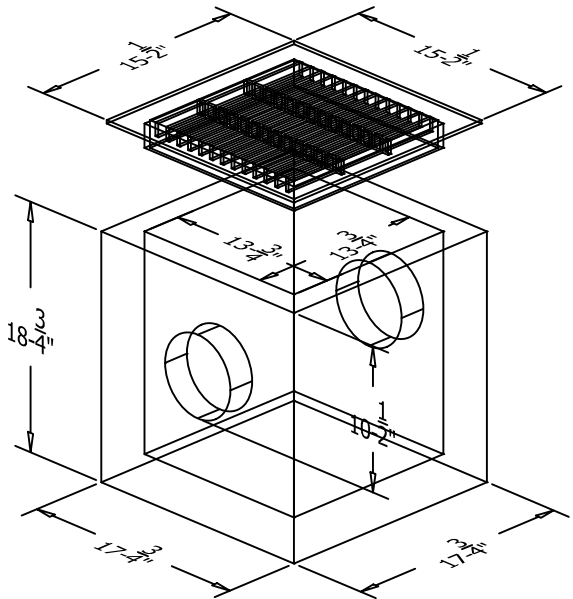
PLAN NO. CK- D.04



**INFILTRATION
FILTER**




ROUND TYPE



SQUARE TYPE

NOTES

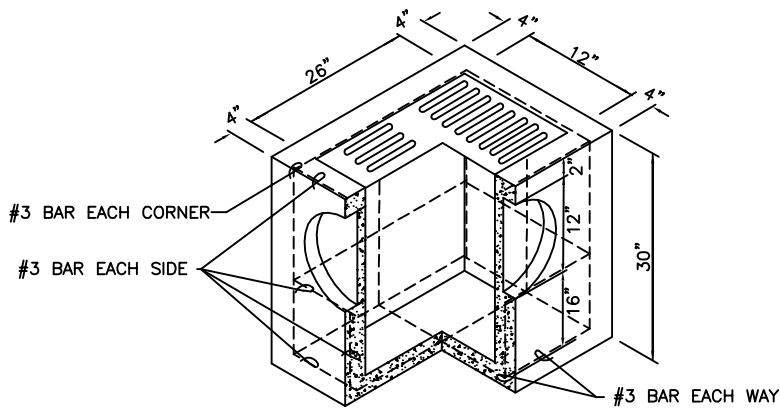
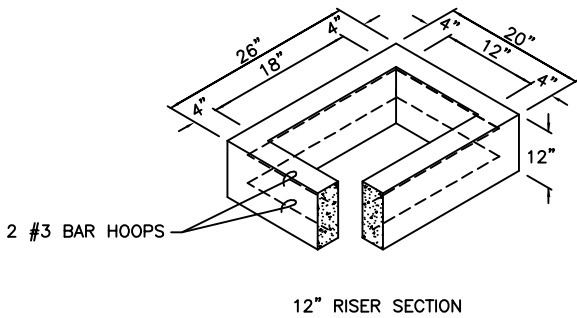
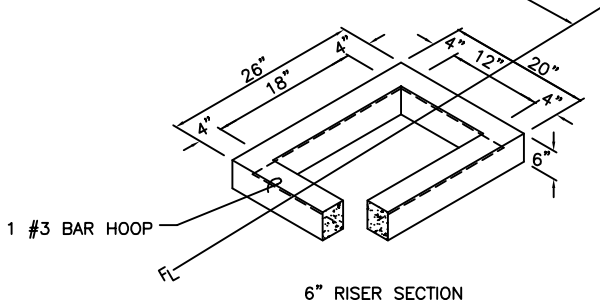
1. FOR USE IN NON-TRAFFIC AREAS ONLY, SUCH AS ENCLOSED YARDS IN PRIVATE RESIDENCES AND ENCLOSED PLAY AREAS IN SCHOOL GROUNDS.
2. FOR USE WITH 6" PIPES AND SMALLER, AND DEPTH LESS THAN 18".
3. LAST STRUCTURE BEFORE ROW HAS 18" MIN. SUMP DEPTH

CITY OF KIRKLAND	
PLAN NO. CK- D.05	
	YARD DRAIN

NOTES:


1. ALL REINFORCED CAST-IN-PLACE CONCRETE SHALL BE CLASS 4000.
2. PRECAST BASES SHALL BE FURNISHED WITH CUTOUTS OR KNOCKOUTS. KNOCKOUTS SHALL HAVE A WALL THICKNESS OF 2" MIN. ALL PIPE SHALL BE INSTALLED IN FACTORY PROVIDED KNOCKOUTS. UNUSED KNOCKOUTS NEED NOT BE GROUTED IF WALL IS LEFT INTACT.
3. KNOCKOUT OR CUTOUT HOLE SIZE IS EQUAL TO PIPE OUTER DIAM. PLUS CATCH BASIN WALL THICKNESS.
4. THE MAX. DEPTH FROM THE FINISHED GRADE TO THE PIPE INVERT IS 5'-0".
5. CATCH BASIN FRAME AND GRATE SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS. MATING SURFACES SHALL BE FINISHED TO ASSURE NON-ROCKING FIT WITH ANY COVER POSITION.
6. CHANNELLING OF ON-SITE CATCH BASINS MAY BE REQUIRED FOR PRIVATE STORM DRAINAGE CONVEYANCE SYSTEMS.

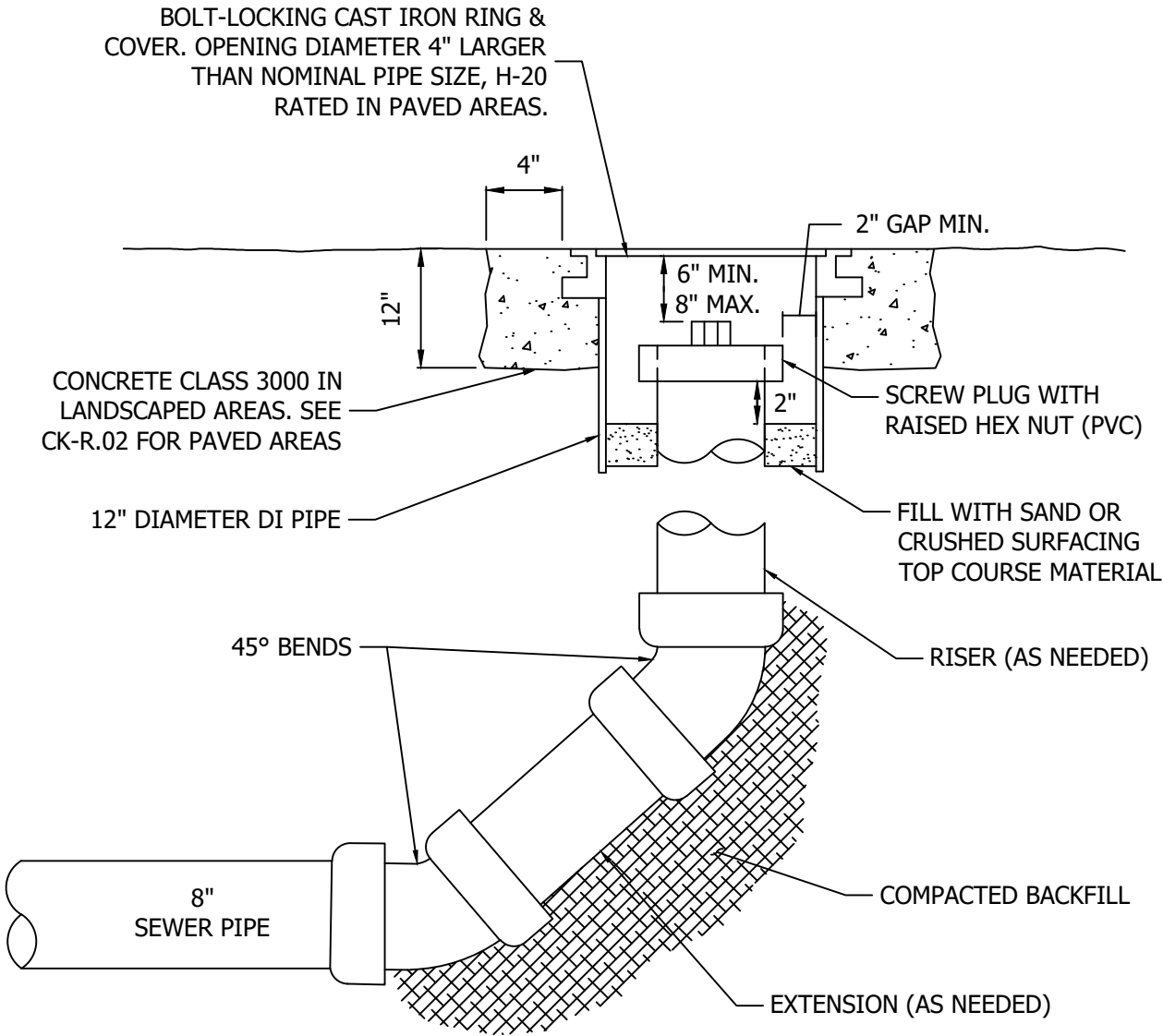
ALIGNMENT OF STRUCTURE TO PIPE FLOWLINE, TYP.



PRECAST BASE SECTION
(MEASUREMENT AT THE TOP
OF THE BASE)


NOT TO SCALE

CITY OF KIRKLAND	
PLAN NO. CK-D.05A	
	YARD DRAIN TYPE 40 FOR PRIVATE SYSTEMS

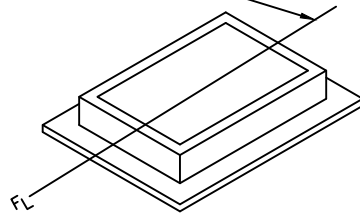


NOTES:

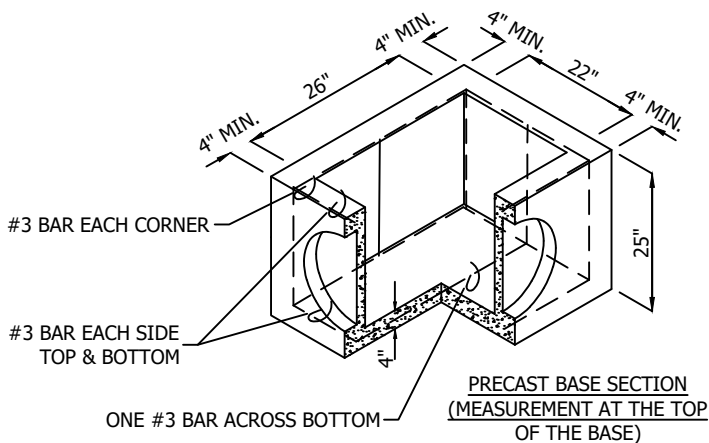
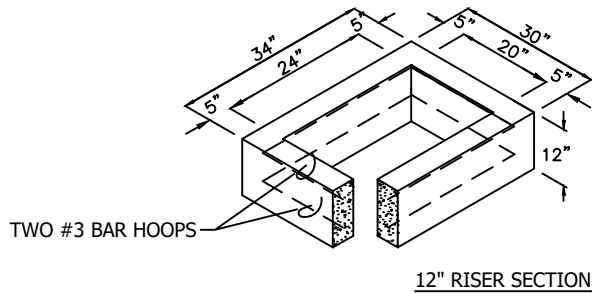
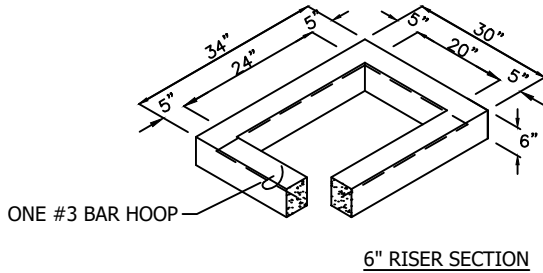
1. CAST IRON COVER SHALL READ EITHER "STORM" OR "DRAIN".
2. LOCKING BOLTS FOR COVER SHALL BE 5/8" -11 NC STAINLESS STEEL TYPE 304 SOCKET (ALLEN) HEAD BOLTS, 2 INCHES LONG.
3. ALL FITTINGS AND PIPE SHALL BE GASKETED (NOT GLUED). PIPE AND FITTING MATERIAL SHALL BE SDR 35.
4. WYE CONFIGURATION ONLY ALLOWED FOR PRIVATELY MAINTAINED SYSTEMS.

CITY OF KIRKLAND	
PLAN NO. CK - D.05B	
	CLEANOUT

ALIGNMENT OF STRUCTURE
TO PIPE FLOWLINE (TYP.)



FRAME AND GRATE (SEE APPLICABLE
STANDARD DETAILS CK-D.11 THROUGH D.16A.)



NOTES:

LAST REVISED: 01/2023

1. CONCRETE INLET TO BE CONSTRUCTED IN ACCORDANCE WITH ASTM C478 (AASHTO M 199) & C890 UNLESS OTHERWISE SHOWN ON PLANS OR NOTED IN THE STANDARD SPECIFICATIONS.
2. AS AN ACCEPTABLE ALTERNATIVE TO REBAR, WELDED WIRE FABRIC HAVING A MIN. AREA OF 0.12 SQUARE INCHES PER FOOT MAY BE USED. WELDED WIRE FABRIC SHALL COMPLY TO ASTM A497 (AASHTO M 221). WIRE FABRIC SHALL NOT BE PLACED IN KNOCKOUTS.
3. ALL REINFORCED CAST-IN-PLACE CONCRETE SHALL BE CLASS 4000.
4. PRECAST BASES SHALL BE FURNISHED WITH CUTOUTS OR KNOCKOUTS. KNOCKOUTS SHALL HAVE A WALL THICKNESS OF 2" MIN. ALL PIPE SHALL BE INSTALLED IN FACTORY PROVIDED KNOCKOUTS. UNUSED KNOCKOUTS NEED NOT BE GROUTED IF WALL IS LEFT INTACT.
5. KNOCKOUT OR CUTOUT HOLE SIZE IS EQUAL TO PIPE OUTER DIAM. PLUS CURB INLET WALL THICKNESS.
6. ROUND KNOCKOUTS MAY BE ON ALL 4 SIDES WITH MAX. DIAM. OF 16".
7. THE MAX. DEPTH FROM THE FINISHED GRADE TO THE PIPE INVERT IS 5'-0".
8. THE TAPER ON THE SIDES OF THE PRECAST BASE SECTION AND RISER SECTION SHALL NOT EXCEED 1/2" PER FOOT.
9. CONCRETE INLET FRAME AND GRATES SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS. MATING SURFACES SHALL BE FINISHED TO ASSURE NON-ROCKING FIT WITH ANY COVER POSITION.
10. FRAME AND GRATE SHALL BE INSTALLED WITH FLANGE DOWN.
11. APPROVAL BY THE CITY OF KIRKLAND REQUIRED.
12. CURB INLET MUST DRAIN TO CATCH BASIN WITH SUMP.
13. ALL NEW PVC PIPES SHALL BE INSTALLED WITH SAND COLLARS AND A NON-SHRINK GROUT. JETSET OR SPEED CRETE RED LINE GROUT NOT ALLOWED.
14. 1", 2", AND 4" RISERS ACCEPTED AS NEEDED.
15. MINIMUM 10' FROM ADJACENT TREES, UNLESS OTHERWISE APPROVED.

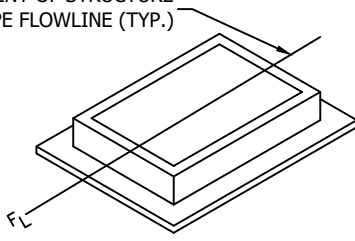
CITY OF KIRKLAND

PLAN NO. CK - D.06

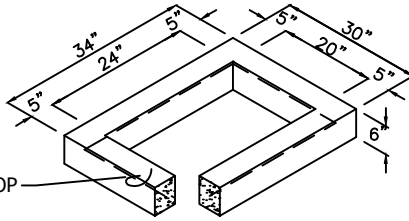


CURB INLET

ALIGNMENT OF STRUCTURE TO PIPE FLOWLINE (TYP.)

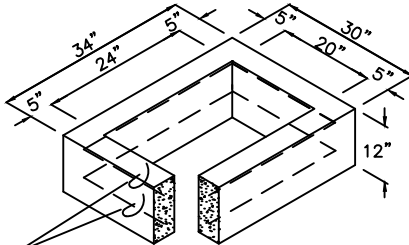


FRAME AND GRATE
(SEE STANDARD DETAILS D.11 THROUGH D.16A)



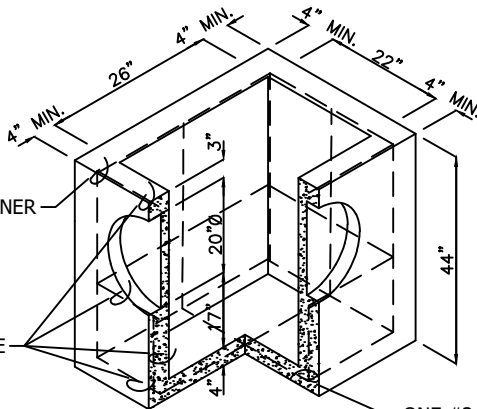
ONE #3 BAR HOOP

6" RISER SECTION



TWO #3 BAR HOOPS

12" RISER SECTION



#3 BAR EACH CORNER

#3 BAR EACH SIDE

ONE #3 BAR EACH WAY

PRECAST BASE SECTION
(MEASUREMENT AT THE TOP OF THE BASE)

NOTES:

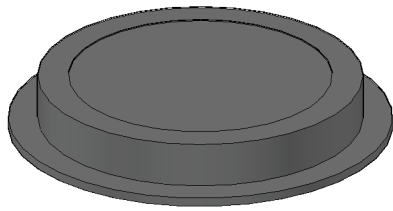
- CATCH BASINS SHALL BE CONSTRUCTED IN ACCORDANCE WITH ASTM C478 (AASHTO M 199) & C890 UNLESS OTHERWISE SHOWN ON PLANS OR NOTED IN THE STANDARD SPECIFICATIONS.
- AS AN ACCEPTABLE ALTERNATIVE TO REBAR, WELDED WIRE FABRIC HAVING A MIN. AREA OF 0.12 SQUARE INCHES PER FOOT MAY BE USED. WELDED WIRE FABRIC SHALL COMPLY TO ASTM A497 (AASHTO M 221). WIRE FABRIC SHALL NOT BE PLACED IN KNOCKOUTS.
- ALL REINFORCED CAST-IN-PLACE CONCRETE SHALL BE CLASS 4000.
- PRECAST BASES SHALL BE FURNISHED WITH CUTOUTS OR KNOCKOUTS. KNOCKOUTS SHALL HAVE A WALL THICKNESS OF 2" MIN. ALL PIPE SHALL BE INSTALLED IN FACTORY PROVIDED KNOCKOUTS. UNUSED KNOCKOUTS NEED NOT BE GROUTED IF WALL IS LEFT INTACT.
- KNOCKOUT OR CUTOUT HOLE SIZE IS EQUAL TO PIPE OUTER DIAM. PLUS CATCH BASIN WALL THICKNESS.
- ROUND KNOCKOUTS MAY BE ON ALL 4 SIDES, WITH MAX. DIAM. OF 20". KNOCKOUTS MAY BE EITHER ROUND OR "D" SHAPE.
- THE MAX. DEPTH FROM THE FINISHED GRADE TO THE PIPE INVERT IS 5'-0".
- THE TAPER ON THE SIDES OF THE PRECAST BASE SECTION AND RISER SECTION SHALL NOT EXCEED 1/2" PER FOOT.
- CATCH BASIN FRAME AND GRATE SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS. MATING SURFACES SHALL BE FINISHED TO ASSURE NON-ROCKING FIT WITH ANY COVER POSITION.
- FRAME AND GRATE SHALL BE INSTALLED WITH FLANGE DOWN.
- EDGE OF RISER OR BRICK SHALL NOT BE MORE THAN 2" FROM VERTICAL EDGE OF CATCH BASIN WALL.
- ACCEPTABLE PIPE SIZES ARE 8", 12" OR 15". 6" PIPE IS ONLY ACCEPTABLE ON PRIVATE SYSTEMS.
- ROUND SOLID LIDS REQUIRED WHENEVER CATCH BASIN DOES NOT COLLECT SURFACE WATER. SEE CK-D.18 AND CK-D.18A FOR REFERENCE.
- ROUND CONCRETE RISERS ARE REQUIRED FOR ROUND SOLID LOCKING LIDS.
- ALL NEW PVC PIPES SHALL BE INSTALLED WITH SAND COLLARS AND A NON-SHRINK GROUT. JETSET OR SPEED CRETE RED LINE GROUT NOT ALLOWED.
- 1", 2", AND 4" RISERS ACCEPTED AS NEEDED.
- MINIMUM 10' FROM ADJACENT TREES, UNLESS OTHERWISE APPROVED.
- CLEAN SURFACE AND BOTTOM AREA. PROVIDE UNIFORM CONTACT. THE SURFACE AREA OF THE BASE SECTION MUST BE MORTARED TO THE BOTTOM AREA OF THE RISER SECTION.

CITY OF KIRKLAND

PLAN NO. CK - D.07



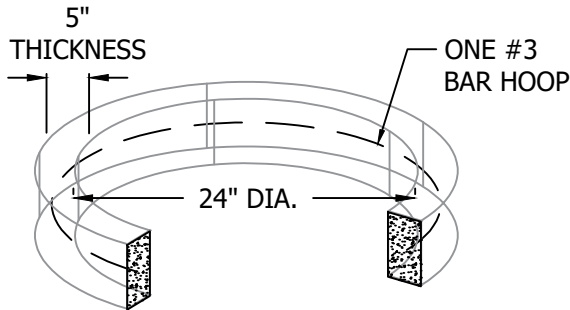
CATCH BASIN
TYPE 1



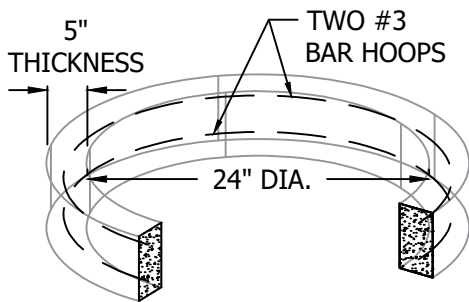
FRAME AND GRATE
(SEE STANDARD DETAILS
D.18 AND D.18A)

NOTES:

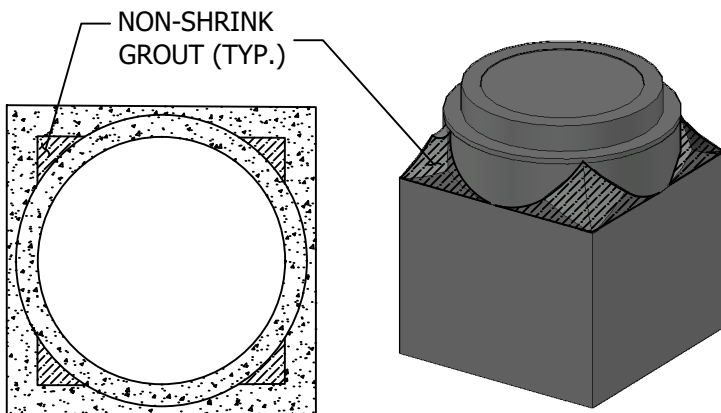
1. GROUT SHALL BE APPLIED BETWEEN ALL MATING SURFACES TO ENSURE A WATER TIGHT SEAL AND STRONG BOND.
2. COMMERCIALY AVAILABLE CONVERTER FROM RECTANGULAR STRUCTURE TO CIRCULAR RISER MAY BE USED IF APPROVED BY PUBLIC WORKS DEPARTMENT.
3. 1", 2", AND 4" RISERS ACCEPTED AS NEEDED.



6" RISER SECTION



12" RISER SECTION



TRANSITION DETAIL
2-D PLAN VIEW

TRANSITION DETAIL
3-D CONCEPTUAL
VIEW

CITY OF KIRKLAND

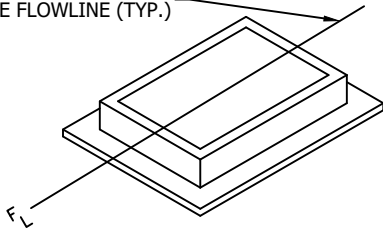
PLAN NO. CK - D.07A



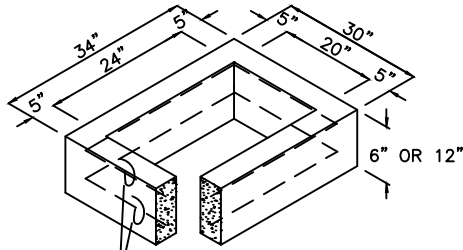
CIRCULAR RISER
AND TRANSITION FOR
TYPE 1 AND 1-L CB

NOTES

ALIGNMENT OF STRUCTURE TO PIPE FLOWLINE (TYP.)

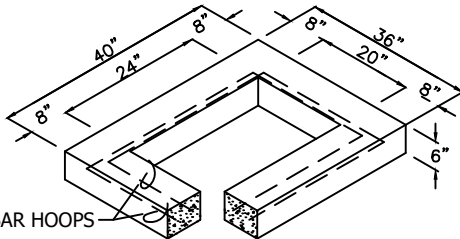


FRAME AND GRATE (SEE APPLICABLE STANDARD DETAILS CK-D.11 THROUGH D.16)



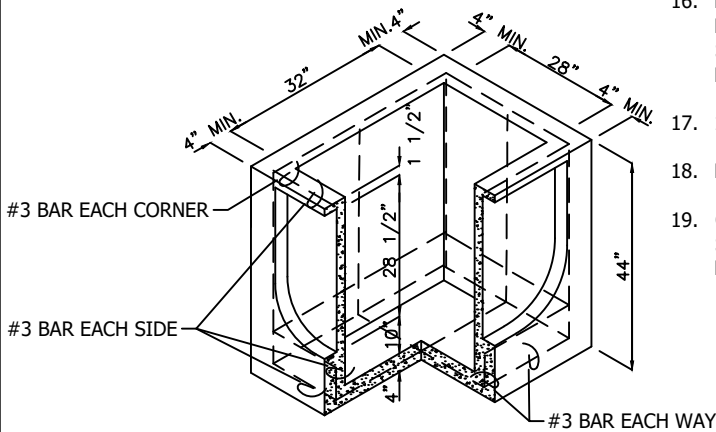
ONE #3 BAR HOOP FOR 6"
TWO #3 BAR HOOPS FOR 12"

RISER SECTION



TWO #3 BAR HOOPS

6" REDUCING SECTION



#3 BAR EACH CORNER

#3 BAR EACH SIDE

#3 BAR EACH WAY

PRECAST BASE SECTION
(MEASUREMENT AT THE
TOP OF THE BASE)

1. CATCH BASINS SHALL BE CONSTRUCTED IN ACCORDANCE WITH ASTM C478 (AASHTO M 199) & C890 UNLESS OTHERWISE SHOWN ON PLANS OR NOTED IN THE STANDARD SPECIFICATIONS.
2. AS AN ACCEPTABLE ALTERNATIVE TO REBAR, WELDED WIRE FABRIC HAVING A MIN. AREA OF 0.12 SQUARE INCHES PER FOOT MAY BE USED. WELDED WIRE FABRIC SHALL COMPLY TO ASTM A497 (AASHTO M 221). WIRE FABRIC SHALL NOT BE PLACED IN KNOCKOUTS.
3. ALL REINFORCED CAST-IN-PLACE CONCRETE SHALL BE CLASS 4000.
4. PRECAST BASES SHALL BE FURNISHED WITH CUTOUTS OR KNOCKOUTS. KNOCKOUTS SHALL HAVE A WALL THICKNESS OF 2" MIN. ALL PIPE SHALL BE INSTALLED IN FACTORY PROVIDED KNOCKOUTS. UNUSED KNOCKOUTS NEED NOT BE GROUTED IF WALL IS LEFT INTACT.
5. KNOCKOUT OR CUTOUT HOLE SIZE IS EQUAL TO PIPE OUTER DIAM. PLUS CATCH BASIN WALL THICKNESS.
6. KNOCKOUTS MAY BE ON ALL 4 SIDES WITH MAX. DIAM. OF 28". KNOCKOUTS MAY BE EITHER ROUND OR "D" SHAPE.
7. THE TAPER ON THE SIDES OF THE PRECAST BASE SECTION AND RISER SECTION SHALL NOT EXCEED 1/2" PER FOOT.
8. CATCH BASIN FRAME AND GRATE SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS. MATING SURFACES SHALL BE FINISHED TO ASSURE NON-ROCKING FIT WITH ANY COVER POSITION.
9. FRAME AND GRATE SHALL BE INSTALLED WITH FLANGE DOWN.
10. MAX. DEPTH FROM FINISHED GRADE TO PIPE INVERT SHALL BE 5'-0".
11. EDGE OF REDUCING SECTION OR BRICK SHALL NOT BE MORE THAN 2" FROM VERTICAL EDGE OF CATCH BASIN WALL.
12. ACCEPTABLE PIPE SIZES ARE 8", 12", 15" OR 18". 6" PIPE IS ONLY ACCEPTABLE ON PRIVATE SYSTEMS.
13. ROUND SOLID LOCKING LIDS REQUIRED WHENEVER CATCH BASIN DOES NOT COLLECT SURFACE WATER, OR WHEN LOCATED IN SIDEWALK AND PLANTER AREAS. SEE CK-D.18 AND CK-D.18A FOR REFERENCE.
14. ROUND CONCRETE RISERS ARE REQUIRED FOR ROUND SOLID LOCKING LIDS.
15. ALL NEW PVC PIPES SHALL BE INSTALLED WITH SAND COLLARS AND A NON-SHRINK GROUT. JETSET OR SPEED CRETE RED LINE GROUT NOT ALLOWED.
16. MAXIMUM RISE OF 20" X 24" RISER THROAT SHALL BE 12". IF MORE RISE IS NEEDED IT SHALL BE PROVIDED WITH AN ADDITIONAL RISER SECTION(S) BENEATH THE REDUCING SLAB, IF REDUCING SLAB IS REQUIRED.
17. 1", 2", AND 4" RISERS ACCEPTED AS NEEDED.
18. MINIMUM 10' FROM ADJACENT TREES, UNLESS OTHERWISE APPROVED.
19. CLEAN SURFACE AND BOTTOM AREA. PROVIDE UNIFORM CONTACT. THE SURFACE AREA OF THE BASE SECTION MUST BE MORTARED TO THE BOTTOM AREA OF THE RISER SECTION.

CITY OF KIRKLAND

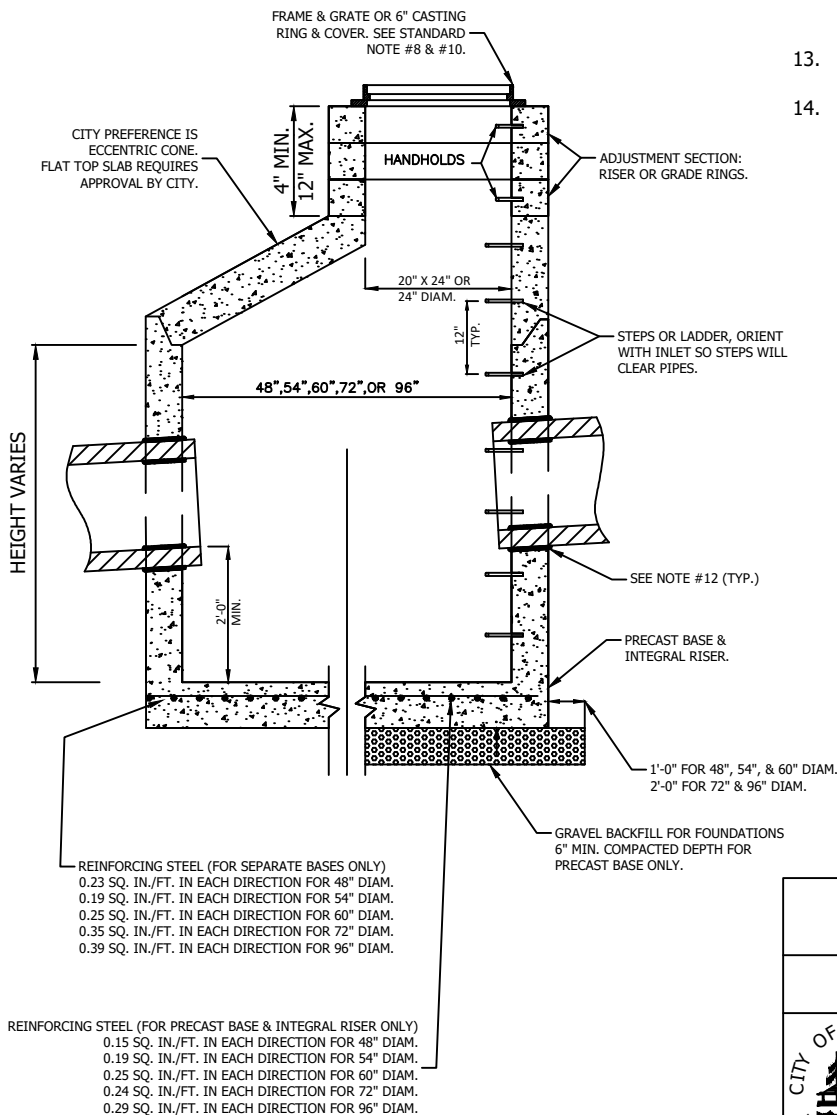
PLAN NO. CK - D.08




CATCH BASIN
TYPE 1-L

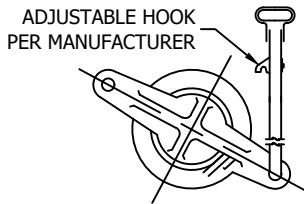
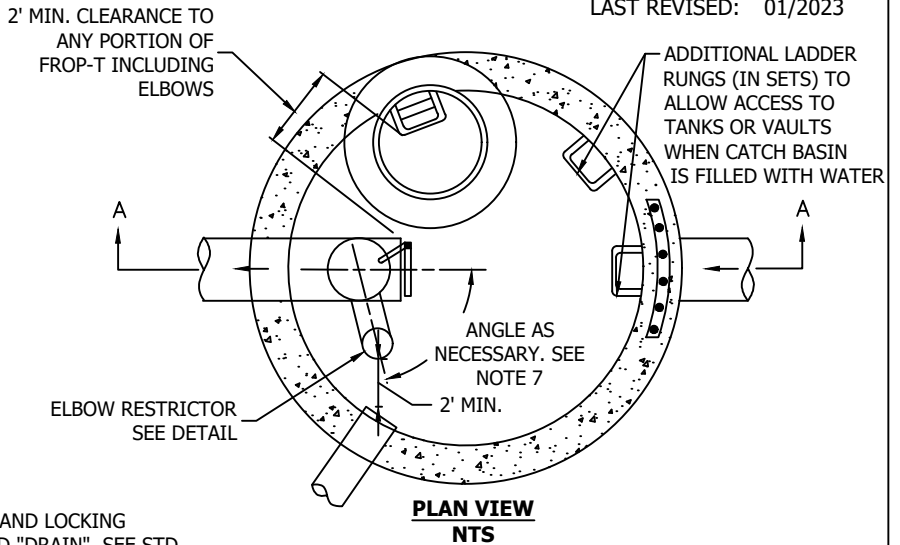
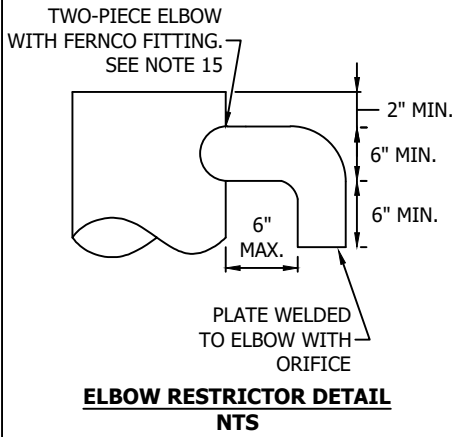
NOTES:

1. CATCH BASINS SHALL BE CONSTRUCTED IN ACCORDANCE WITH ASTM C478 (AASHTO M199) AND ASTM C890 UNLESS OTHERWISE SHOWN ON PLANS OR NOTED IN THE STANDARD SPECIFICATIONS.
2. HANDHOLDS IN ADJUSTMENT SECTION SHALL HAVE 3" MIN. CLEARANCE. STEPS IN CATCH BASIN SHALL HAVE 6" MIN. CLEARANCE. SEE STD. DTL. NO. CK-D.12, CATCH BASIN DETAILS. HANDHOLDS SHALL BE PLACED IN ALTERNATING GRADE RINGS OR LEVELING BRICK COURSE WITH A MIN. OF ONE HANDHOLD BETWEEN THE LAST STEP AND TOP OF THE FINISHED GRADE.
3. ALL CONCRETE SHALL BE CLASS 4000.
4. PRECAST BASES SHALL BE FURNISHED WITH CUTOUTS OR KNOCKOUTS. KNOCKOUTS SHALL HAVE WALL THICKNESS OF 2" MIN TO 2.5" MAX. UNUSED KNOCKOUTS NEED NOT BE GROUTED IF WALL IS LEFT INTACT. PIPES SHALL BE INSTALLED ONLY IN FACTORY KNOCKOUTS UNLESS OTHERWISE APPROVED BY THE ENGINEER.
5. CATCH BASIN FRAMES AND GRATES OR COVERS SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. MATING SURFACES SHALL BE FINISHED TO ASSURE NON-ROCKING FIT WITH ANY COVER POSITION.
6. ALL BASE REINFORCING STEEL SHALL HAVE A MIN. YIELD STRENGTH OF 60,000 PSI AND BE PLACED IN THE UPPER HALF OF THE BASE WITH 1" MIN. CLEARANCE.
7. MIN. SOIL BEARING VALUE SHALL EQUAL 3,300 POUNDS PER SQUARE FOOT.
8. SEE CITY OF KIRKLAND PRE-APPROVED PLAN CK-D.11 FOR FRAME AND GRATE ADJUSTMENT, CK-D.12 FOR COVER AND LADDER, CK-D.14 FOR VANED GRATE, CK-D.16/16A FOR CURB INSTALLATION.
9. ALL MANHOLE JOINTS SHALL USE A CONFINED RUBBER GASKET AND GROUTED (INSIDE AND OUT) TO MEET ASTM C-443 SPECIFICATIONS.
10. ROUND SOLID LOCKING LIDS REQUIRED WHENEVER CATCH BASIN DOES NOT COLLECT SURFACE WATER, OR WHEN LOCATED IN SIDEWALK AND PLANTER AREAS. SEE CK-D.18, CK-D.18A, AND CK-D.18B FOR REFERENCE.
11. ROUND CONCRETE RISERS ARE REQUIRED FOR ROUND SOLID LOCKING LIDS.
12. ALL NEW PIPES SHALL BE INSTALLED WITH EITHER A KOR-N-SEAL BOOT, OR SAND COLLARS AND A NON-SHRINK GROUT. JETSET OR SPEED CRETE RED LINE GROUT NOT ALLOWED.
13. MINIMUM 10' FROM ADJACENT TREES, UNLESS OTHERWISE APPROVED.
14. ALL RISERS WILL BE WET SET IN GROUT, AND SMOOTHED INSIDE AND OUT PRIOR TO BEING BURIED.



CATCH BASIN DIMENSIONS				
CATCH BASIN DIAMETER	MIN. WALL THICKNESS	MIN. BASE THICKNESS	MAXIMUM KNOCKOUT SIZE	MINIMUM DISTANCE BETWEEN KNOCKOUTS
48"	4"	6"	36"	8"
54"	4.5"	8"	42"	8"
60"	5"	8"	48"	8"
72"	6"	8"	60"	12"
84"	8"	12"	72"	12"
96"	8"	12"	84"	12"

CITY OF KIRKLAND	
PLAN NO. CK - D.09	
	CATCH BASIN
	TYPE 2
48", 54", 60", 72", 96"	

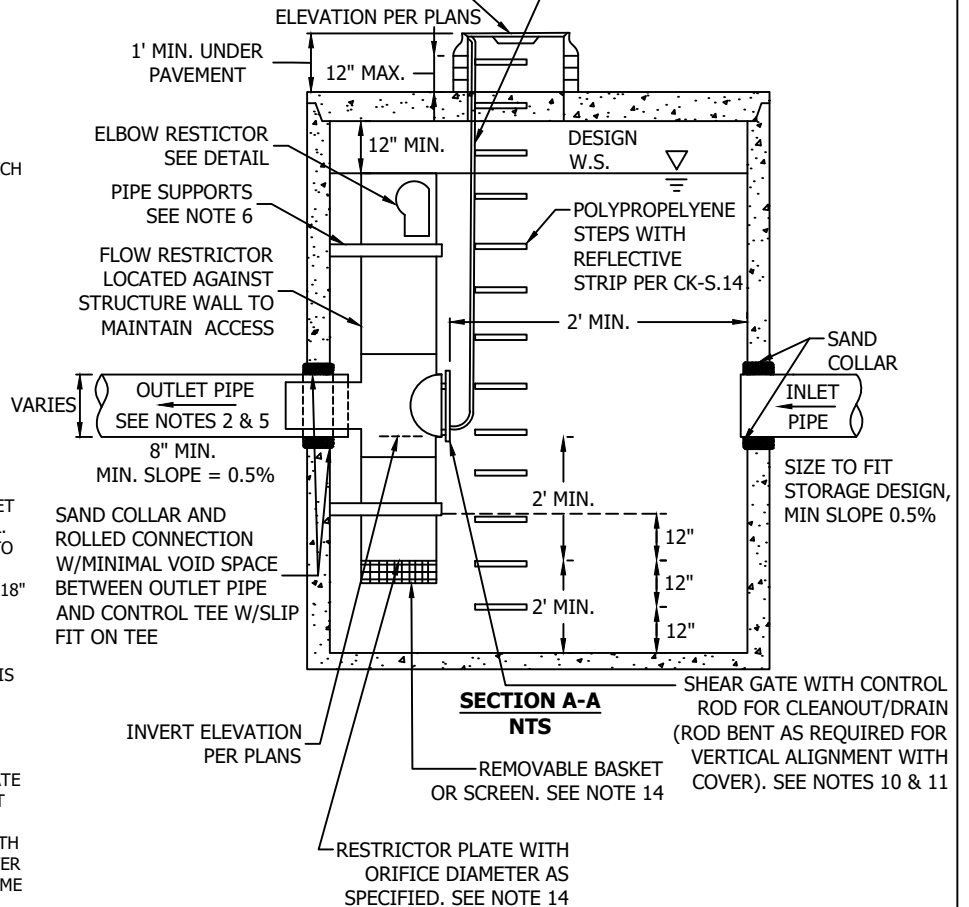


FRAME GRATE AND LOCKING COVER MARKED "DRAIN". SEE STD. DWG. CK-D.18, -D.18A, OR -D.18B. OFFSET MANHOLE OR CATCH BASIN LID SO THAT RESTRICTOR/SEPARATOR DEVICE IS 75% VISIBLE.

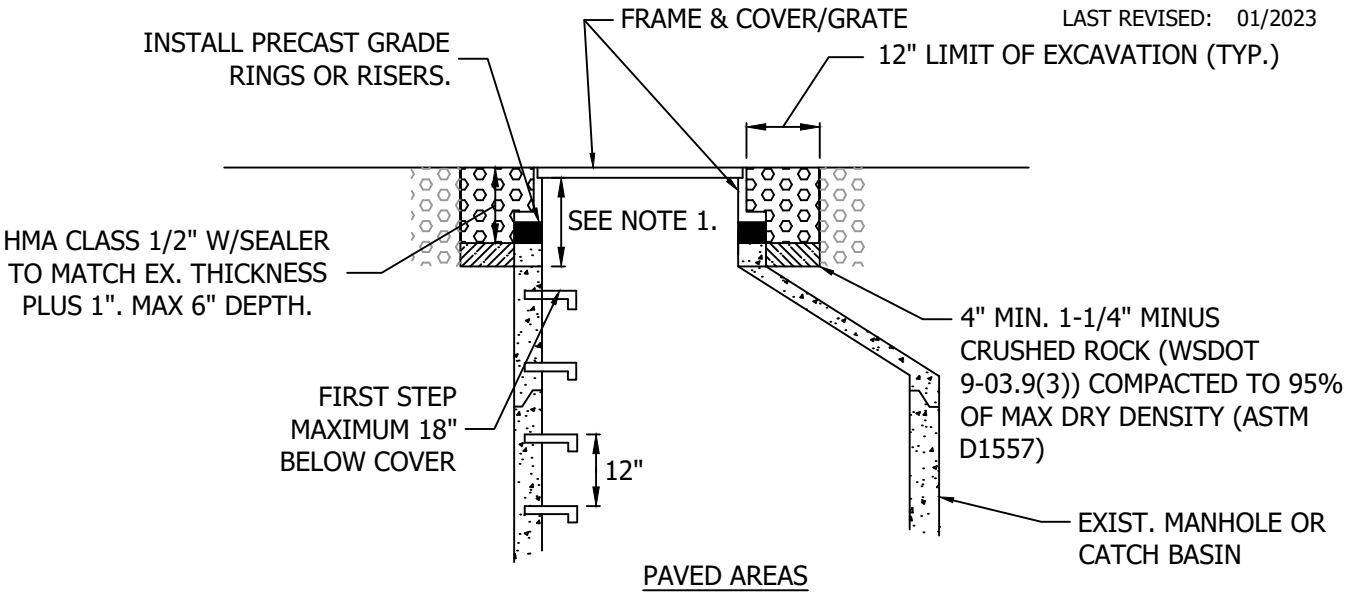
SECURE HANDLE OUT OF WAY OF LADDER. TO BE FIELD ADJUSTED PER MANUFACTURER

NOTES:

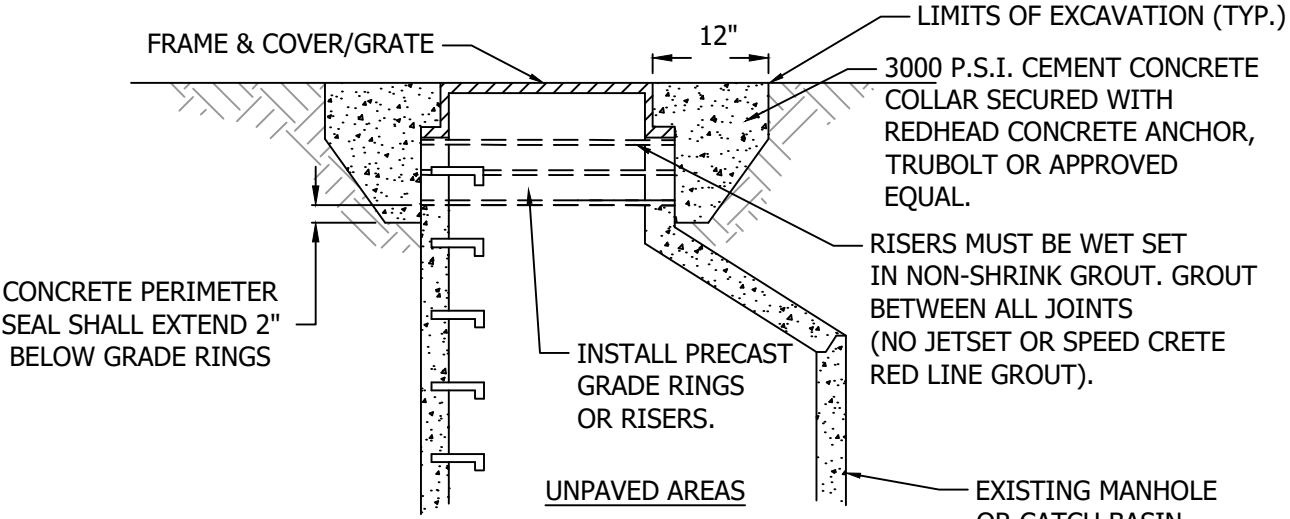
1. USE A MINIMUM OF A 54" DIAMETER TYPE-II CATCH BASIN.
2. OUTLET CAPACITY: 100-YEAR DEVELOPED PEAK FLOW.
3. METAL PARTS SHALL BE CORROSION RESISTANT, EITHER ALUMINUM OR STAINLESS STEEL. RISER STRUCTURE MATERIAL SHALL BE ALUMINUM. FASTENERS MAY BE STAINLESS STEEL.
4. FRAME & LADDER OR STEPS TO OFFSET SO:
 - A. CLEANOUT GATE IS VISIBLE FROM TOP.
 - B. CLIMB-DOWN SPACE IS CLEAR OF RISER AND CLEANOUT GATE.
 - C. FRAME IS CLEAR OF CURB.
5. IF METAL OUTLET PIPE CONNECTS TO CEMENT CONCRETE PIPE: OUTLET PIPE TO HAVE SMOOTH O.D. EQUAL TO CONCRETE PIPE I.D. LESS 1/4".
6. PROVIDE TWO 3" X 0.100 GAGE SUPPORT BRACKET BOLTED OR EMBEDDED 2" INTO CONCRETE WALL.
7. LOCATE ELBOW RESTRICTOR(S) AS NECESSARY TO PROVIDE MINIMUM CLEARANCE AS SHOWN.
8. TOP HAND HOLD SHALL BE LOCATED LESS THAN 18" BELOW FINISHED GRADE.
9. LOCATE ADDITIONAL LADDER RUNGS IN STRUCTURES USED AS ACCESS TO TANKS OR VAULTS TO ALLOW ACCESS WHEN CATCH BASIN IS FILLED WITH WATER.
10. SHEAR GATE SHALL BE PRODUCT MADE OF CAST ALUMINUM (NO CAST IRON).
11. GATE SHALL BE 8" OR LARGER IN DIAMETER FOR OUTLET PIPES SMALLER THAN 23" DIAMETER. GATE SHALL BE 12" OR LARGER DIAMETER FOR OUTLET PIPES 24" DIAMETER AND LARGER.
12. LIFT ROD: AS SPECIFIED BY MANUFACTURER. WITH HANDLE TENDING TO WITHIN ONE FOOT OF COVER AND ADJUSTABLE HOOK LOCK FASTENED TO FRAME OR UPPER HANDHOLD.
13. FILL CATCH BASIN TO INVERT LEVEL OF OUTFLOW PIPE TO PREVENT ANY OIL ESCAPING.
14. REMOVABLE BASKET OR SCREEN REQUIRED REGARDLESS OF BOTTOM ORIFICE SIZE. ALUMINUM MESH, 8" DEPTH, MIN. 3 STAINLESS STEEL SCREWS, 0.5" EXPANDED SHEET MESH TYPICAL.
15. CITY OF KIRKLAND REQUIRES ELBOW AND FERNCO, INDIANA SEAL OR EQUIVALENT TO BE REMOVABLE.
16. ALL NEW PVC PIPES SHALL BE INSTALLED WITH SAND COLLARS AND A NON-SHRINK GROUT. JETSET OR SPEED CRETE RED LINE GROUT NOT ALLOWED.
17. MINIMUM 10' FROM ADJACENT TREES, UNLESS OTHERWISE APPROVED.



CITY OF KIRKLAND	
PLAN NO. CK - D.10	
	CATCH BASIN-TYPE 2 W/OIL SEPARATOR FLOW RESTRICTOR



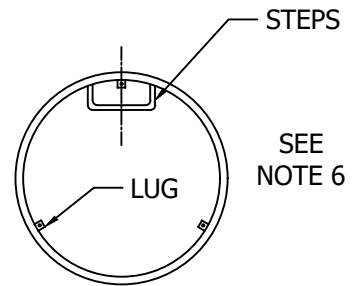
PAVED AREAS




UNPAVED AREAS

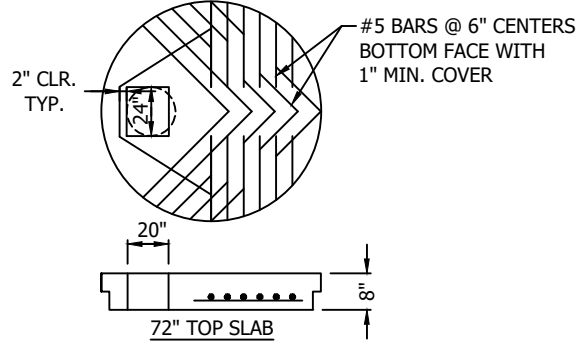
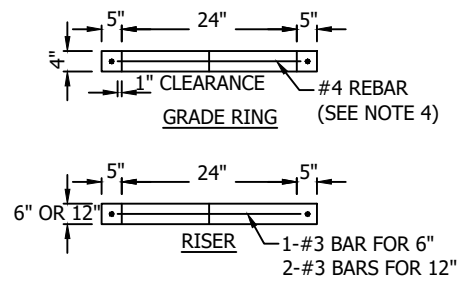
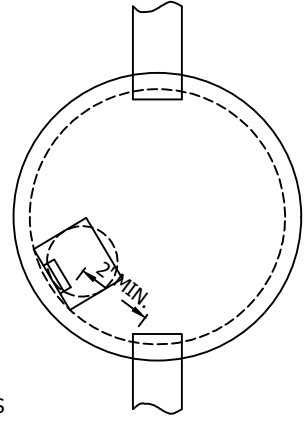
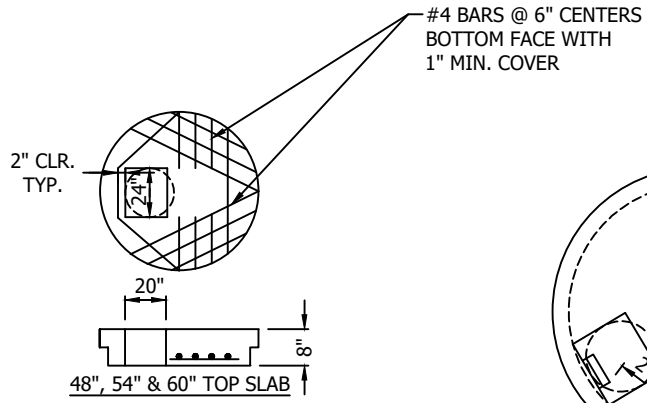
NOTES:

1. WHERE DEPTH OF NECK EXCEEDS 18 INCHES (INCLUDING FRAME AND COVER), ADJUST MANHOLE/CATCH BASIN TO GRADE BY INSERTING NEW BARREL SECTION BETWEEN THE CONE/SLAB AND EXISTING BARREL.
2. GRADE RINGS, RISERS AND FRAME SHALL BE SET IN 3/4" NON-SHRINK GROUT, GROUT BETWEEN ALL JOINTS. ALL SURFACES MUST BE CLEAN OF DEBRIS AND DIRT, AND WETTED PRIOR TO GROUTING. GROUT SMOOTH INSIDE AND OUTSIDE SURFACES PRIOR TO BACKFILL.
3. STEPS OR HAND HOLDS SHALL BE ADDED PER ASTM C478.
4. PRECAST GRADE RINGS AND RISERS MUST BE CAST WITH GROOVE TO ALLOW FIELD INSTALLATION OF SAFETY STEP WHEN RISER IS 4" OR HIGHER.
5. REPLACE EXISTING FRAME AND COVER/GRATE IF NOT MEETING CURRENT SPECIFICATIONS.
6. IF REQUIRED: LOCKING MH SHALL BE POSITIONED WITH ONE LUG CENTERED OVER STEPS, UNLESS USING CK-D.18A CASTING.

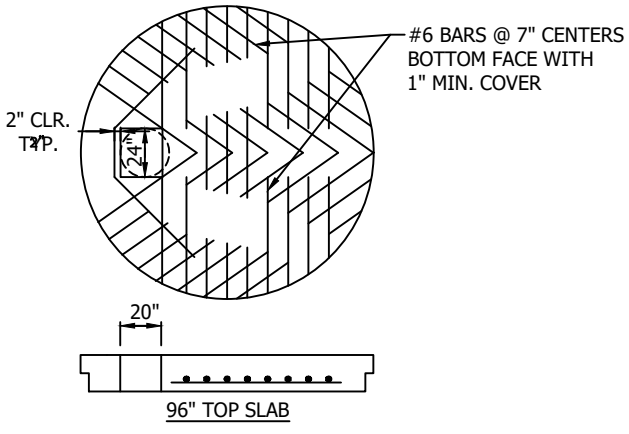
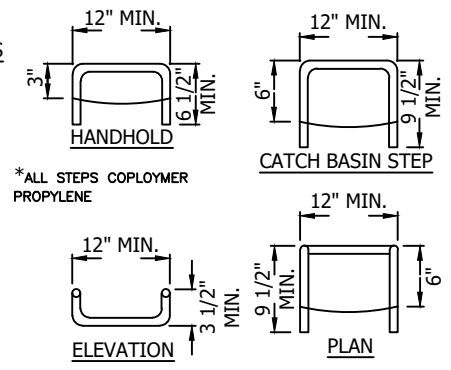


LOCKING MH FRAME
PLAN VIEW

CITY OF KIRKLAND	
PLAN NO. CK - D.11	
	MANHOLE/CB FRAME AND GRATE ADJUSTMENT

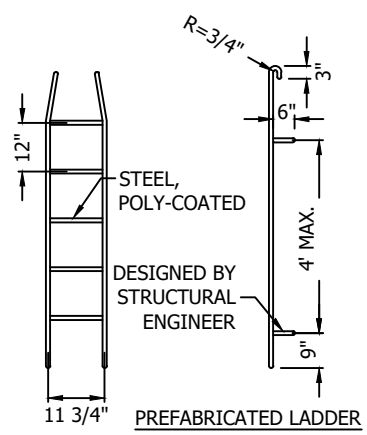



TYPICAL ORIENTATION FOR ACCESS AND STEPS



DROP RUNG CATCH BASIN STEP

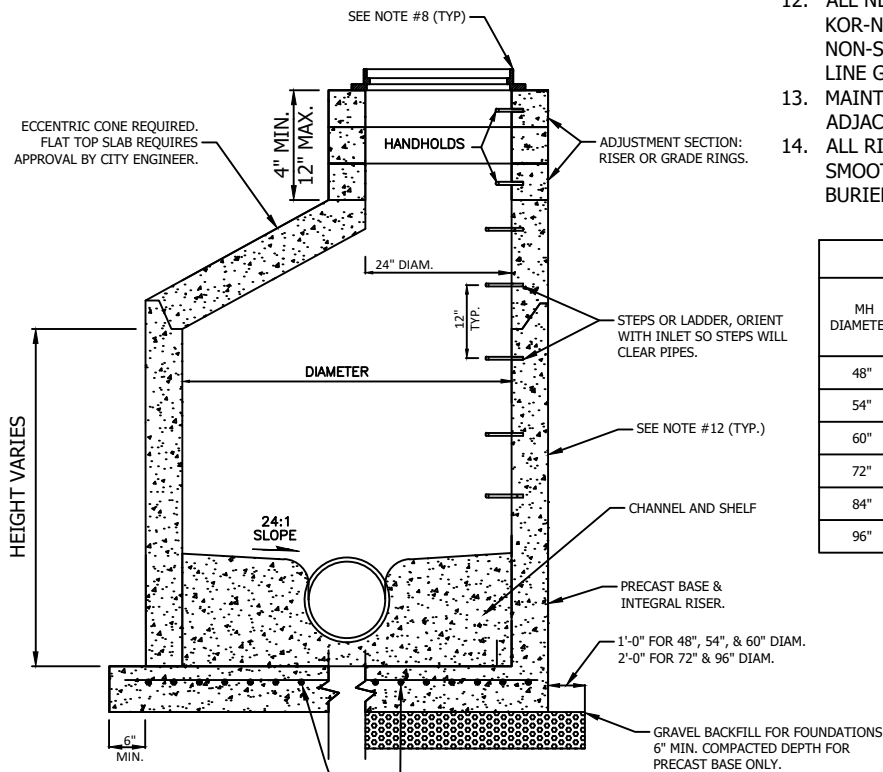
- NOTES:**
1. PROPRIETARY CATCH BASIN HANDHOLDS AND STEPS ARE ACCEPTABLE, PROVIDED THAT THEY CONFORM TO SEC. R, ASTM C478, AASHTO M-199 AND MEET ALL WISHA REQUIREMENTS. RETRO-REFLECTIVE MARKERS REQUIRED AT EACH END OF STEPS AND HAND-HOLDS.
 2. CATCH BASIN STEP/HANDHOLD LEGS SHALL BE PARALLEL OR APPROXIMATELY RADIAL AT THE OPTION OF THE MANUFACTURER, EXCEPT THAT ALL STEPS IN ANY CATCH BASIN SHALL BE SIMILAR. PENETRATION OF OUTER WALL BY A LEG IS PROHIBITED.
 3. HANDHOLDS AND STEPS SHALL HAVE "DROP" RUNGS AS SHOWN ON DETAIL OR PROTUBERANCES TO PREVENT SIDEWAYS SLIP.
 4. SLAB OPENING MAY BE 24" X 20" RECTANGLE FOR CATCH BASIN OR 24" DIAM. CIRCLE FOR MANHOLE.
 5. AS AN ACCEPTABLE ALTERNATIVE TO REBAR, WELDED WIRE FABRIC HAVING A MIN. AREA OF 0.12 SQUARE INCHES PER FOOT MAY BE USED. WELDED WIRE FABRIC SHALL COMPLY TO ASTM A497.
 6. LADDERS OR STEPS SHALL EXTEND TO WITHIN 16" OF BOTTOM OF CATCH BASIN.
 7. HANGING LADDERS SHALL BE PERMANENTLY FASTENED AT TOP BY HANGING ON STEP AND BY BOLTING.
 8. ADDITIONAL SAFETY FEATURES MAY BE REQUIRED IN VERY DEEP OR UNUSUAL STRUCTURES.



CITY OF KIRKLAND	
PLAN NO. CK - D.12	
	CATCH BASIN INLET PRECAST COVER AND EXTENSION UNITS

NOTES:

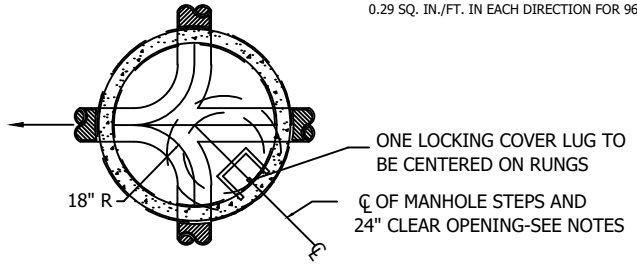
1. CATCH BASINS SHALL BE CONSTRUCTED IN ACCORDANCE WITH ASTM C478 (AASHTO M199) AND ASTM C890 UNLESS OTHERWISE SHOWN ON PLANS OR NOTED IN THE STANDARD SPECIFICATIONS.
2. HANDHOLDS IN ADJUSTMENT SECTION SHALL HAVE 3" MIN. CLEARANCE. STEPS IN CATCH BASIN SHALL HAVE 6" MIN. CLEARANCE. SEE STD. DTL. NO. CK-D.12. HANDHOLDS SHALL BE PLACED IN ALTERNATING GRADE RINGS OR LEVELING BRICK COURSE WITH A MIN. OF ONE HANDHOLD BETWEEN THE LAST STEP AND TOP OF THE FINISHED GRADE.
3. ALL CONCRETE SHALL BE CLASS 4000.
4. PRECAST BASES SHALL BE FURNISHED WITH CUTOUTS OR KNOCKOUTS. KNOCKOUTS SHALL HAVE WALL THICKNESS OF 2" MIN TO 2.5" MAX. UNUSED KNOCKOUTS NEED NOT BE GROUTED IF WALL IS LEFT INTACT. PIPES SHALL BE INSTALLED ONLY IN FACTORY KNOCKOUTS UNLESS OTHERWISE APPROVED BY THE ENGINEER.
5. CATCH BASIN FRAMES AND GRATES OR COVERS SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. MATING SURFACES SHALL BE FINISHED TO ASSURE NON-ROCKING FIT WITH ANY COVER POSITION.
6. ALL BASE REINFORCING STEEL SHALL HAVE A MIN. YIELD STRENGTH OF 60,000 PSI AND BE PLACED IN THE UPPER HALF OF THE BASE WITH 1" MIN. CLEARANCE.
7. MIN. SOIL BEARING VALUE SHALL EQUAL 3,300 POUNDS PER SQUARE FOOT.
8. SEE CITY OF KIRKLAND PRE-APPROVED PLAN CK-D.11 FOR FRAME AND GRATE ADJUSTMENT, CK-D.12 FOR COVER AND LADDER, CK-D.14 FOR VANED GRATE, CK-D.16/16A FOR CURB INSTALLATION.
9. ALL MANHOLE JOINTS SHALL USE A CONFINED RUBBER GASKET AND GROUTED (INSIDE AND OUT) TO MEET ASTM C-443 SPECIFICATIONS.
10. ROUND SOLID LOCKING LIDS REQUIRED WHENEVER CATCH BASIN DOES NOT COLLECT SURFACE WATER, OR WHEN LOCATED IN SIDEWALK AND PLANTER AREAS. SEE CK-D.18, CK-D.18A, AND CK-D.18B FOR REFERENCE.
11. ROUND CONCRETE RISERS ARE REQUIRED.
12. ALL NEW PIPES SHALL BE INSTALLED WITH EITHER A KOR-N-SEAL BOOT, OR SAND COLLARS AND A NON-SHRINK GROUT. JETSET OR SPEED CRETE RED LINE GROUT NOT ALLOWED.
13. MAINTENANCE HOLE SHALL BE A MINIMUM 10' FROM ADJACENT TREES, UNLESS OTHERWISE APPROVED.
14. ALL RISERS WILL BE WET SET IN GROUT, AND SMOOTHED INSIDE AND OUT PRIOR TO BEING BURIED.



REINFORCING STEEL (FOR SEPARATE BASES ONLY)
 0.23 SQ. IN./FT. IN EACH DIRECTION FOR 48" DIAM.
 0.19 SQ. IN./FT. IN EACH DIRECTION FOR 54" DIAM.
 0.25 SQ. IN./FT. IN EACH DIRECTION FOR 60" DIAM.
 0.35 SQ. IN./FT. IN EACH DIRECTION FOR 72" DIAM.
 0.39 SQ. IN./FT. IN EACH DIRECTION FOR 96" DIAM.

REINFORCING STEEL (FOR PRECAST BASE & INTEGRAL RISER ONLY)
 0.15 SQ. IN./FT. IN EACH DIRECTION FOR 48" DIAM.
 0.19 SQ. IN./FT. IN EACH DIRECTION FOR 54" DIAM.
 0.25 SQ. IN./FT. IN EACH DIRECTION FOR 60" DIAM.
 0.24 SQ. IN./FT. IN EACH DIRECTION FOR 72" DIAM.
 0.29 SQ. IN./FT. IN EACH DIRECTION FOR 96" DIAM.

MAINTENANCE HOLE DIMENSIONS					
MH DIAMETER	MIN. WALL THICKNESS	MIN. BASE THICKNESS	MAXIMUM KNOCKOUT SIZE	MINIMUM DISTANCE BETWEEN KNOCKOUTS	MAXIMUM PIPE DIA.
48"	4"	6"	36"	8"	30"
54"	4.5"	8"	42"	8"	36"
60"	5"	8"	48"	8"	42"
72"	6"	8"	60"	12"	48"
84"	8"	12"	72"	12"	48"
96"	8"	12"	84"	12"	48"



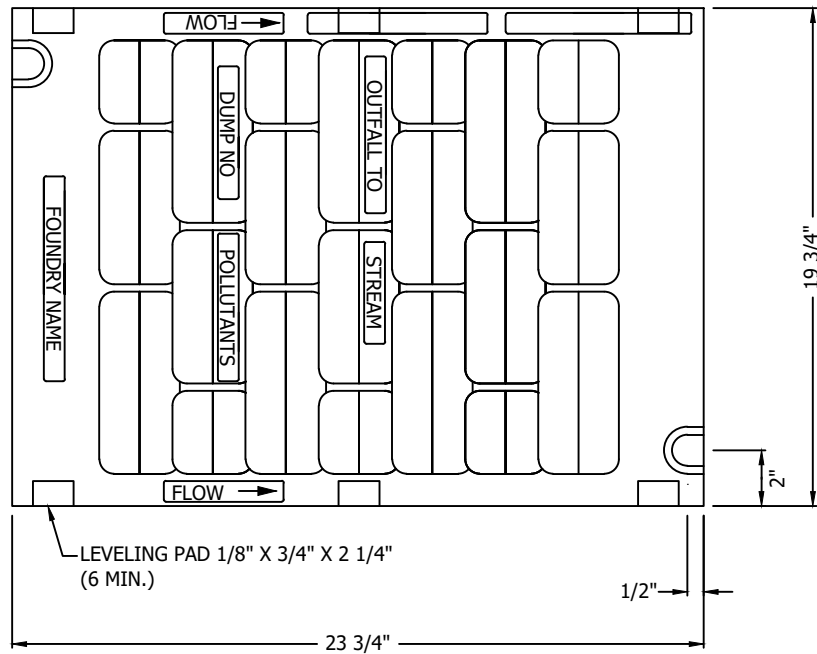
PLAN VIEW

CITY OF KIRKLAND

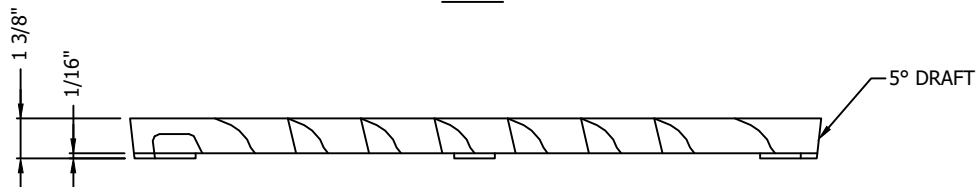
PLAN NO. CK - D.13

CITY OF KIRKLAND
WASHINGTON

STANDARD 48"
STORM MAINTENANCE
HOLE




PLAN

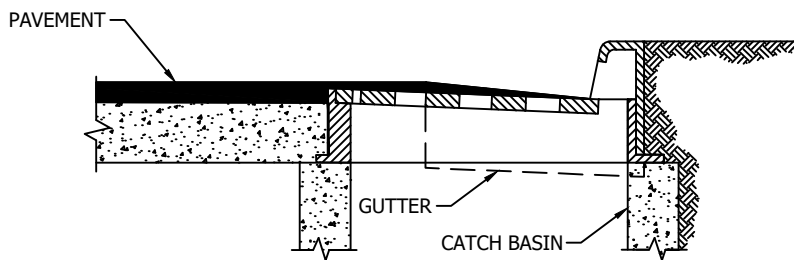
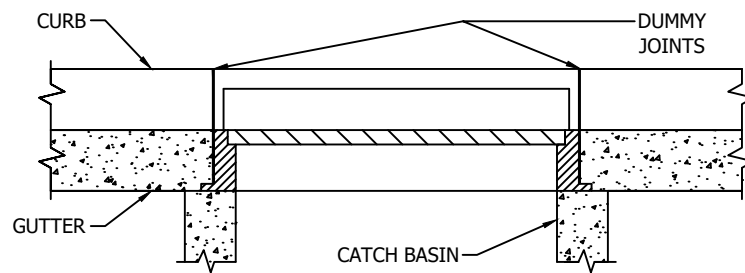
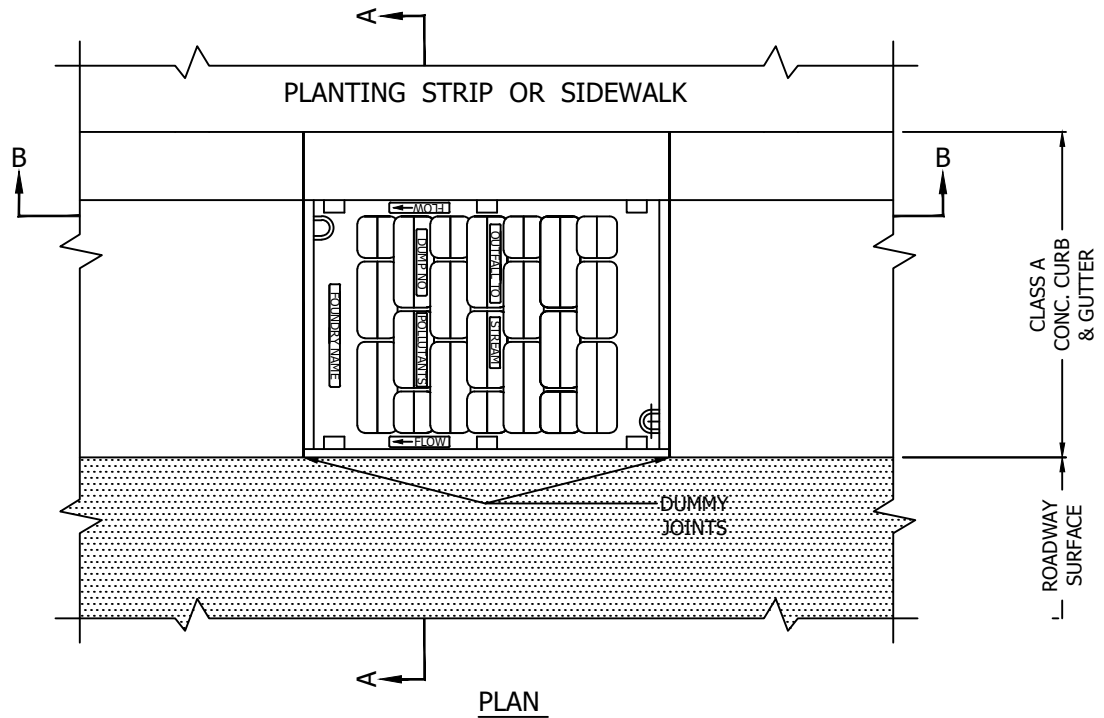


ELEVATION

NOTES:


1. USE EAST JORDAN IRON WORKS OR EQUAL TWO BOLT LOCK CAPABILITY THAT MEETS WSDOT SPEC. MANUFACTURER SUBJECT TO APPROVAL BY CITY.
2. USE WITH TWO LOCKING BOLTS 5/8"-11 NC STAINLESS TYPE 304 STEEL SOCKET HEAD (ALLEN HEAD) BOLTS, 2" LONG. FRAMES SHALL INCLUDE THREADS AS DROP-OUT REPLACEABLE NUTS.
3. MATERIAL IS DUCTILE IRON ASTM A536 GRADE 80-55-06.
4. "OUTFALL TO STREAM DUMP NO POLLUTANTS" MAY BE LOCATED ON BORDER AREA.
5. SHALL CONFORM TO SEC. 7.05 OF THE STANDARD SPECIFICATIONS.
6. WELDING IS NOT PERMITTED.
7. EDGES SHALL HAVE 0.125" RADIUS, 0.125" CHAMBER OR COMPLETE DEBURRING.
8. USE A BI-DIRECTIONAL VANED GRATE AT ANY LOW POINT OR WHEN FLOWS COME FROM MULTIPLE DIRECTIONS.
9. NO EXPANSION MATERIAL IN THE FLOW LINE, WHERE CONCRETE COMES TO FRAME.
10. FRAME AND COVER SHALL BE H-20 LOADING RATED IF INSTALLED IN ROADWAY.
11. MUST BE MADE IN USA.

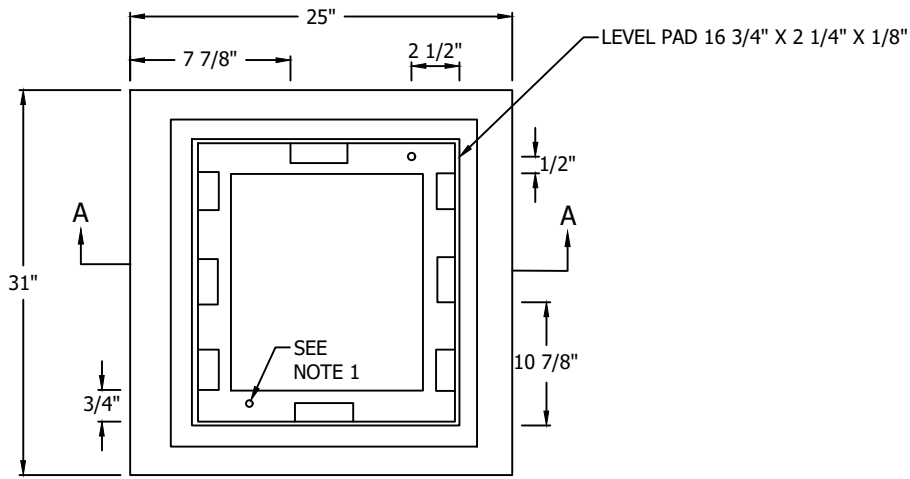
CITY OF KIRKLAND	
PLAN NO. CK - D.14	
	VANED GRATE FOR CATCH BASIN AND INLET



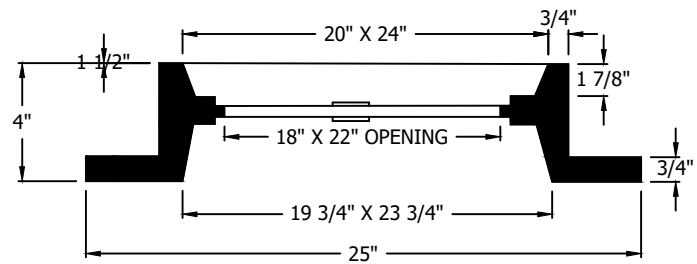
NOTES:

1. FRAME AND COVER SHALL BE EAST JORDAN IRON WORKS OR EQUAL, SUBJECT TO APPROVAL BY CITY. SEE CK-D.15.
2. PATTERN ON TOP SHALL SPECIFY FISH LOGO AND DUMP NO POLLUTANTS (NO DIAMOND PATTERN).
3. CASTING MUST BE SET 0.5" BELOW FINAL ROAD/GUTTER GRADE.
4. HOOD SHALL MATCH TOP OF CURB ELEVATION.
5. NO HORIZONTAL CROSS BAR IN THE OPENING.
6. TROWELED EDGE MUST BE IN CONTACT WITH FRAME (RATHER THAN EXPANSION JOINT).
7. MUST BE MADE IN THE USA.

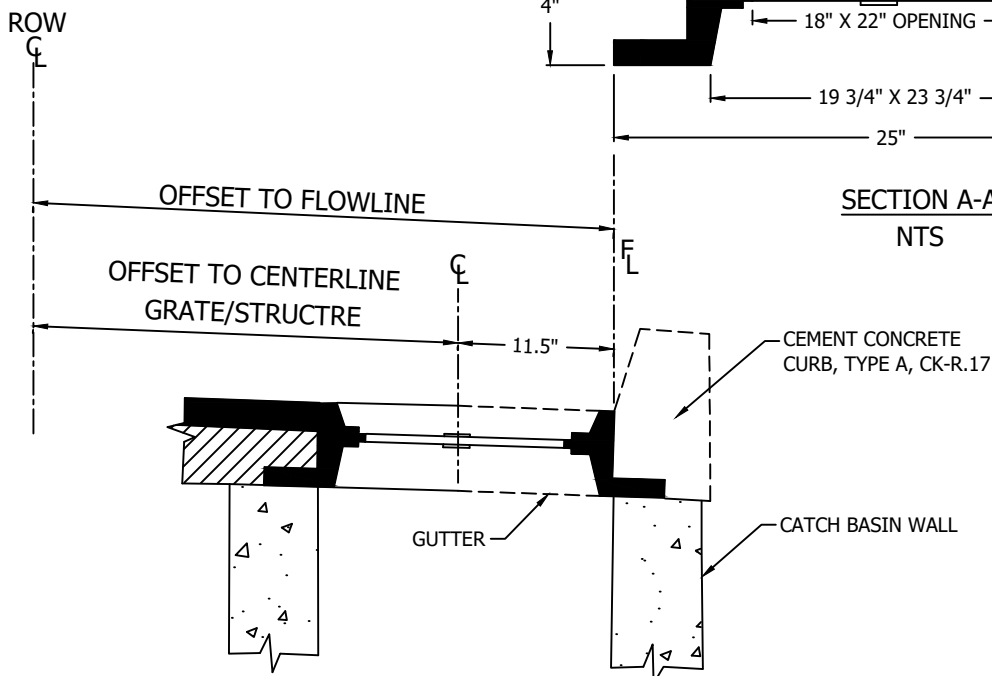
CITY OF KIRKLAND	
PLAN NO. CK - D.16	
	THROUGH-CURB INLET FRAME AND GRATE WITH VERTICAL CURB INSTALLATION



PLAN VIEW
NTS




SECTION A-A
NTS



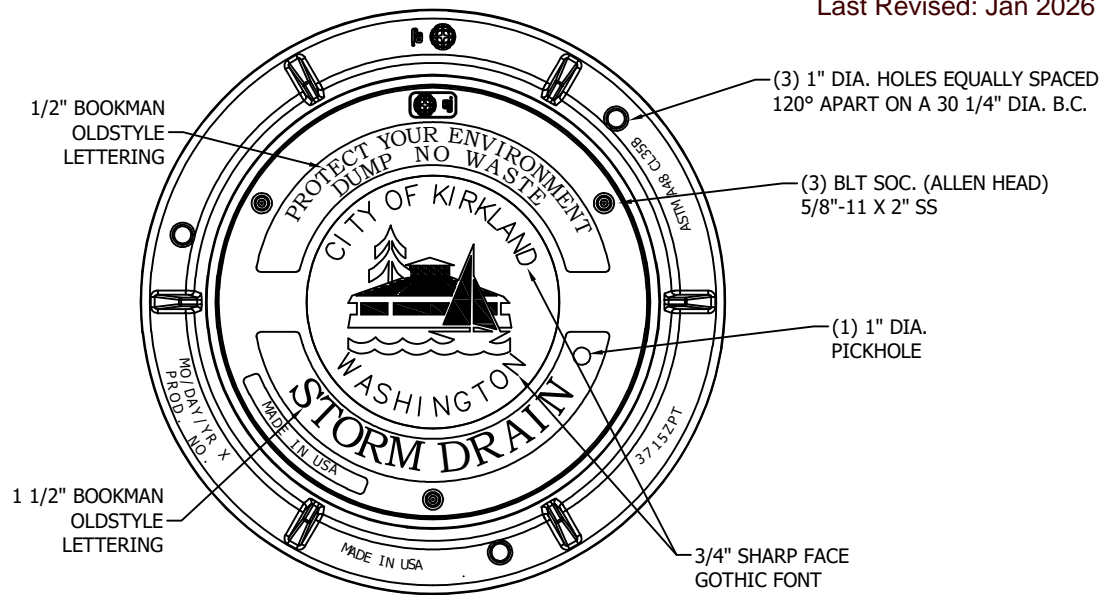
TYPE 1 CATCH BASIN ALIGNMENT CROSS SECTION
NTS

NOTE:

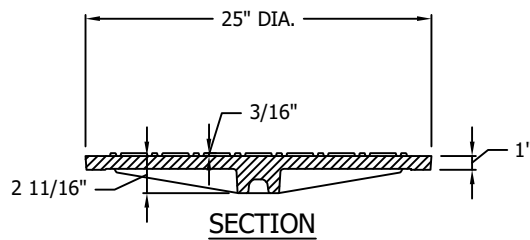
1. FRAME MATERIAL IS CAST IRON PER ASTM A48 CLASS 30.
2. SET FRAME TO GRADE AND CONSTRUCT ROAD AND GUTTER TO BE FLUSH WITH FRAME.
3. BACK OF FRAME SHALL BE IN FLOWLINE OF GUTTER.
4. MUST BE MADE IN THE USA.

CITY OF KIRKLAND	
PLAN NO. CK - D.16A	
	STANDARD FRAME WITH CURB INSTALLATION

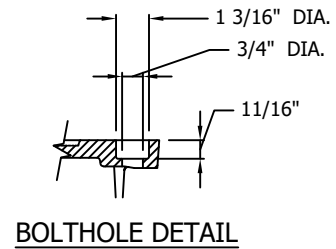
Last Revised: Jan 2026



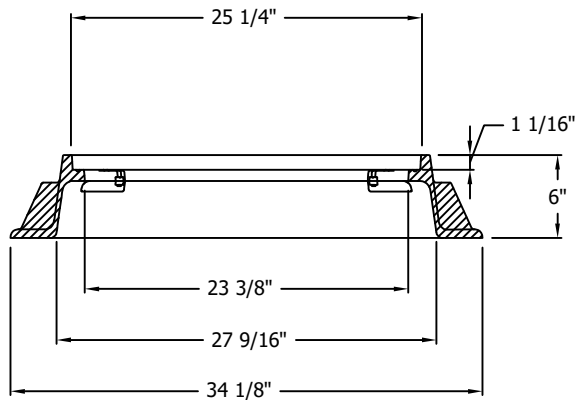
PLAN VIEW



SECTION




BOLTHOLE DETAIL

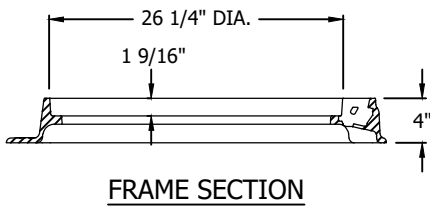
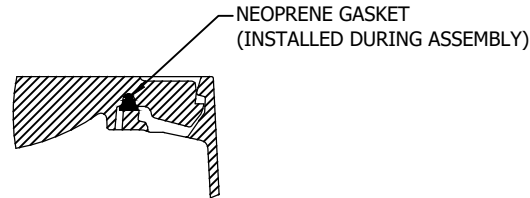
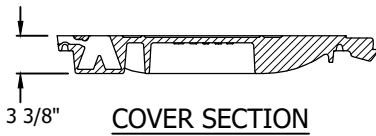
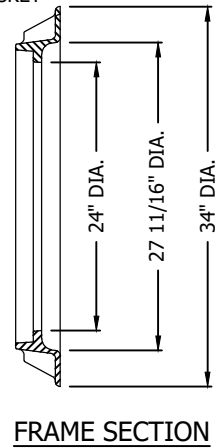
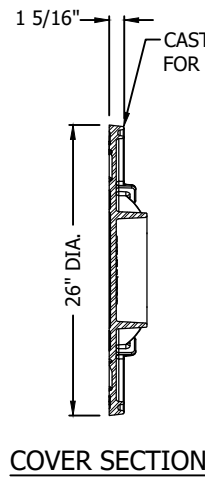
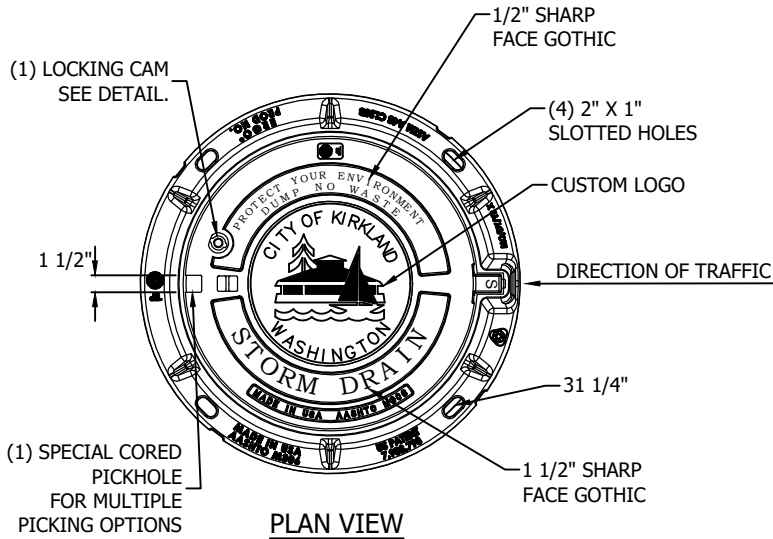


SECTION

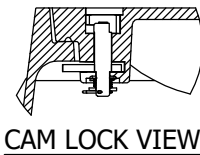
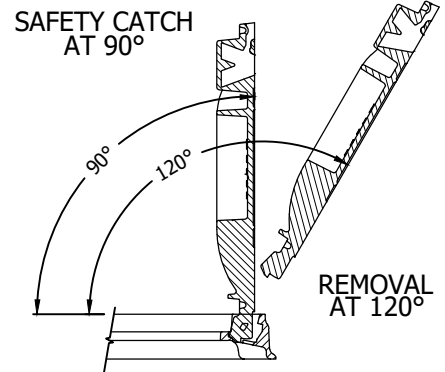
NOTES:

1. COVERS SHALL BE GRAY IRON, LOCKING, WITH A MINIMUM WEIGHT OF 141 LBS.
2. MINIMUM WEIGHT OF FRAME SHALL BE 134 LBS.
3. PRODUCT SUPPLIED BY EJ GROUP, INC., APPROVED EQUAL.
4. CITY OF KIRKLAND LOGO REQUIRED
5. THIS SPEC SHOULD NOT BE USED IN THE ROADWAY.
6. MUST BE MADE IN THE USA.

CITY OF KIRKLAND	
PLAN NO. CK - D.18	
	24" MANHOLE FRAME W/LOCKING COVER AND LOGO




HINGE & GASKET VIEW



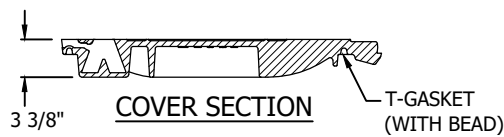
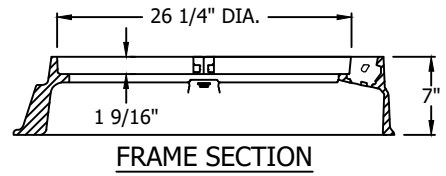
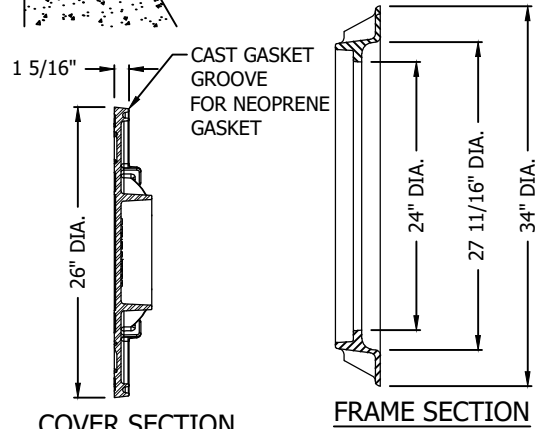
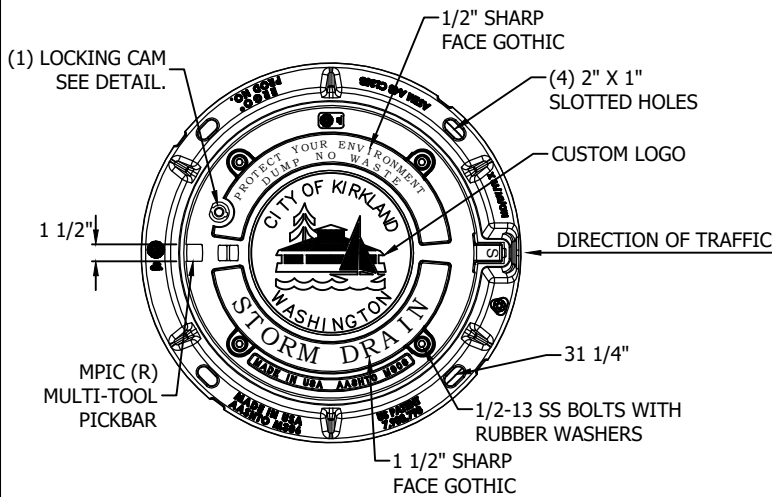
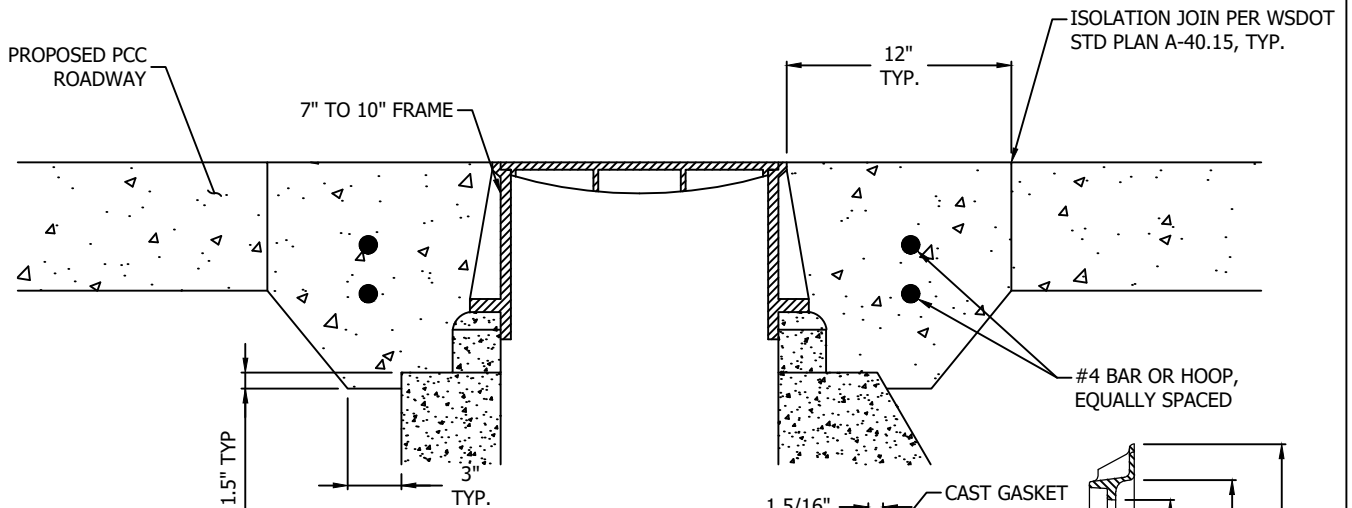
HINGE POSITIONS

NOTES:

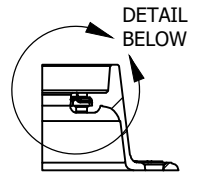
1. VERIFY SLOTTED FRAMES ARE THOROUGHLY FILLED IN WITH MORTAR FOR EFFICIENT INTERACTION WITH IRON AND STRUCTURE.
2. VERIFY BEDDING MORTAR IS NOT IN CONTACT WITH AREA UNDER LID FLANGE THAT WILL INTERFERE WITH CAMLOCK.
3. INSTALL PLUG IN LOCK HOLE TO KEEP LOCK FREE OF FOREIGN MATERIAL.
4. 24 INCH MANHOLE LID IS FITTED WITH AN INFILTRATION PLUG LOCATED IN THE HINGE HOUSING OF THE FRAME. VERIFY PLUG IS PROPERLY INSTALLED BEFORE INSTALLING THE FRAME.
5. REQUIRED ON ALL ARTERIALS, COLLECTORS OR ANY TIME THAT THE IRON WILL BE WITHIN THE TRAVEL LANE.
6. LID SHALL BE MARKED "STORM DRAIN".
7. CITY OF KIRKLAND LOGO REQUIRED.
8. LID MUST BE COVERED WITH TAR PAPER BEFORE OVERLAY.
9. PRODUCT SUPPLIED BY EAST JORDAN IRON WORKS, OR APPROVED EQUAL.
10. FRAME AND COVER SHALL BE H-20 LOADING RATED AND BE AT MINIMUM 7" TALL IF INSTALLED IN ROADWAY.
11. 7" TALL ERGO CASTING REQUIRED FOR CONCRETE ROADWAYS.
12. MUST BE MADE IN THE USA.

CITY OF KIRKLAND	
PLAN NO. CK - D.18A	
	MODIFIED 24" MANHOLE FRAME W/ HINGED COVER

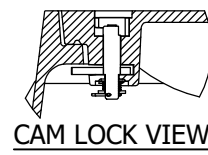
LAST REVISED: 01/2023



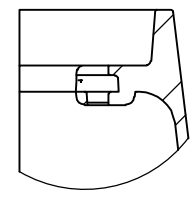
T-GASKET (WITH BEAD)
(INSTALLED DURING ASSEMBLY)



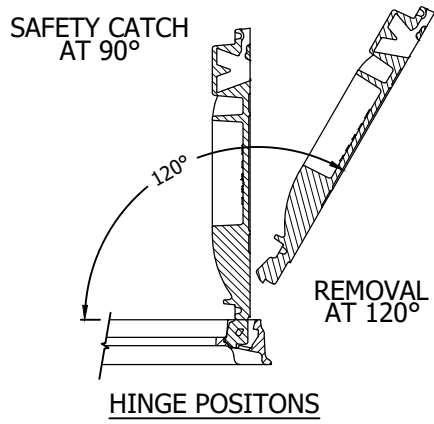
EON SECTION



CAM LOCK VIEW



EON DETAIL



HINGE POSITIONS

CITY OF KIRKLAND

PLAN NO. CK - D.18B

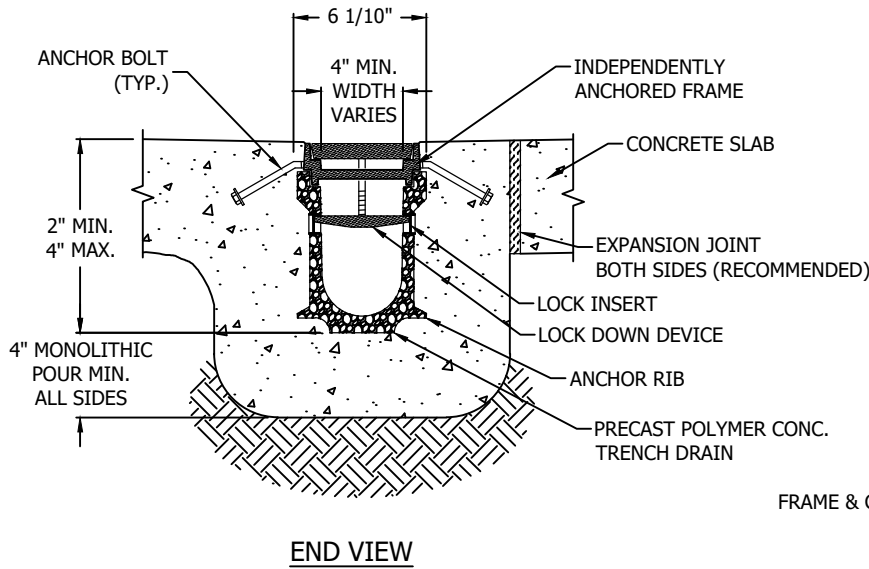


DEEP
MANHOLE FRAME
CASTING

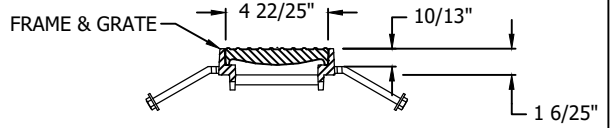
NOTES:

1. REFER TO CK-D.18A NOTES FOR ADDITIONAL REQUIREMENTS.

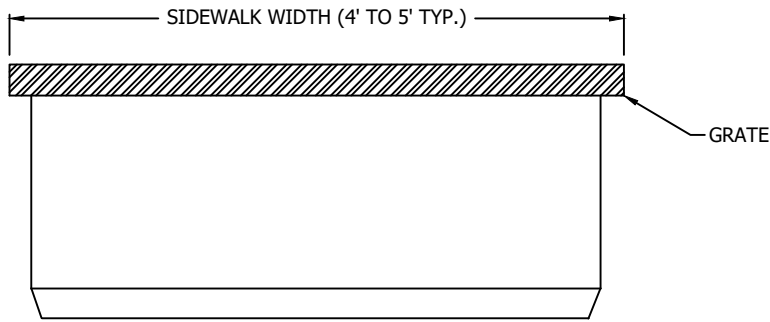
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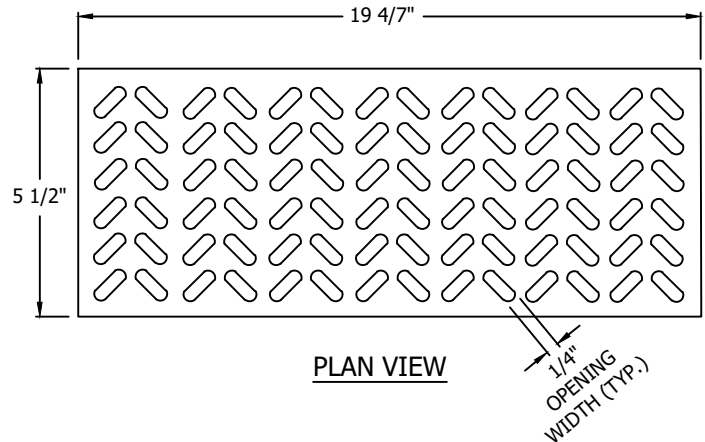
END VIEW



GRATE END VIEW




SIDE VIEW

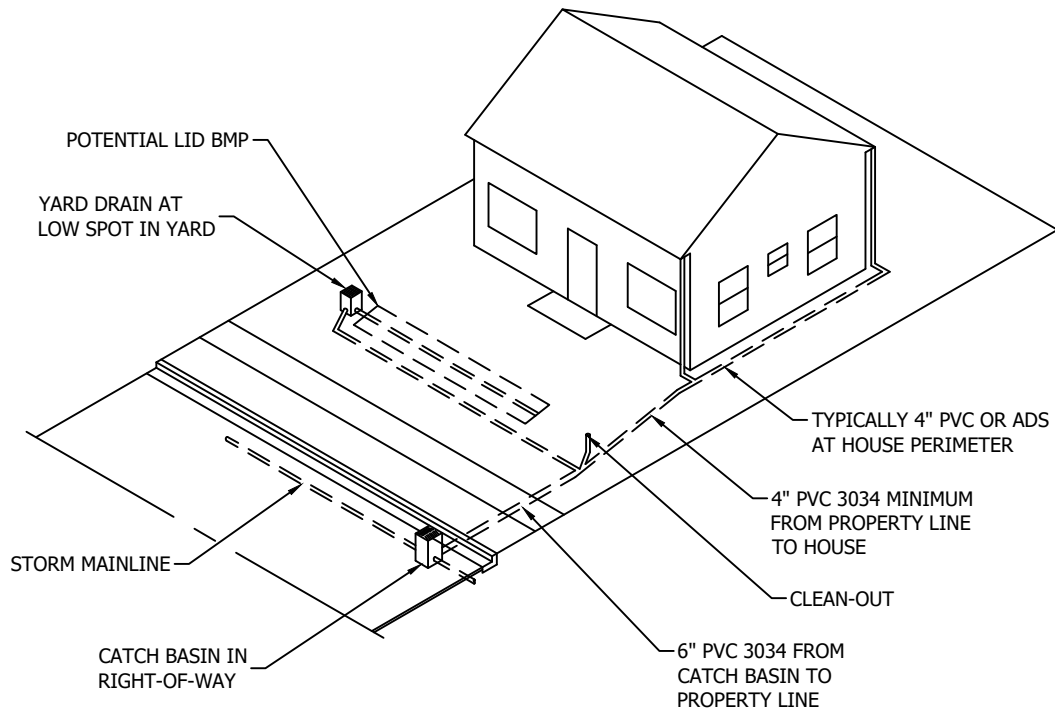


PLAN VIEW

NOTES:

1. PRODUCT IS TRENCH FORMER TFX (www.abtdrains.com), POLYCAST DRAIN (www.polycastdrain.com), OR EQUIVALENT.
2. TO BE USED IN LIEU OF D-19, WHEN CURB HEIGHT DOES NOT ALLOW PIPE INSTALLATION.
3. USE ADA/HEEL PROOF GRATE PER ADA SPECIFICATION 302.3.

CITY OF KIRKLAND	
PLAN NO. CK - D.19B	
	PRECAST CHANNEL DRAIN FORMING SYSTEM



NOTES

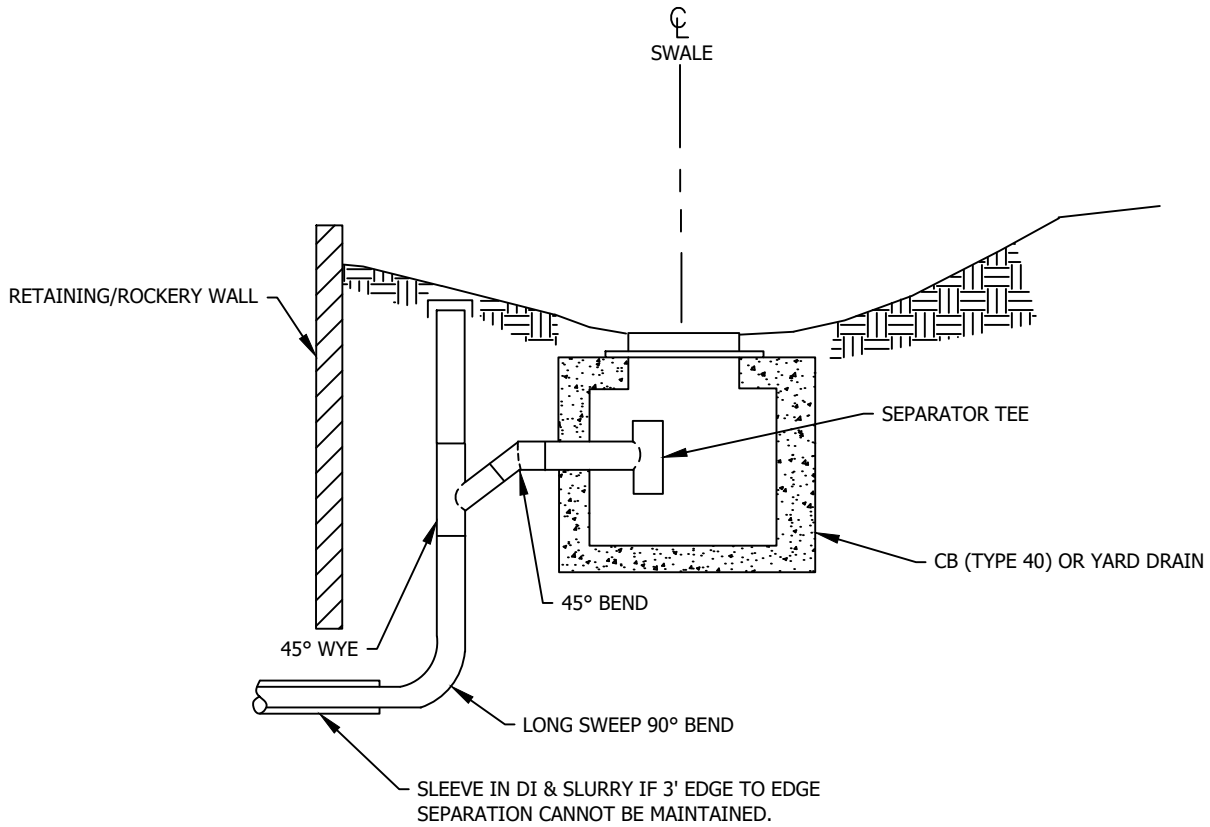
1. ALL HOUSE DOWNSPOUTS AND EXTERIOR SURFACE DRAINS MUST BE CONNECTED TO THE PUBLIC DRAIN SYSTEM, DETENTION FACILITY OR LID BMP (IF APPLICABLE). NO STORM DRAINAGE MAY BE CONNECTED TO PUBLIC SANITARY SEWER SYSTEM.
2. MINIMUM GRADE 2 % FOR 6" AND 2 % FOR 4", AND 1% FOR 8".
3. ALL CONSTRUCTION WITHIN STREETS AND/OR PUBLIC RIGHT-OF-WAYS MUST BE DONE BY A GENERAL CONTRACTOR LICENSED BY THE STATE AND COK.
4. NEW TIE-INS MUST INSTALL PVC/DI TEE OR INSERTA TEE FOR LATERAL CONNECTION. NO BREAK-IN CONNECTIONS WITH MORTAR ALLOWED. LATERAL PIPE MAY NOT PROTRUDE INTO MAINLINE.
5. BACKFILL MATERIAL IN THE RIGHT-OF-WAY AND UNDER PAVED SURFACES SHALL BE 5/8" MINUS COMPACTED TO 95 % OR GREATER (CRUSHED SURFACING TOP COURSE PER WSDOT 9-03.9(3)).
6. CLEANOUTS REQUIRED FOR EACH PIPE LENGTH GREATER THAN 100' AND FOR EACH ACCUMULATED 90 DEGREES PER 100'.

CITY OF KIRKLAND

PLAN NO. CK - D.20




LOT DRAIN
CONNECTIONS

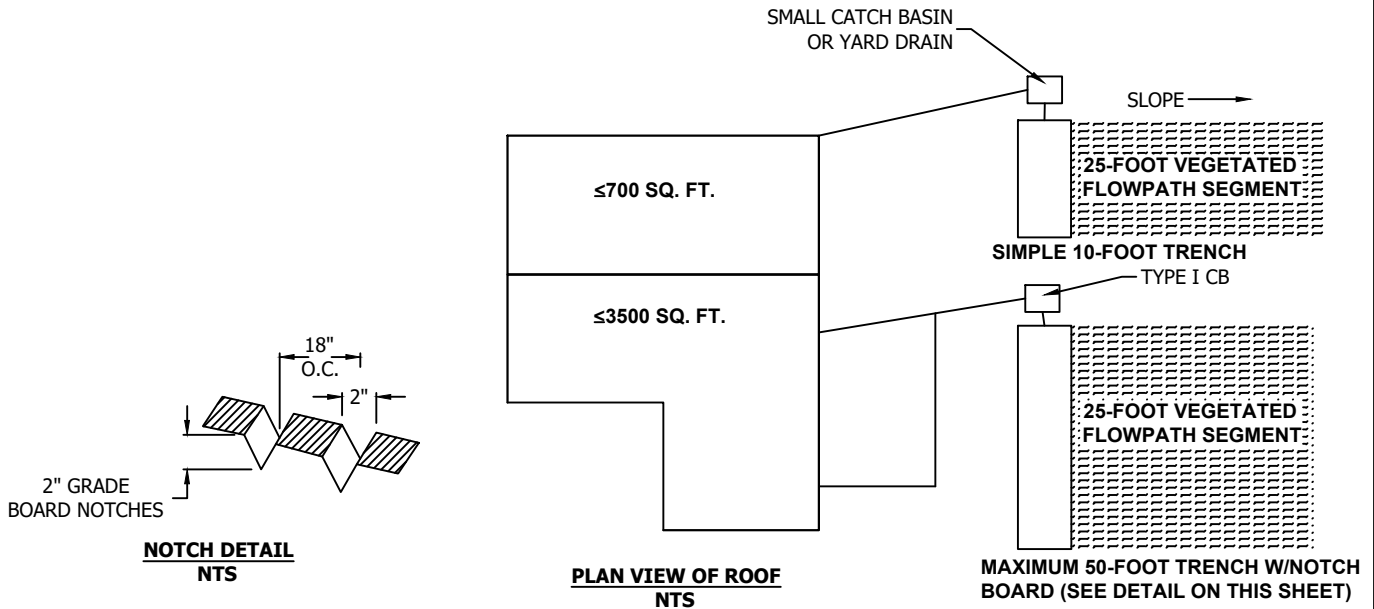
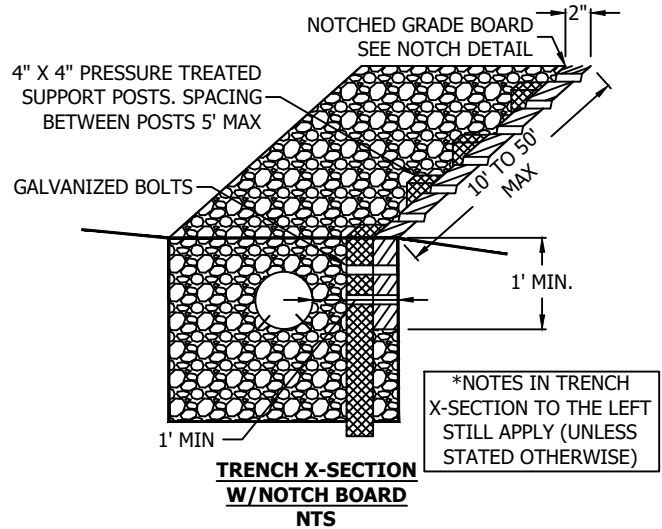
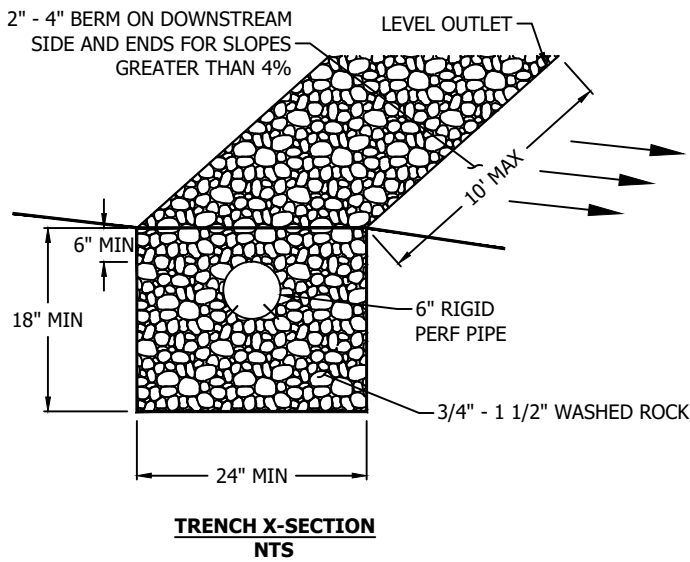


SIDE VIEW
NOT TO SCALE

NOTE:

ALL PIPE SHALL BE PVC ASTM 3034, SDR35, OR PVC C900.
USE PVC C900 UNDER WALL OR FOR CUTS IN EXCESS OF 5 FEET.

CITY OF KIRKLAND	
PLAN NO. CK-D.20A	
	DROP-CONVEYANCE DRAIN

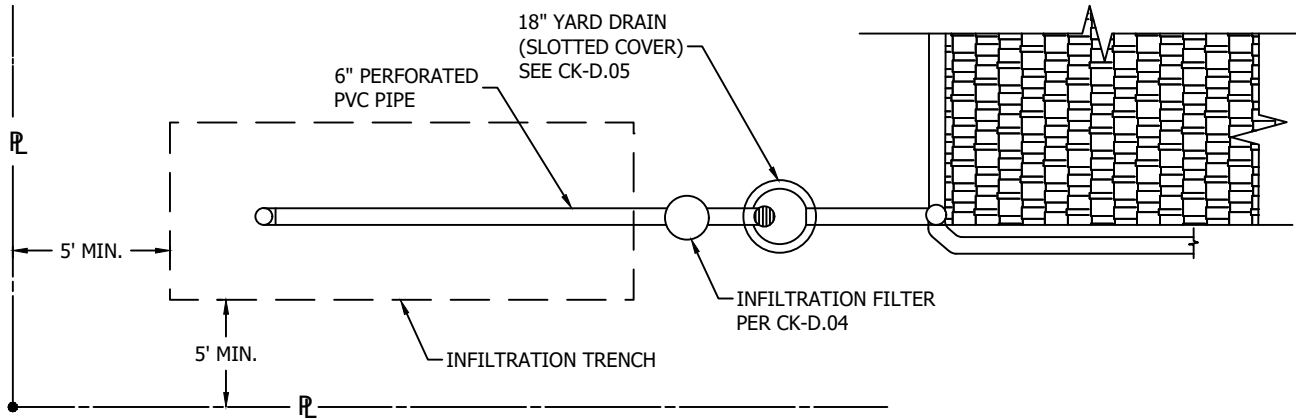


NOTES:

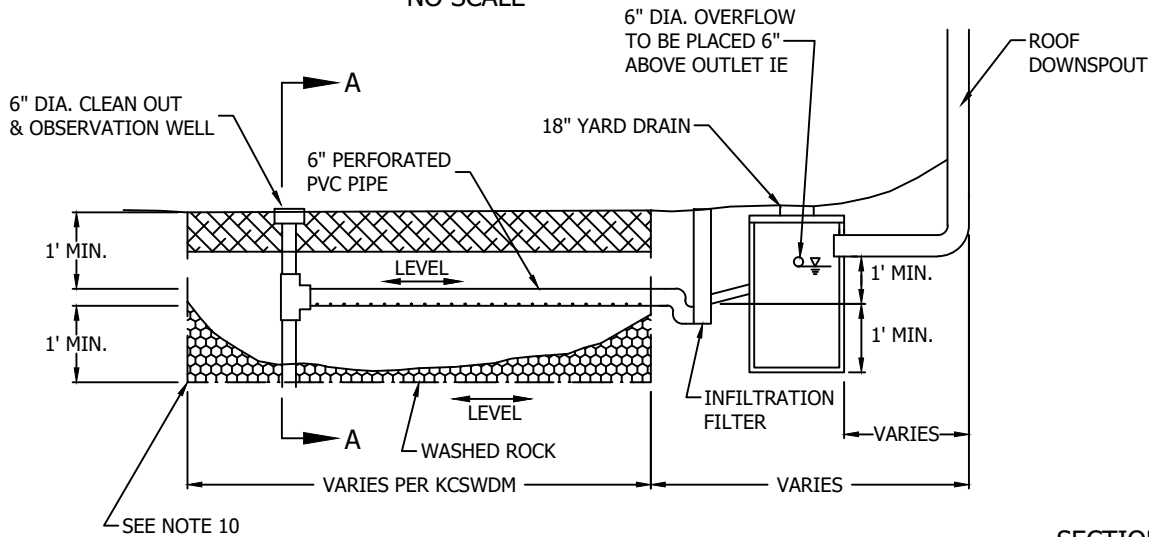
1. BASIC DISPERSION TRENCH MUST DISCHARGE RUNOFF SUCH THAT IT FLOWS OVER A MINIMUM 25' DISTANCE OF VEGETATED AREA (VEGETATED FLOWPATH SEGMENT).
2. THE VEGETATED FLOWPATH SEGMENT MUST BE OVER WELL-ESTABLISHED LAWN OR PASTURE, LANDSCAPING WITH WELL-ESTABLISHED GROUND COVER, OR NATIVE VEGETATION WITH NATURAL GROUND COVER. THE GROUND COVER MUST BE DENSE ENOUGH TO HELP DISPERSE & INFILTRATE FLOWS AND TO PREVENT EROSION.
3. THE VEGETATED FLOWPATH SEGMENT MUST BE ONSITE OR IN AN OFFSITE TRACT OR EASEMENT AREA RESERVED FOR SUCH DISPERSION.
4. DISPERSION DEVICES ARE NOT ALLOWED IN CRITICAL AREA BUFFERS OR ON SLOPES STEEPER THAN 20%. DISPERSION DEVICES PROPOSED ON SLOPES STEEPER THAN 15% OR WITHIN 50 FEET OF A STEEP SLOPE HAZARD OR LANDSLIDE HAZARD AREA MUST BE APPROVED BY A GEOTECHNICAL ENGINEER OR ENGINEERING GEOLOGIST UNLESS OTHERWISE APPROVED BY CITY ENGINEER.
5. FOR SITES WITH SEPTIC SYSTEMS, THE DISCHARGE OF RUNOFF FROM DISPERSION TRENCHES MUST BE LOCATED DOWN SLOPE OF THE PRIMARY AND RESERVE DRAINFIELD AREAS. CITY STAFF MAY WAIVE THIS REQUIREMENT IF SITE TOPOGRAPHY PROHIBITS DISCHARGED FLOWS FROM INTERSECTING THE DRAINFIELD.
6. THE DISPERSION OF RUNOFF MUST NOT CREATE FLOODING OR EROSION IMPACTS ON ADJACENT PROPERTIES.

CITY OF KIRKLAND	
PLAN NO. CK - D.21	
	BASIC DISPERSION TRENCH

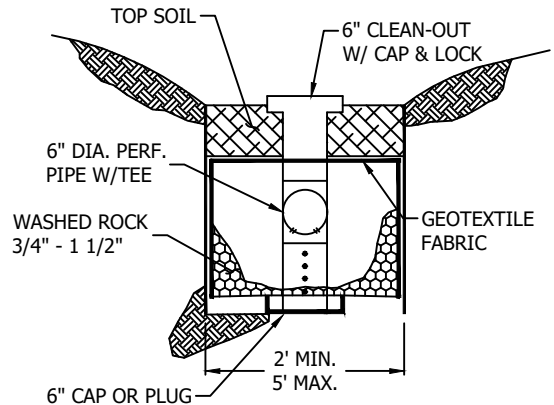
**PLAN VIEW
NO SCALE**



**PROFILE VIEW
NO SCALE**



**SECTION A-A
NO SCALE**



NOTES:

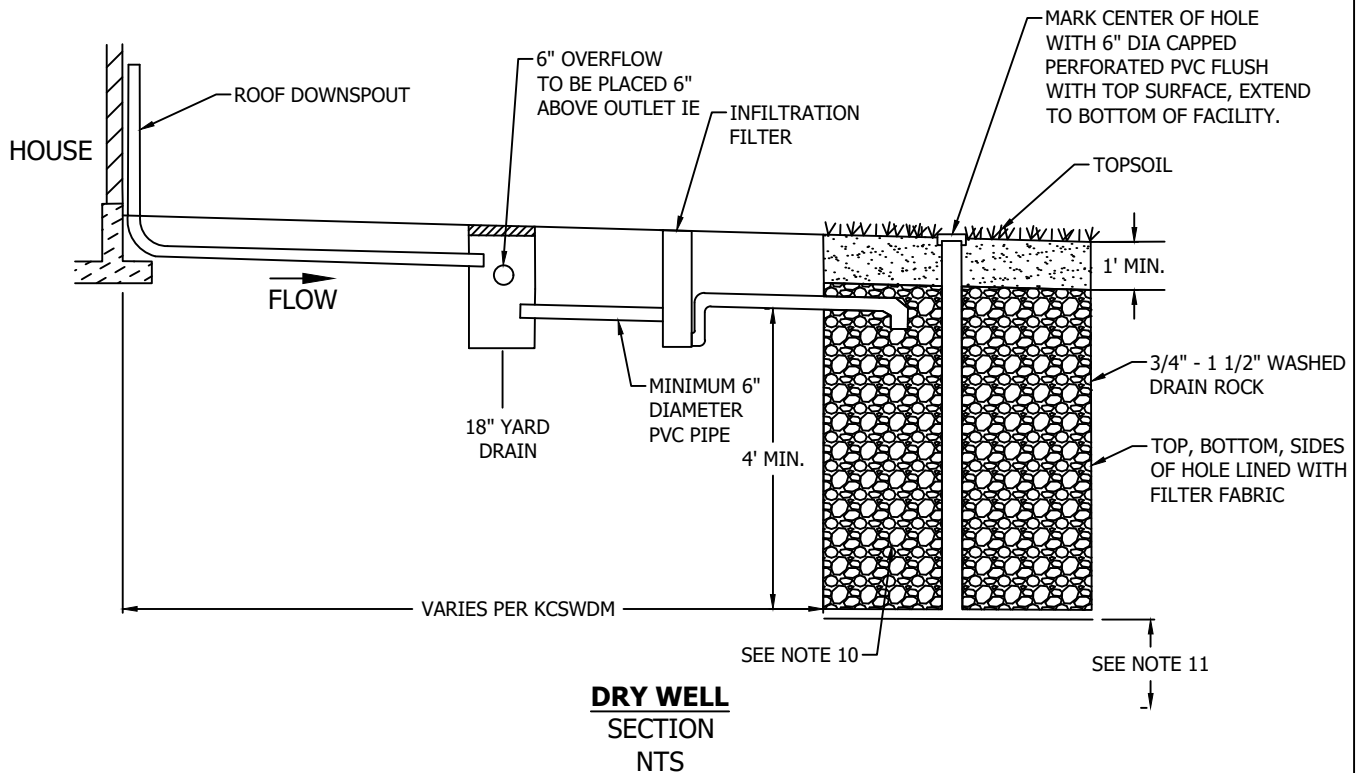
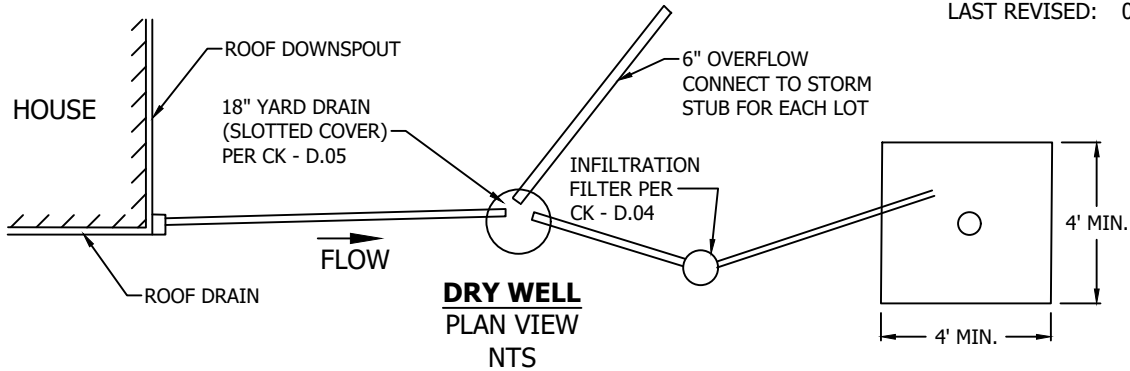
1. SPECIAL INSPECTION WILL BE REQUIRED FOR PROJECTS THAT USE AN INFILTRATION TRENCH TO MEET FULL INFILTRATION OR EXCEPTION, OR AS A FLOW CONTROL FACILITY. SEE POLICY D-8 FOR SPECIAL INSPECTION REQUIREMENTS.
2. FOR SMALL SITE PROJECTS, SEE POLICY D-8 FOR SOIL INFORMATION REQUIREMENTS AND APP. C, 2021 KING COUNTY SURFACE WATER DESIGN MANUAL (KCSWDM) FOR SIZING AND DESIGN CRITERIA. FOR PROJECTS OTHER THAN SMALL SITE, USE DESIGN CRITERIA IN SECTION 5.2 IN THE 2021 KCSWDM.
3. MINIMUM SPACING BETWEEN TRENCH EDGES SHALL BE 5 FEET.
4. MAXIMUM TRENCH LENGTH MUST NOT EXCEED 100 FEET FROM THE INLET SUMP.
5. A MIN. 5-FT SETBACK SHALL BE MAINTAINED FROM ANY PROPERTY LINE OR NGPE.
6. A 50-FT SETBACK IS REQUIRED FROM STEEP SLOPE HAZARD AREAS OR LANDSLIDE HAZARD AREAS.
7. SHALL BE LOCATED 30-FT DOWN SLOPE FROM ANY SEPTIC TANK/DRAIN FIELD ONSITE OR ON ADJACENT PROPERTIES, AND A MINIMUM OF 100-FT UPSLOPE FROM ANY SEPTIC TANK/DRAIN FIELD ONSITE OR ON ADJACENT PROPERTIES. ALL SEPTIC TANK/DRAIN FIELD SYSTEMS SHALL BE IDENTIFIED AND SHOWN ON PLAN SET PRIOR TO INFILTRATION SYSTEM APPROVAL.
8. SHALL ONLY BE PLACED UNDER 6" THICK DRIVEWAYS, CLEANOUT MUST MEET CK-S.09, AND 2' MINIMUM COVER IF THERE IS NO OVERFLOW.
9. THE INFILTRATION AREA AND A 5-FT BUFFER MUST BE FENCED PRIOR TO CONSTRUCTION AND UNTIL FINAL STABILIZATION OF THE SITE TO PREVENT SOIL COMPACTION BY CONSTRUCTION ACTIVITIES. FOR EXPOSED INFILTRATION TRENCHES, SILT FENCE SHALL BE INSTALLED AROUND THE CONSTRUCTED PERIMETER TO PREVENT SEDIMENTATION OF THE FACILITY.
10. THE DISTANCE MEASURED DOWN FROM THE BOTTOM OF THE TRENCH TO THE MAXIMUM WET SEASON WATER TABLE OR HARDPAN MUST BE AT LEAST 3 FEET IF CREDIT PER TABLE 1.2.9.A IS BEING USED. IF NOT, MINIMUM IS 1 FOOT.

CITY OF KIRKLAND

PLAN NO. CK - D.22




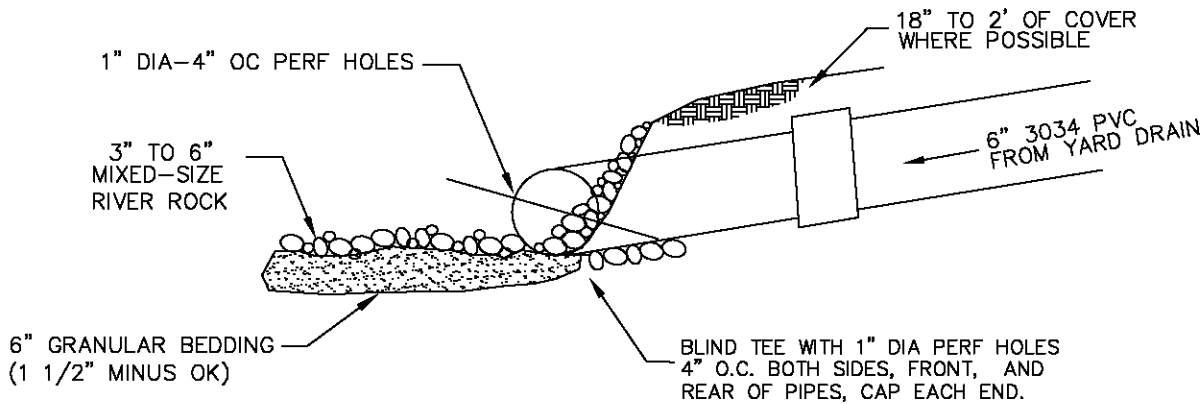
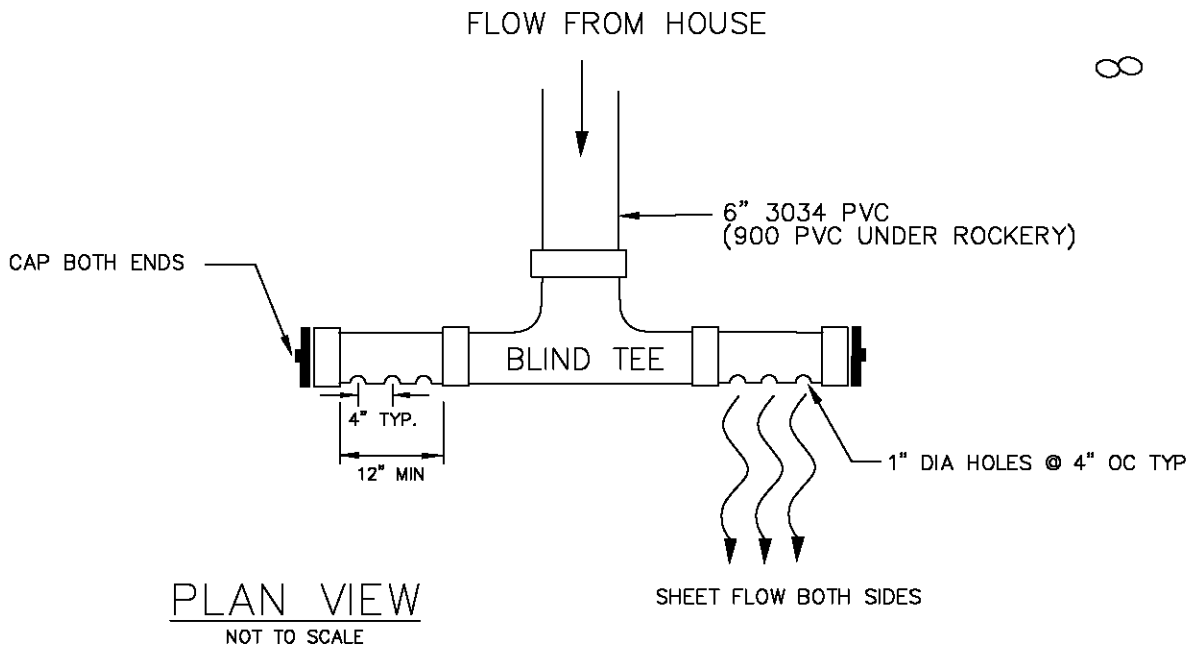
**INFILTRATION
TRENCH**



NOTES:


1. SPECIAL INSPECTION WILL BE REQUIRED FOR PROJECTS THAT USE AN INFILTRATION DRYWELL TO MEET FULL INFILTRATION OR EXCEPTION, OR AS A FLOW CONTROL FACILITY. SEE POLICY D-8 FOR SPECIAL INSPECTION REQUIREMENTS.
2. THIS DETAIL APPLIES TO SMALL SITE PROJECTS, AS DESCRIBED IN APPENDIX C, 2021 KCSWDM. FOR PROJECTS OTHER THAN SMALL SITE, USE DESIGN CRITERIA IN SECTION 5.2 IN THE 2021 KCSWDM.
3. MINIMUM SPACING BETWEEN OUTER EDGE OF DRYWELLS SHALL BE 10 FEET.
4. A MAXIMUM OF 5,000 SF OF IMPERVIOUS AREA IS ALLOWED TO DRAIN TO ONE DRYWELL.
5. A MINIMUM 5-FT SETBACK SHALL BE MAINTAINED FROM ANY PROPERTY LINE OR NGPE.
6. A 50-FT SETBACK IS REQUIRED FROM STEEP SLOPE HAZARD AREAS OR LANDSLIDE HAZARD AREAS.
7. INFILTRATION SYSTEMS SHALL BE LOCATED 30-FT DOWN SLOPE FROM ANY SEPTIC TANK/DRAIN FIELD ONSITE OR ON ADJACENT PROPERTIES, AND A MINIMUM OF 100-FT UPSLOPE FROM ANY SEPTIC TANK/DRAIN FIELD ONSITE OR ON ADJACENT PROPERTIES. ALL SEPTIC TANK/DRAIN FIELD SYSTEMS SHALL BE IDENTIFIED AND SHOWN ON PLAN SET PRIOR TO INFILTRATION SYSTEM APPROVAL.
8. INFILTRATION DRYWELLS SHALL ONLY BE PLACED UNDER 6" THICK DRIVEWAYS, CLEANOUT MUST MEET CK-D.05B, AND 2' MINIMUM COVER IF THERE IS NO OVERFLOW.
9. THE INFILTRATION AREA AND A 5-FT BUFFER MUST BE FENCED PRIOR TO CONSTRUCTION AND UNTIL FINAL STABILIZATION OF THE SITE TO PREVENT SOIL COMPACTION BY CONSTRUCTION ACTIVITIES. FOR EXPOSED INFILTRATION AREAS, SILT FENCE SHALL BE INSTALLED AROUND THIS CONSTRUCTED PERIMETER TO PREVENT SEDIMENTATION OF THE FACILITY.
10. DRYWELL MAXIMUM SURFACE AREA SHALL BE 100 SQUARE FEET, MINIMUM WIDTH SHALL BE 4 FEET AND A MAX DEPTH OF 6FT.
11. THE DISTANCE MEASURED DOWN FROM THE BOTTOM OF THE TRENCH TO THE MAXIMUM WET SEASON WATER TABLE OR HARDPAN MUST BE AT LEAST 3 FEET IF CREDIT PER TABLE 1.2.9.A IS BEING USED. IF NOT, MINIMUM IS 1 FOOT.

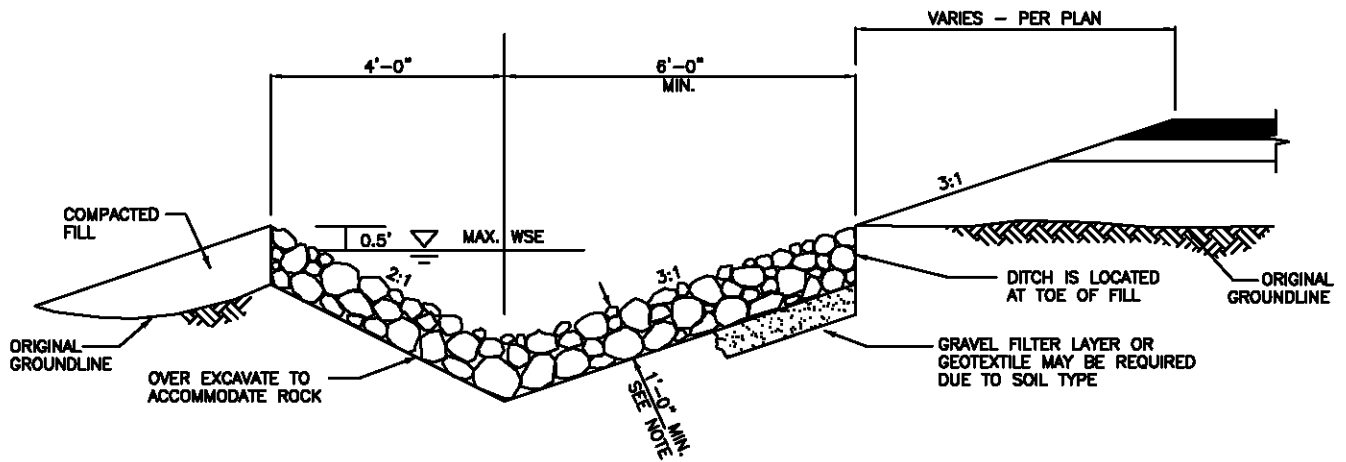
CITY OF KIRKLAND	
PLAN NO. CK - D.22B	
	INFILTRATION DRYWELL



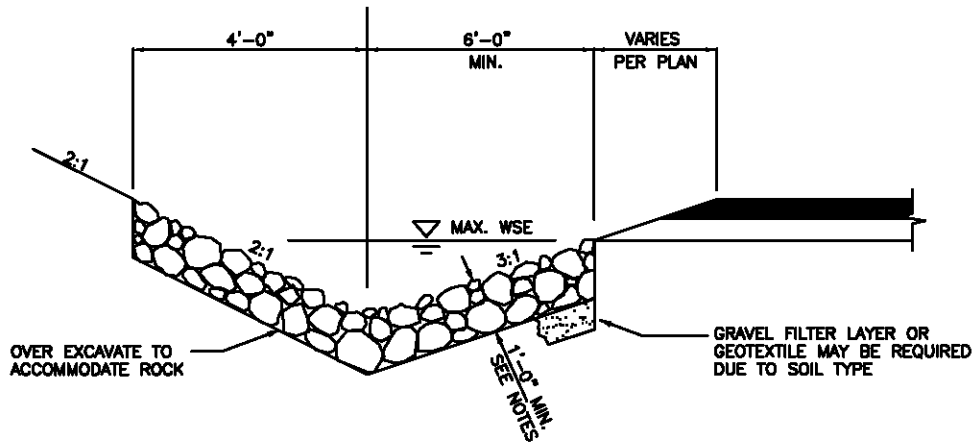
NOTES:

1. LEVEL SPREADER SHALL BE CONSTRUCTED SO AS TO PREVENT POINT DISCHARGE AND EROSION.
2. LEVEL SPREADERS MAY BE PLACED NO CLOSER THAN 50' TO ONE ANOTHER (100' ALONG FLOWLINE).
3. HAND PLACE AND INTERLOCK RIVER ROCK (OR EQUAL) OVER GRANULAR BEDDING.
FILL IN VOID SPACE WITH SMALLER ROCK.
4. A VEGETATED FLOWPATH OF 25' MIN. IS REQUIRED AFTER LEVEL SPREADER, PRIOR TO PROPERTY LINE.

CITY OF KIRKLAND	
PLAN NO. CK-D.23A	
	ALTERNATE LEVEL SPREADER



ROCK-LINED SHOULDER DITCH
IN FILL SECTION



ROCK-LINED SHOULDER DITCH
IN CUT SECTION

NOTES:

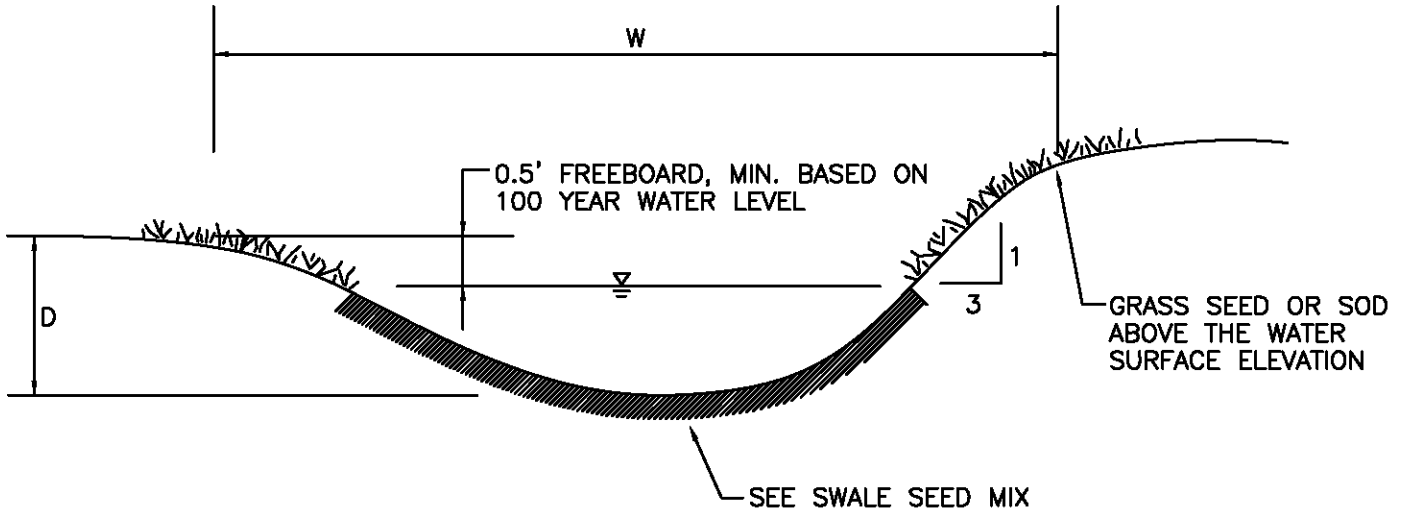
1. ROCK LINED DITCHES TO BE USED WHEN FLOW VELOCITIES EXCEED 4 FPS.
2. ROCK SIZE AND DEPTH DEPENDENT ON FLOW VELOCITY. MINIMUM ROCK SIZE 2"-4" QUARRY SPALLS.

CITY OF KIRKLAND

PLAN NO. CK-D.24




ROCK-LINED
SHOULDER DITCHES



TYPICAL SECTION

NOTES:

1. D AND W SIZED TO ACCOMMODATE DESIGN FLOW, PER CHAPTER 6.3 OF THE KING COUNTY SURFACE WATER DESIGN MANUAL.
2. ROUND ALL CORNERS FOR EASE OF MOWING.
3. MAXIMUM DESIGN VELOCITY SHALL BE 1 FPS FOR WATER QUALITY TREATMENT, AND 3 FPS FOR 100-YR CONVEYANCE.
4. MINIMUM SWALE LENGTH IS 100 FEET.
5. MINIMUM BOTTOM WIDTH IS 2 FEET (b).
6. SLOPE SHALL BE BETWEEN 1 AND 6%.
7. ADD SPREADER WEIR AT SWALE INLET FOR EVEN FLOW DISTRIBUTIONS.
8. LOCATE ALL SEDIMENT TRAPS FOR EASE OF MAINTENANCE.

CITY OF KIRKLAND	
PLAN NO. CK-D.25	
	<p>GRASS-LINED SWALE</p>

**TABLE 6.3.1.C
GRASS SEED MIXES SUITABLE FOR BIOFILTRATION SWALE TREATMENT AREAS***

MIX 1		MIX 2	
75–80 percent	Tall or Meadow Fescue	60–70 percent	Tall Fescue
10–15 percent	Seaside Creeping Bentgrass or Colonial Bentgrass	10–15 percent	Seaside Creeping Bentgrass or Colonial Bentgrass
5–10 percent	Redtop	10–15 percent	Meadow Foxtail
		6–10 percent	Alsike Clover
		1–5 percent	Marshfield Big Trefoil
		1–6 percent	Redtop

NOTE: All percentages are by weight.

TABLE 6.3.1.D FINELY-TEXTURED PLANTS TOLERANT OF FREQUENT SATURATED SOIL CONDITIONS OR STANDING WATER

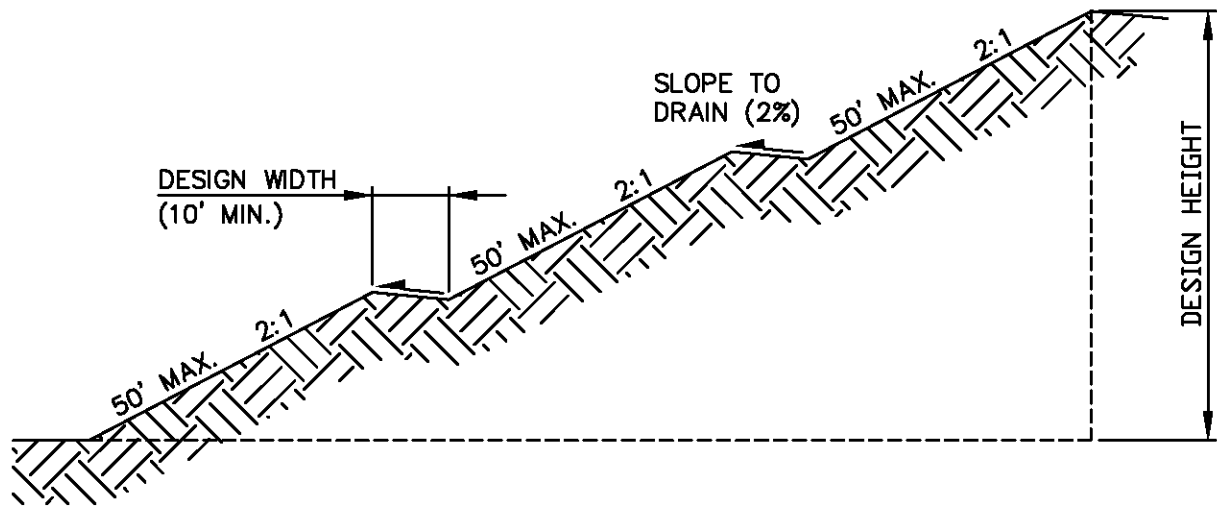
GRASSES		WETLAND PLANTS	
Water Foxtail	<i>Alopercurus geniculatus</i>	Sawbeak Sedge	<i>Carex stipata</i>
Shortawn Foxtail	<i>Alopercurus aequalis</i>	Spike Rush	<i>Eleocharis palustris</i>
Bentgrass	<i>Agrosits spp.</i>	Slender Rush	<i>Juncus tenuis</i>
Spike Bentgrass	<i>A. exarata</i>	Grass-leaf Rush	<i>Juncus marginatus</i>
Redtop	<i>A. alba or gigantea</i>		
Colonial Bentgrass	<i>A. tenuis or capillaris</i>		
Mannagrass	<i>Glyceria spp.</i>		
Western	<i>G. occidentalis</i>		
Northern	<i>G. borealis</i>		
Slender-Spiked	<i>G. leptostachya</i>		
Rough-Stalked Bluegrass	<i>Poa trivialis</i>		
Velvet Grass	<i>Holcus mollis</i>		


CITY OF KIRKLAND

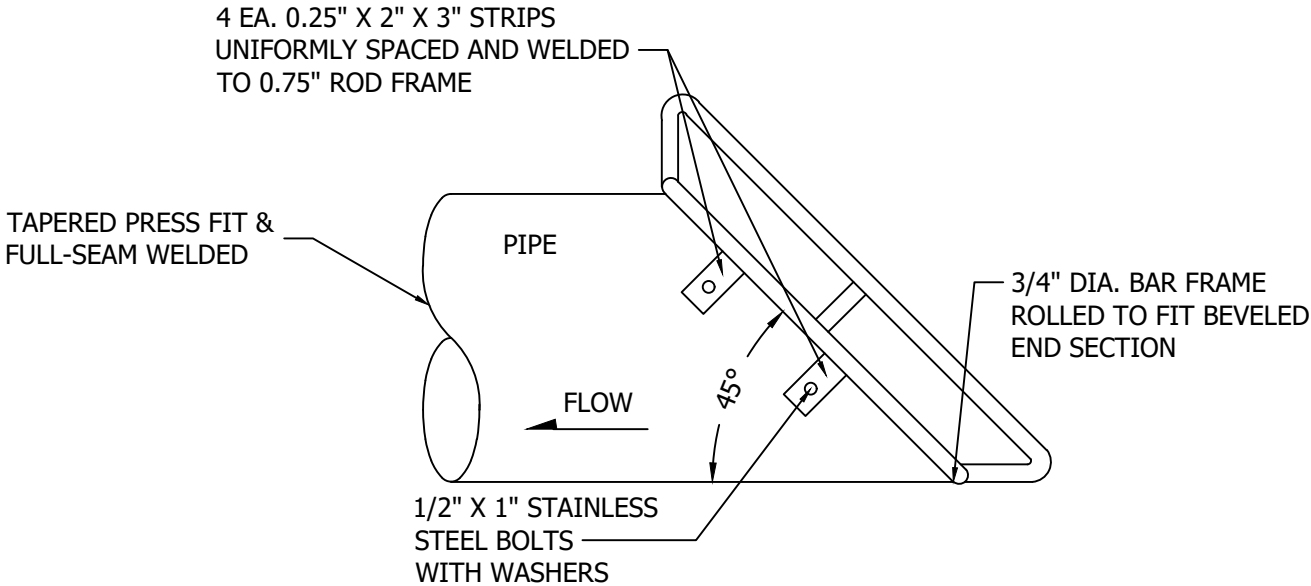
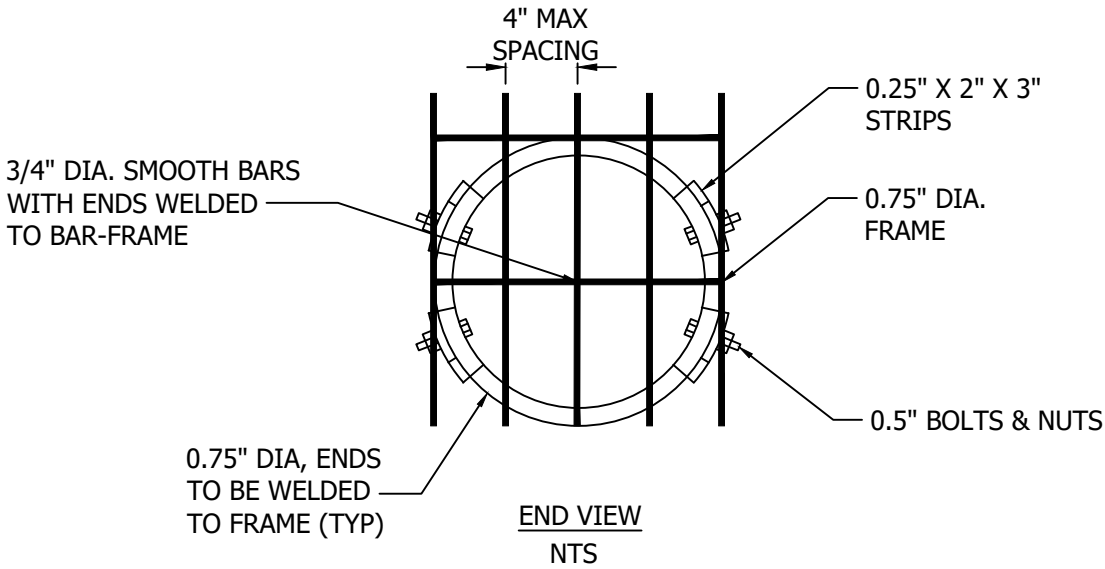
PLAN NO. CK-D.25A



SWALE SEED MIX
FOR CK-D.25




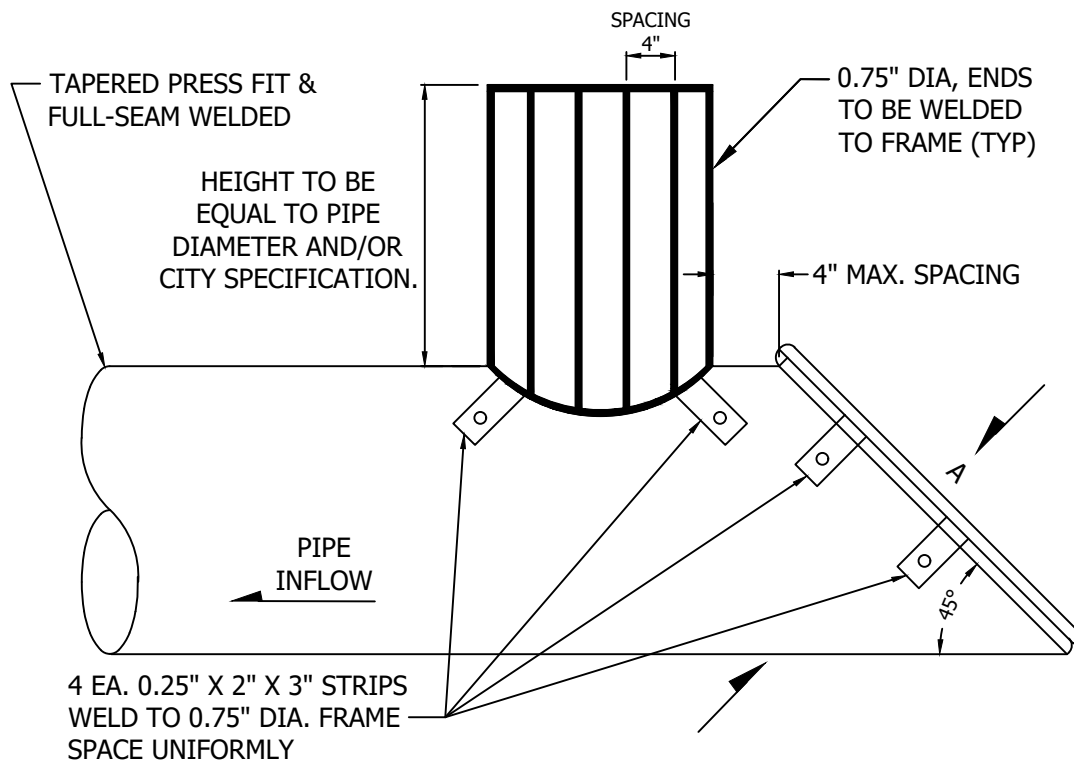
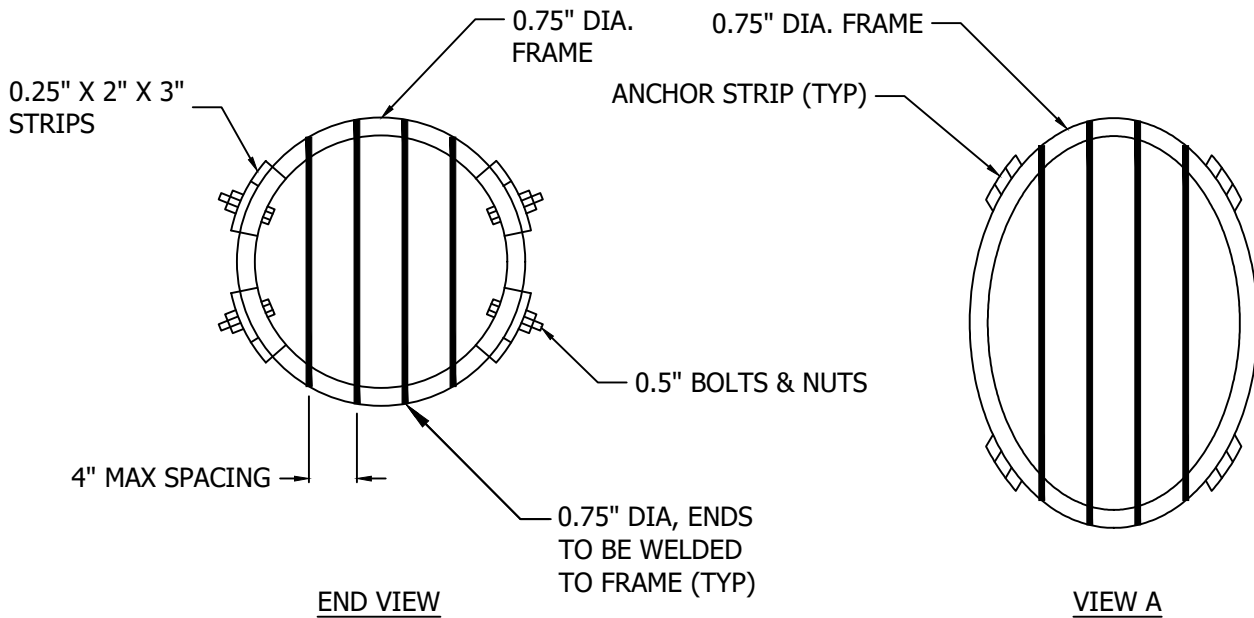
CITY OF KIRKLAND	
PLAN NO. CK-D.26	
	GRADIENT TERRACE CROSS-SECTION



NOTES:


1. ATWOOD FABRICATION OR APPROVED EQUAL.
2. REQUIRED FOR ANY PIPE 8" OR LARGER.
3. DEBRIS BARRIER MUST BE ALL ALUMINUM.
4. DEBRIS BARRIER NOT ALLOWED ON OUTLET END.
5. ALL BOLT HARDWARE SHALL BE STAINLESS STEEL.

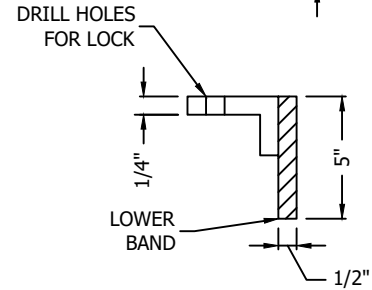
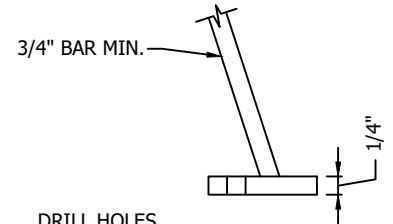
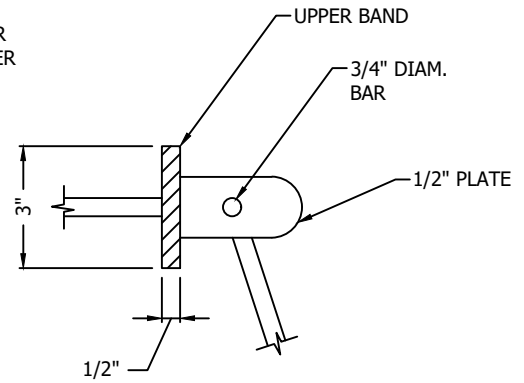
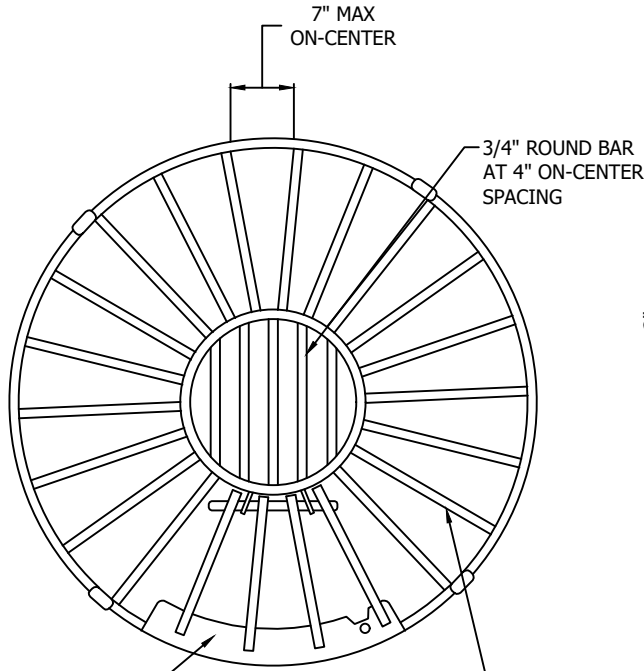
CITY OF KIRKLAND	
PLAN NO. CK - D.27	
	TYPICAL DEBRIS BARRIER



NOTES

1. REQUIRED FOR ANY PIPE 8" OR LARGER.
2. DEBRIS BARRIER MUST BE ALL ALUMINUM.
3. DEBRIS BARRIER NOT ALLOWED ON OUTLET END.
4. ALL BOLT HARDWARE SHALL BE STAINLESS STEEL.
5. ATWOOD FABRICATION OR APPROVED EQUAL.

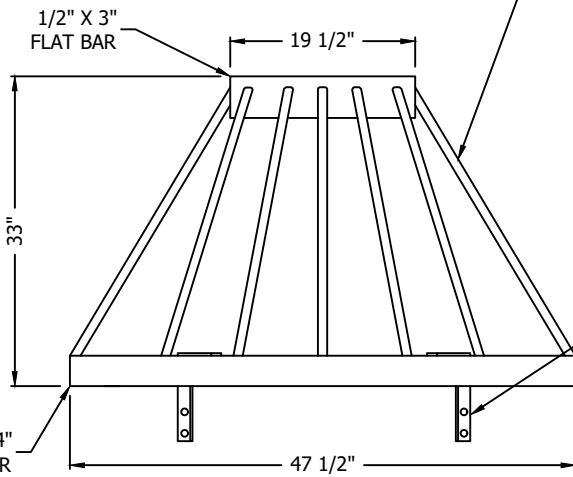
CITY OF KIRKLAND	
PLAN NO. CK - D.27A	
	TYPICAL DEBRIS BARRIER WITH OVERFLOW



ENTRY GATE DETAIL

24" ACCESS DOOR WITH LOCKING MECHANISM

PLAN



ELEVATION

FOUR 3/8" X 2" FLAT BAR, 8" LONG ANCHOR PLATE W/ TWO 5/8" HOLES

CB	LOWER BAND O.D.	UPPER BAND O.D.
48"	47.5"	19.5"
54"	53.5"	23.5"
60"	59.5"	23.5"
72"	71.5"	28.5"
96"	95.5"	36.0"

NOTES:

1. ALL METAL PARTS SHALL BE 6061 ALUMINUM, STAINLESS STEEL HARDWARE.
2. ALL JOINTS SHALL BE WELDED SOLID.

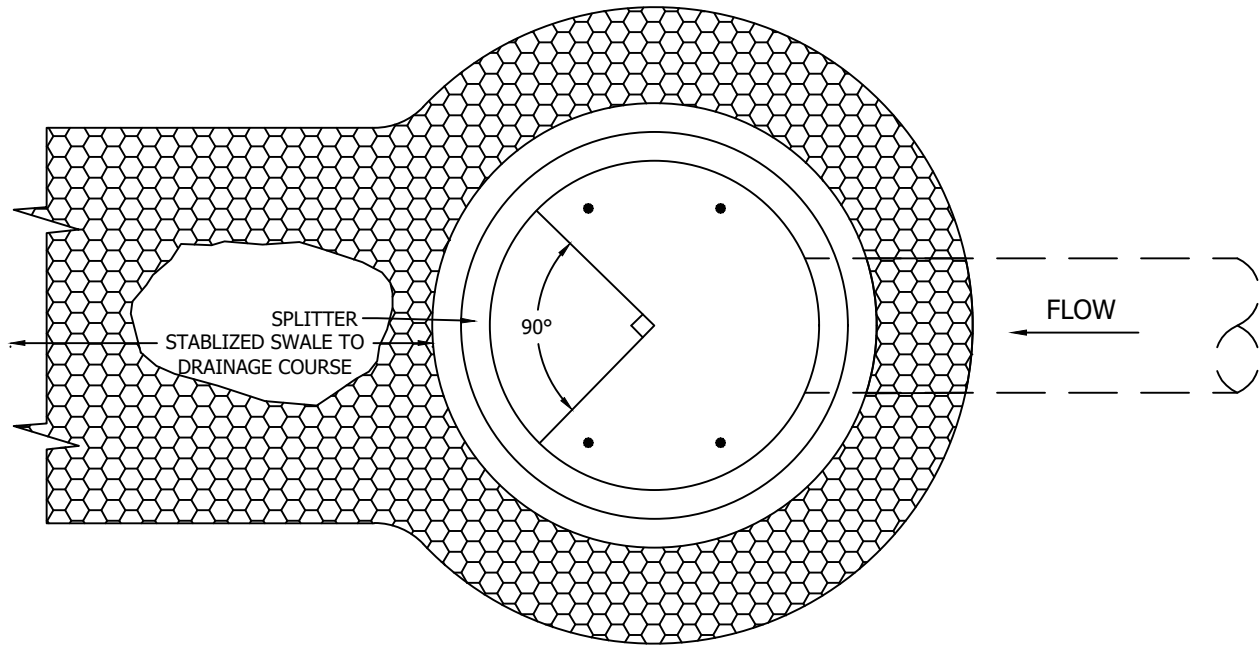
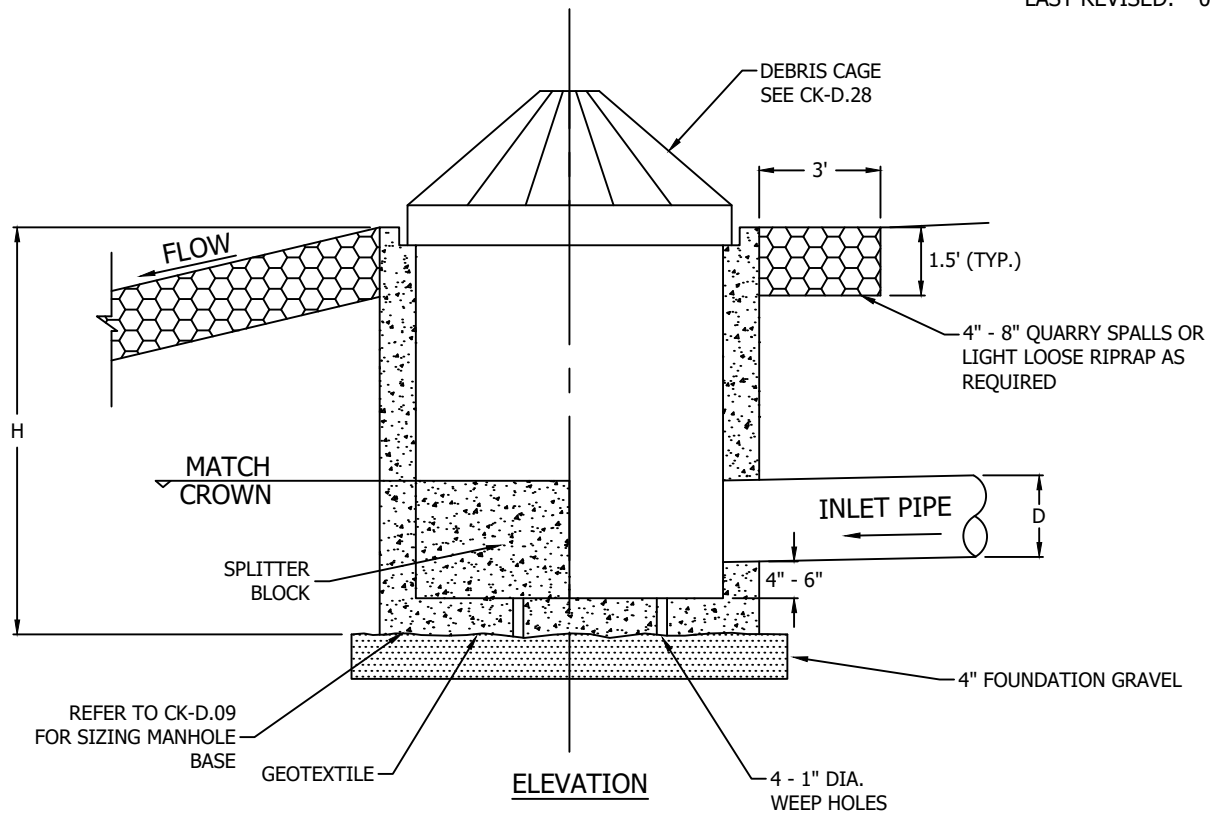
NOT TO SCALE

CITY OF KIRKLAND

PLAN NO. CK - D.28

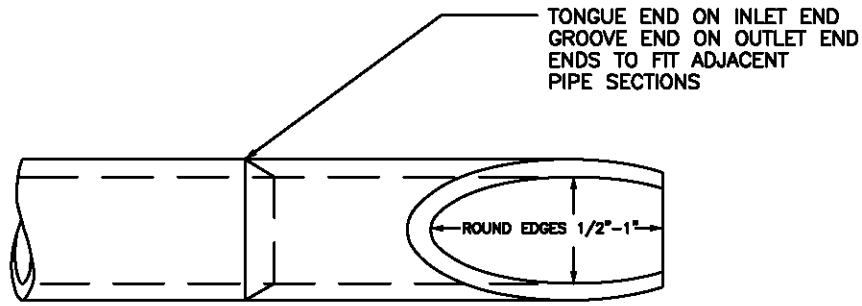


DEBRIS CAGE

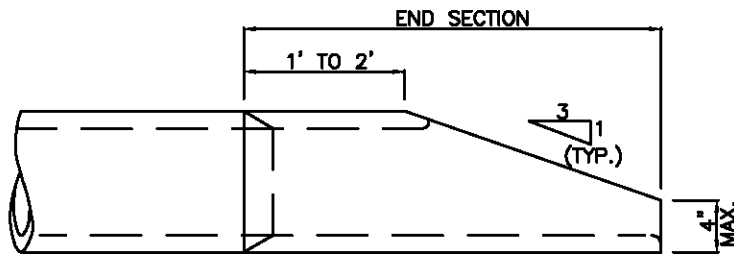


INLET PIPE SIZE "D"	BASE HEIGHT "H"
8"	2'
12"	3'
18"	3'
24"	4'

CITY OF KIRKLAND	
PLAN NO. CK - D.29	
	ENERGY DISSIPATOR

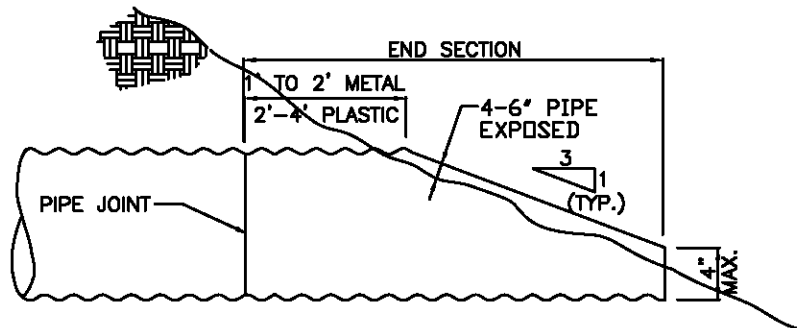


PLAN



ELEVATION

CONCRETE PIPE



METAL & THERMO-PLASTIC PIPE

NOTE:

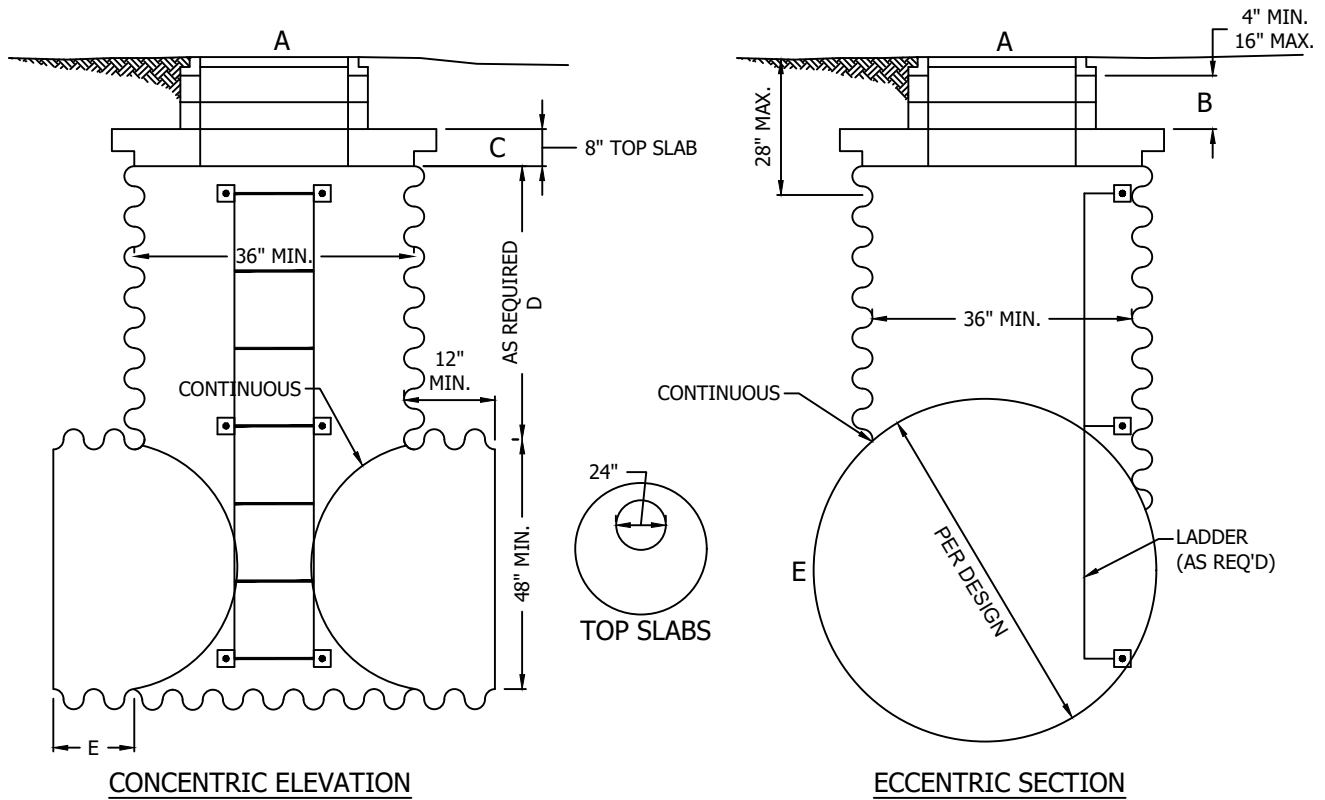
SIDE SLOPE SHALL BE WARPED TO MATCH THE BEVELED PIPE END. WHEN CULVERT IS ON SKEW, BEVELED END SHALL BE ROTATED TO CONFORM TO SLOPE. IF SLOPE DIFFERS FROM 3:1, PIPE SHALL BE BEVELED TO MATCH SLOPE.

CITY OF KIRKLAND

PLAN NO. CK-D.30



BEVELED END
PIPE SECTION




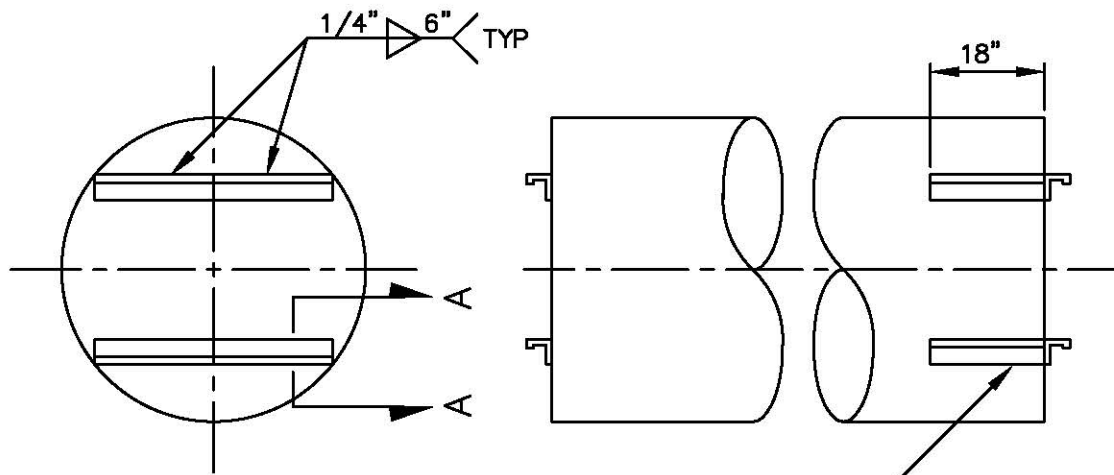
LEGEND

- A. 24" MANHOLE FRAME WITH LOCKING COVER PER CK-D.18 OR CK-D.18A.
- B. CONCRETE GRADE RINGS AS NEEDED TO MATCH FINISHED GRADE. SEE CK.D09.
- C. CONCRETE TOP SLAB SHORT ADJUSTMENT UNIT WITH FRAME AND GRATE PER STANDARDS.
- D. MATERIAL TO MATCH DETENTION PIPE. CMP RISER: 16 GAUGE HELICAL OR ANNULAR CORRUGATED METAL PIPE, MATERIAL AND DIAMETER TO MATCH DETENTION PIPE. FOR DEPTHS GREATER THAN 4' USE STEPS PER STANDARD PLAN CK-D.12. FOR DEPTHS GREATER THAN 5' AN ACCESS RISER WITH A MINIMUM DIAMETER OF 48" WILL BE USED.
- E. CORRUGATED METAL STUBS AND DETENTION PIPE TO BE SAME GAUGE. STUB LENGTHS TO BE 12" MIN.

NOTES

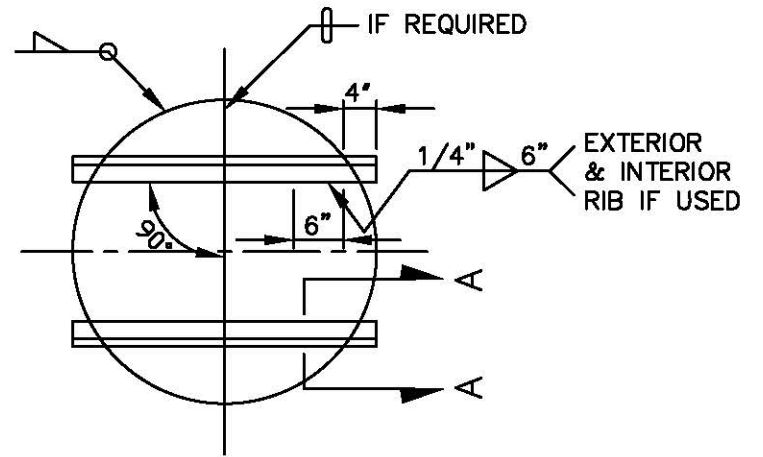
- 1. ALL METAL PARTS AND SURFACES MUST BE ALUMINUM OR ALUMINIZED. ALL CUTS MUST BE SPRAYED WITH ALUMINIZED TREATMENT.
- 2. NOT FOR USE IN PUBLIC ROADWAYS. USE IN DRIVEWAYS AND OTHER TRAFFIC AREAS AS APPROVED BY PUBLIC WORKS.
- 3. A MAX. DEPTH OF 15' AND A MAX. COVER OF 8' IS ALLOWED FOR TANKS.
- 4. CORRUGATED METAL MANHOLE ONLY ALLOWED TO BE USED TO ACCESS PROPOSED DETENTION TANK FACILITIES.

CITY OF KIRKLAND	
PLAN NO. CK - D.32	
	CORRUGATED METAL MANHOLE

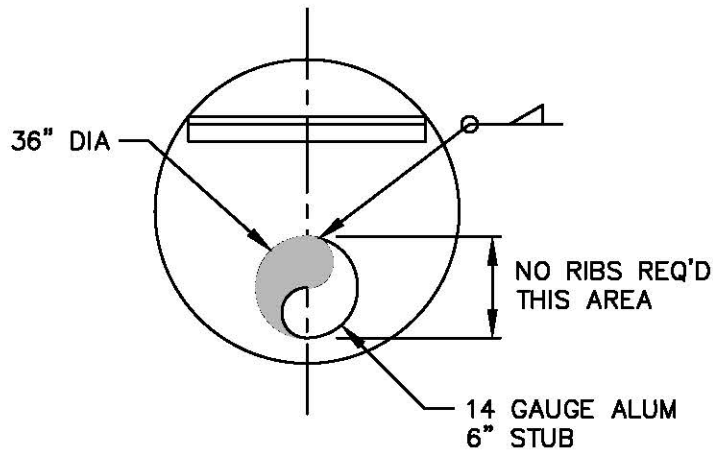


RIB DETAIL A

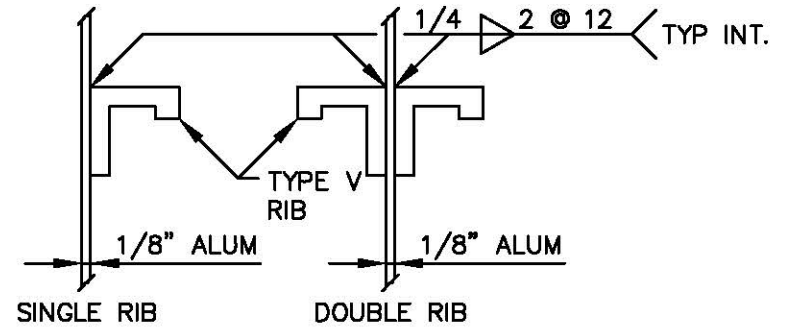
1/4 1-1/2 @ 9 (EA
1/4 CREST CORRUGATION)



RIB DETAIL B



RIB DETAIL C



SECTION A-A

NOTES

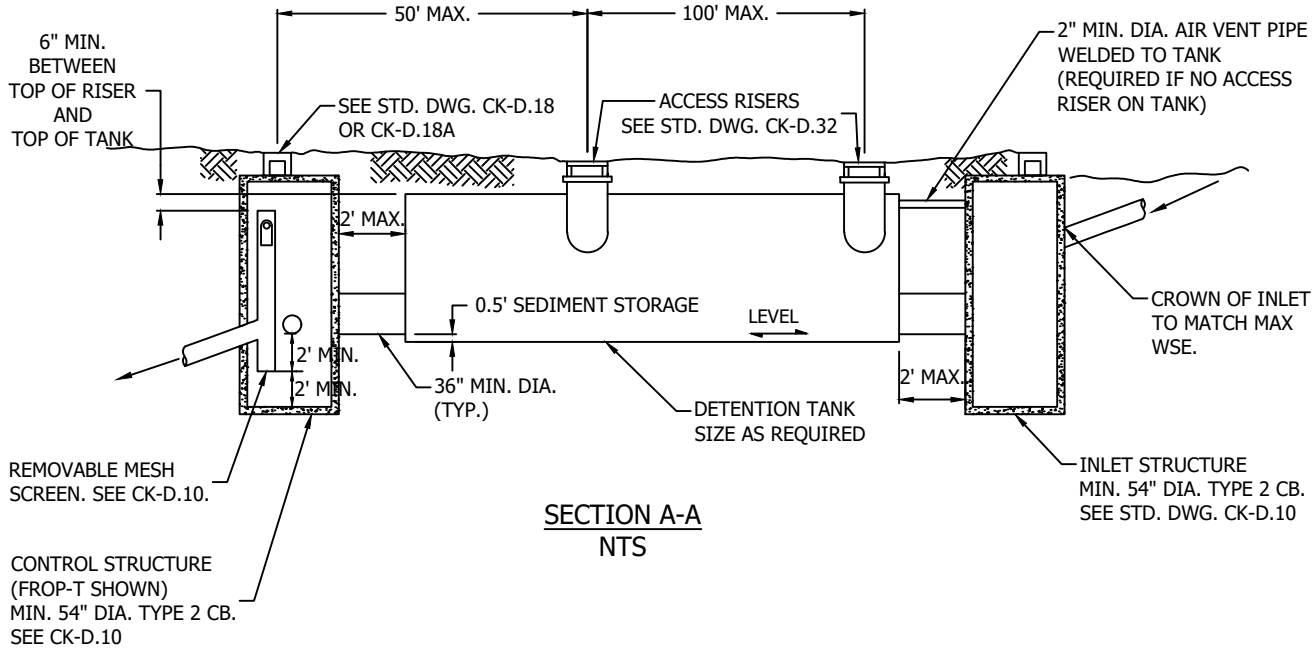
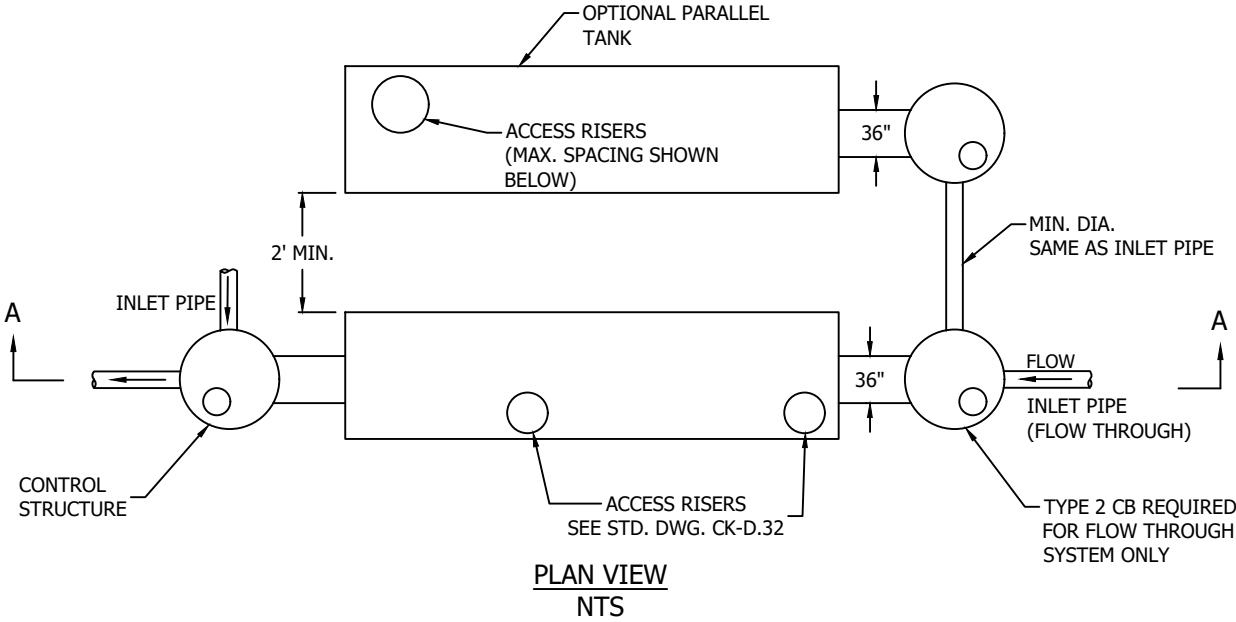
1. USE RIB DETAIL B WHEN SIDE BRACKETS ARE REQUIRED.
2. RIBS ARE NOT REQUIRED TO BE USED AROUND TANK NOZZLES AS SHOWN IN DETAIL C.



PLAN NO. CK-D.33


CITY OF KIRKLAND

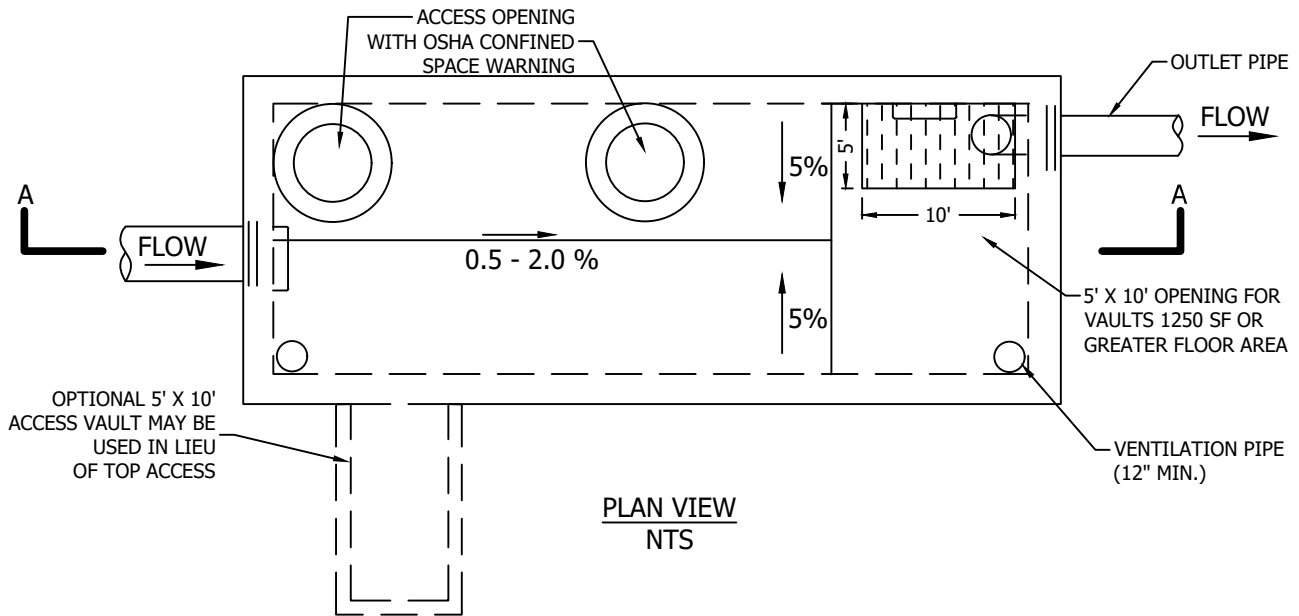
DETENTION
STRUCTURE END
PLATE DETAIL



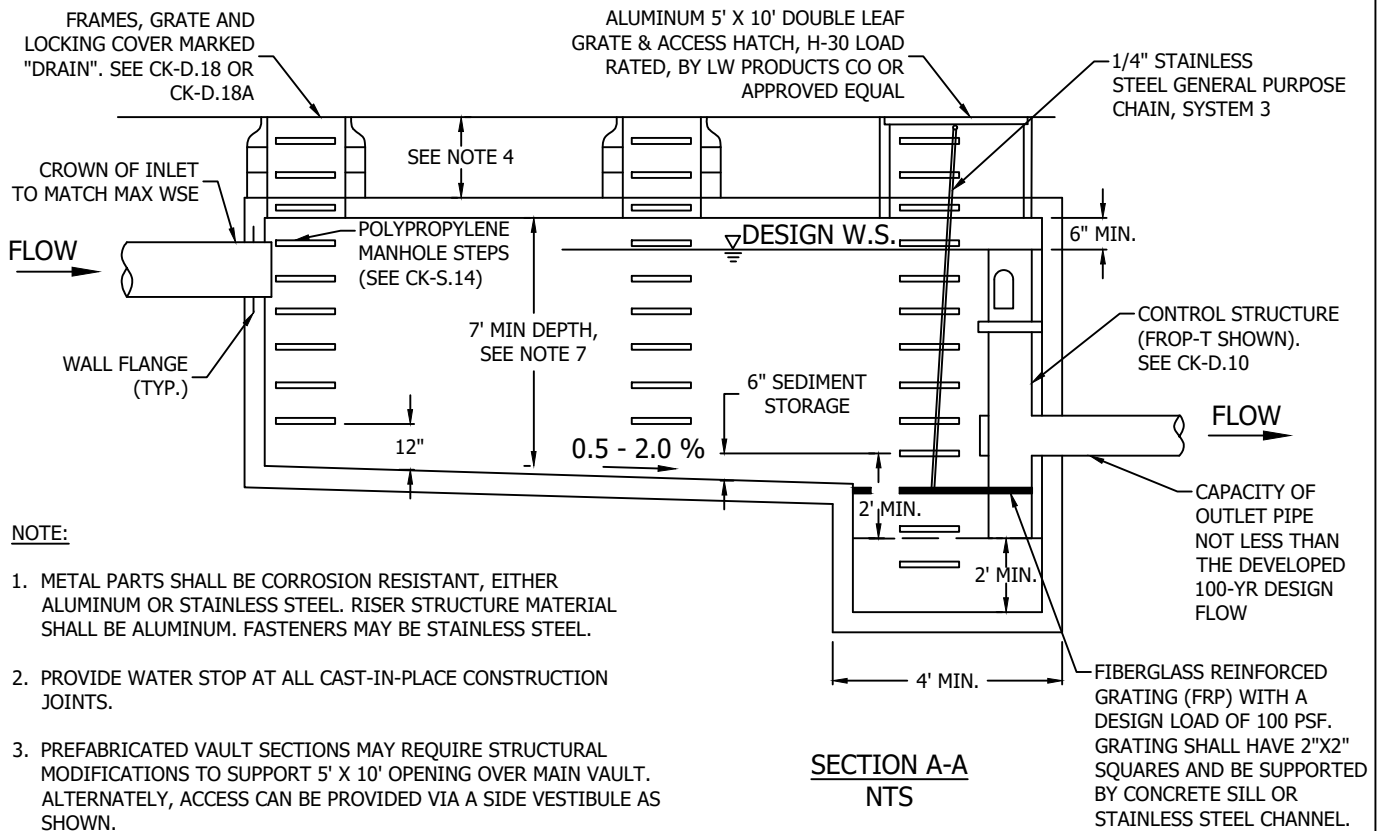
NOTES:

1. METAL PARTS SHALL BE CORROSION RESISTANT, EITHER ALUMINUM OR STAINLESS STEEL. RISER STRUCTURE MATERIAL SHALL BE ALUMINUM. FASTENERS MAY BE STAINLESS STEEL.
2. ACCESS MANHOLES SHALL BE POSITIONED 50' MAX FROM ANY POINT WITHIN THE STRUCTURE.
3. ONE ACCESS RISER MINIMUM FOR ALL TANKS.
4. NO INLET PIPES SHALL BE WELDED TO THE SIDES OF TANKS; ALL CONNECTIONS SHALL BE THROUGH CATCH BASINS, UNLESS APPROVED BY THE CITY.
5. A MAX. DEPTH OF 15' AND A MAX. COVER OF 8' IS ALLOWED FOR TANKS.
6. ALLOWABLE TANK TYPES (SEE POLICY D-10):
 - a. COATED CORRUGATED METAL PIPE (CMP)
 - b. ALUMINUM ALLOY PIPE
 - c. STEEL-REINFORCED POLYETHYLENE PIPE (SRPE)

CITY OF KIRKLAND	
PLAN NO. CK - D.34	
	DETENTION TANK




PLAN VIEW
NTS

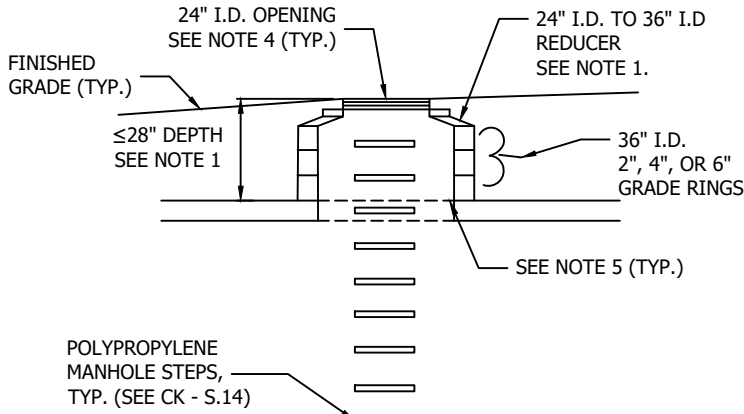


SECTION A-A
NTS

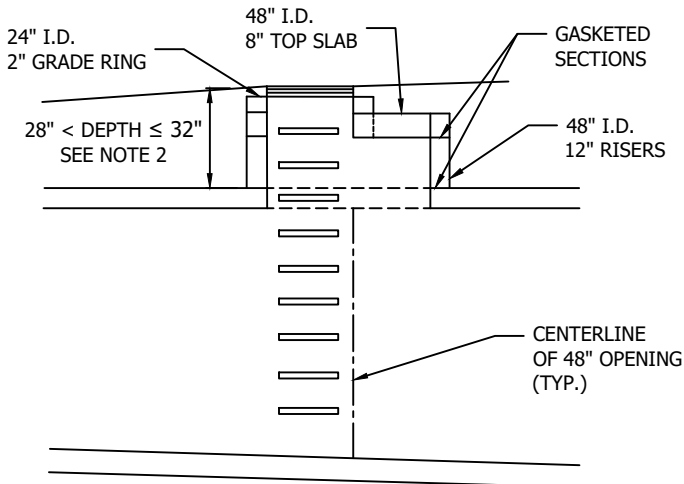
NOTE:

1. METAL PARTS SHALL BE CORROSION RESISTANT, EITHER ALUMINUM OR STAINLESS STEEL. RISER STRUCTURE MATERIAL SHALL BE ALUMINUM. FASTENERS MAY BE STAINLESS STEEL.
2. PROVIDE WATER STOP AT ALL CAST-IN-PLACE CONSTRUCTION JOINTS.
3. PREFABRICATED VAULT SECTIONS MAY REQUIRE STRUCTURAL MODIFICATIONS TO SUPPORT 5' X 10' OPENING OVER MAIN VAULT. ALTERNATELY, ACCESS CAN BE PROVIDED VIA A SIDE VESTIBULE AS SHOWN.
4. SEE CK-D.35A FOR VAULT ACCESS REQUIREMENTS.
5. ACCESS MANHOLES SHALL BE POSITIONED 50' MAX FROM ANY POINT WITHIN THE STRUCTURE.
6. PROVIDE WATER STOP AT ALL CAST-IN-PLACE CONSTRUCTION POINTS. PRECAST VAULTS SHALL HAVE APPROVED RUBBER GASKET SYSTEMS, WITH JOINTS GROUTED AFTER INSTALL.
7. DEPTH MAY BE REDUCED TO A 4-FOOT MINIMUM FOR PROJECTS THAT QUALIFY AS 4-LOT PLATS OR LESS, WITH APPROVAL OF CITY ENGINEER.

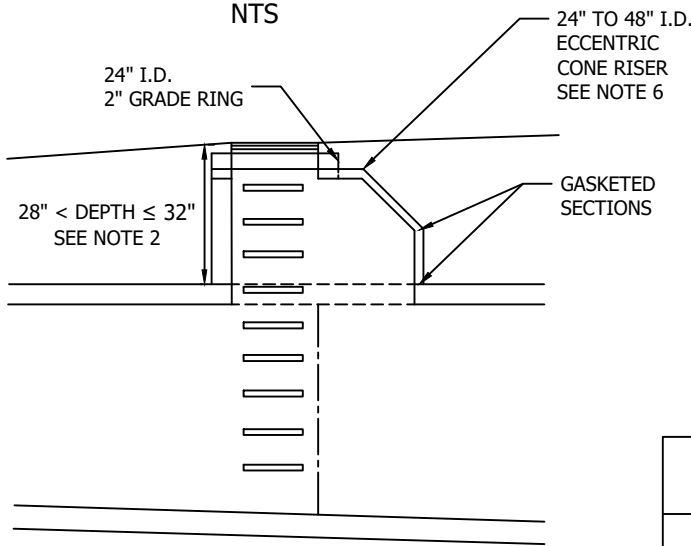
CITY OF KIRKLAND	
PLAN NO. CK - D.35	
	DETENTION VAULT



GRADE RINGS ONLY
PROFILE VIEW
NTS



GRADE RINGS, RISERS AND TOP SLAB
PROFILE VIEW
NTS



**GRADE RINGS WITH ECCENTRIC
CONE TRANSITION**
PROFILE VIEW
NTS

NOTE:

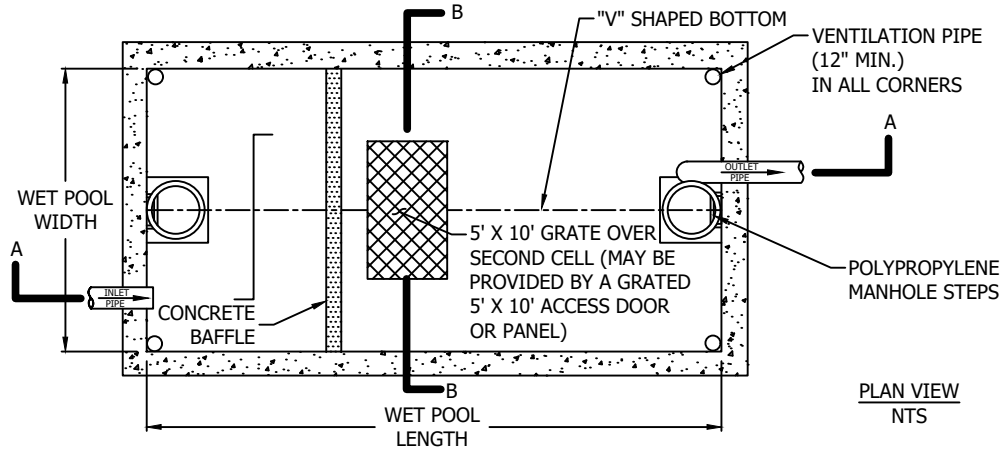
1. 24 INCH ACCESS LID SET ON REDUCER ATOP 36 INCH GRADE RINGS TO BE USED WHEN DEPTH TO VAULT OPENING IS 28 INCHES OR LESS FROM THE SURFACE.
2. TRANSITION TO 48 INCH ACCESS TO BE USED WHEN DEPTH TO VAULT OPENING IS GREATER THAN 28 INCHES FROM THE SURFACE. FOR DEPTHS BETWEEN 28 INCHES AND 32 INCHES, USE COMBINATION OF RISERS AND TOP SLAB. FOR DEPTHS GREATER THAN 32 INCHES, USE ECCENTRIC CONE TRANSITION.
3. REFER TO MANUFACTURER FOR HOW ACCESS RISERS AND TOP SLAB SHALL BE STRUCTURALLY SUPPORTED.
4. REFER TO CK-D.18, CK-D.18A, AND CK-D.18B FOR APPROPRIATE 24 INCH ACCESS CASTING.
5. BOND FROM ACCESS RISERS, GRADE RINGS, OR CONE TO VAULT SHALL BE WET SET IN 3/4" NON-SHRINK GROUT. GROUT BETWEEN ALL JOINTS (NO JETSET OR SPEED CRETE RED LINE GROUT). ALL SURFACES MUST BE CLEAN OF DEBRIS AND DIRT, AND WETTED PRIOR TO GROUTING. GROUT SMOOTH INSIDE AND OUTSIDE SURFACE PRIOR TO BACKFILL.
6. MUST BE ECCENTRIC CONE. CONCENTRIC CONE IS NOT ALLOWED.

CITY OF KIRKLAND

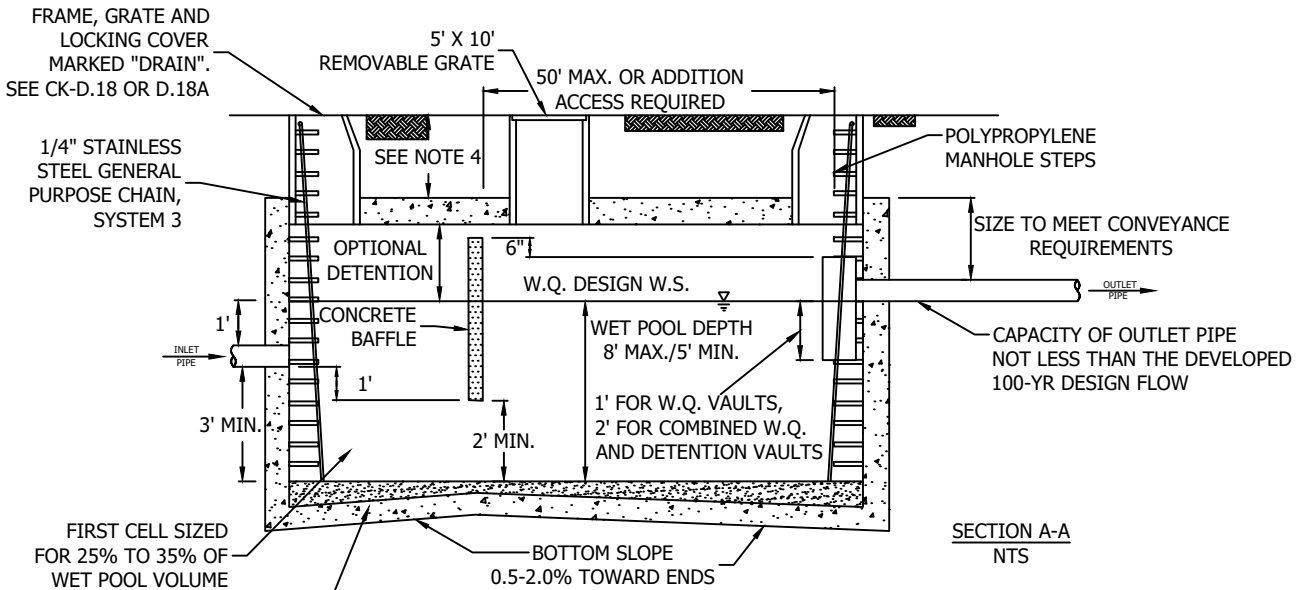
PLAN NO. CK - D.35A



**VAULT
ACCESS**



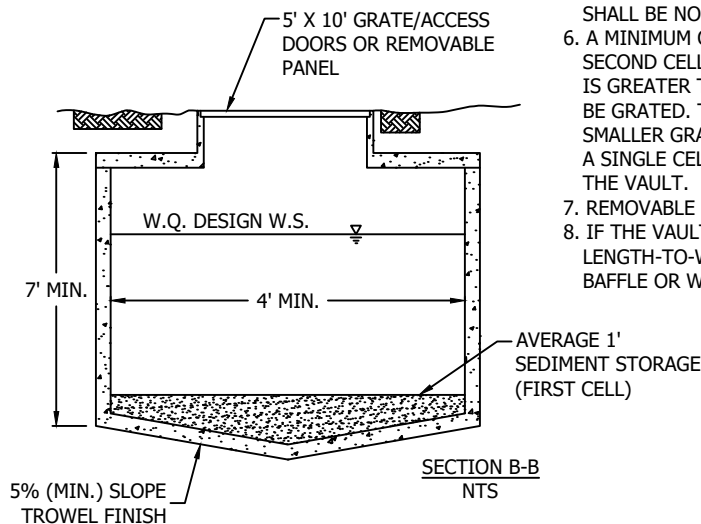
PLAN VIEW
NTS



SECTION A-A
NTS

NOTE:

1. HARDWARE AND METAL PARTS SHALL BE ALUMINUM OR STAINLESS.
2. PROVIDE WATER STOP AT ALL CAST-IN-PLACE CONSTRUCTION JOINTS.
3. PREFABRICATED VAULT SECTIONS MAY REQUIRE STRUCTURAL MODIFICATIONS TO SUPPORT 5' X 10' OPENING OVER MAIN VAULT. ALTERNATELY, ACCESS CAN BE PROVIDED VIA A SIDE VESTIBULE AS SHOWN.
4. REFER TO CK-D.35 AND D.35A FOR ACCESS SIZING.
5. DISTANCE BETWEEN ACCESS MANHOLES AND ANY POINT WITHIN THE STRUCTURE SHALL BE NO GREATER THAN 50' MAX.
6. A MINIMUM OF 50 SQUARE FEET OF GRATE SHALL BE PROVIDED OVER THE SECOND CELL. FOR VAULTS IN WHICH THE SURFACE AREA OF THE SECOND CELL IS GREATER THAN 1,250 SQUARE FEET, 4% OF THE TOTAL SURFACE AREA SHALL BE GRATED. THIS REQUIREMENT MAY BE MET BY ONE GRATE OR BY MANY SMALLER GRATES DISTRIBUTED OVER THE SECOND CELL AREA. IF THE VAULT IS A SINGLE CELL, VENTILATION SHALL BE PROVIDED OVER THE SECOND HALF OF THE VAULT.
7. REMOVABLE BAFFLE IS NOT ALLOWED IN PUBLICLY MAINTAINED VAULTS.
8. IF THE VAULT IS LESS THAN 2,000CF (INSIDE DIMENSIONS) OR IF THE LENGTH-TO-WIDTH RATIO OF THE VAULT POOL IS 5:1 OR GREATER, THE BAFFLE OR WALL MAY BE OMITTED AND THE VAULT MAY BE ONE-CELLED.



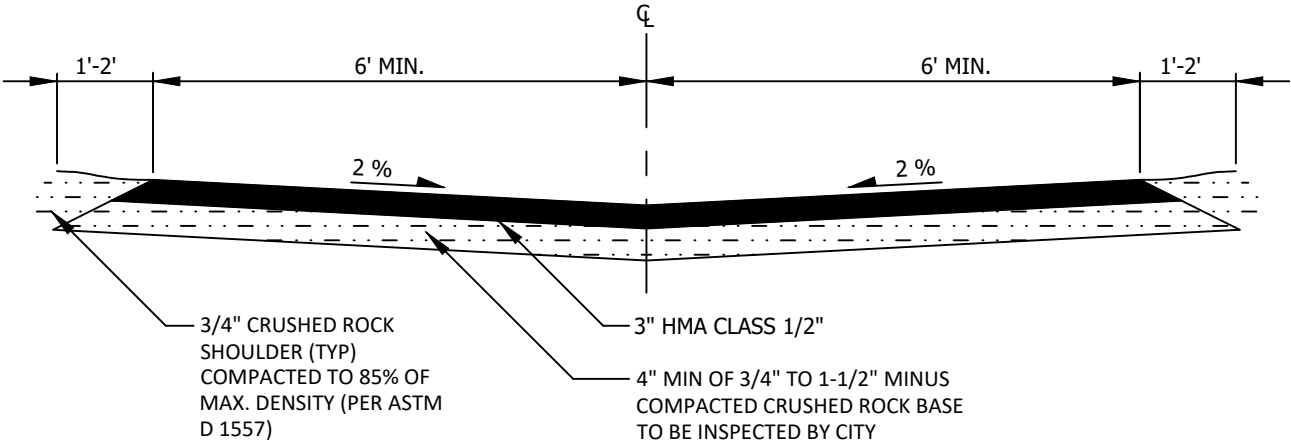
SECTION B-B
NTS

CITY OF KIRKLAND

PLAN NO. CK - D.36



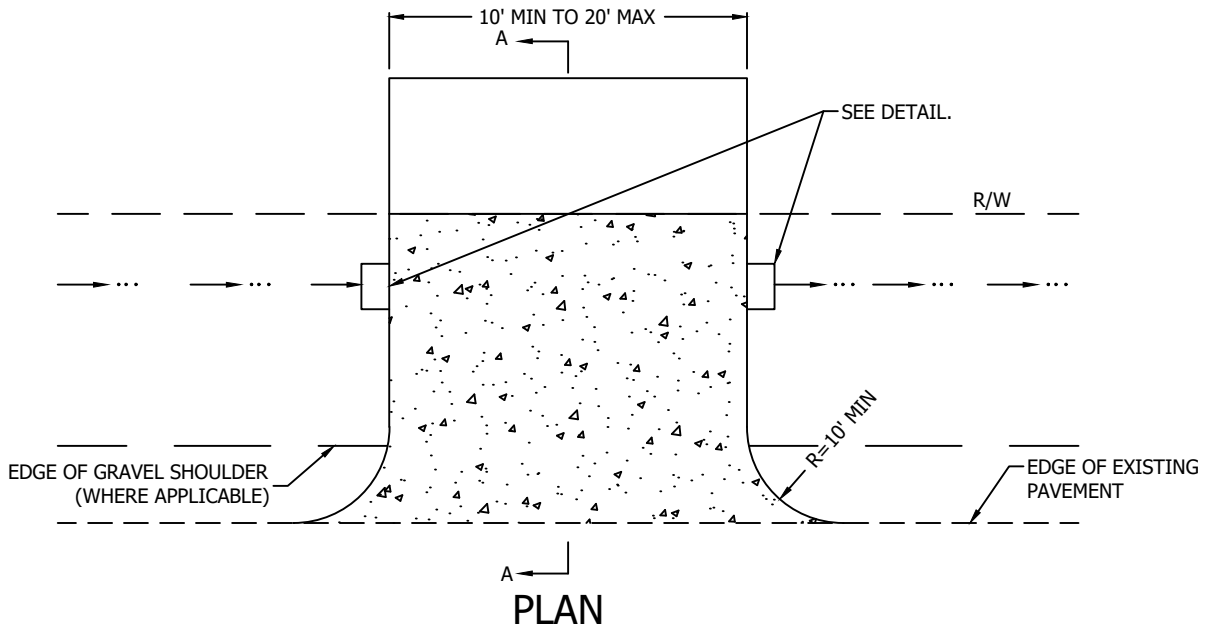
WET VAULT



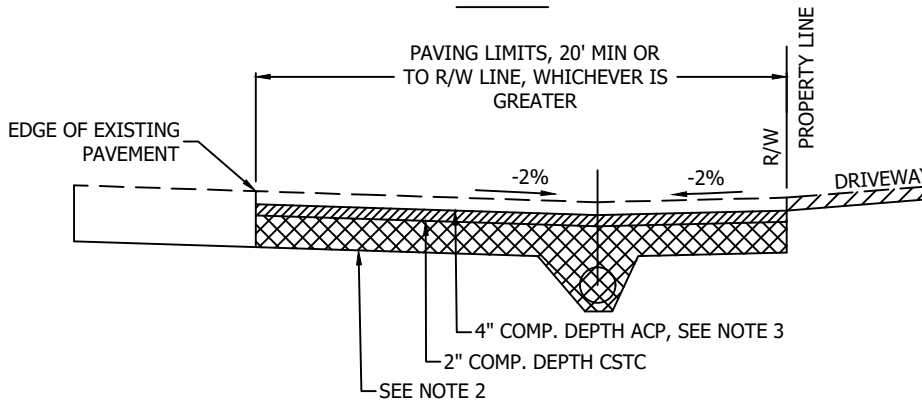
NOTES

1. ALL UTILITY ACCESS ROADS SHALL HAVE A MINIMUM PAVEMENT WIDTH OF 12 FEET UNLESS APPROVED BY THE PUBLIC WORKS DEPARTMENT.
2. INVERT DRAINAGE TO BE COLLECTED AT LOW END OF IMPROVED SECTION WITH CATCH BASIN INSTALLATION AND TIGHTLINED TO STORM DRAIN SYSTEM.
3. COMPACTION TESTS ON SUBGRADE AND ROCK GRADE SHALL BE REQUIRED. THE NUMBER OF TESTS SHALL BE AT THE DISCRETION OF THE CITY INSPECTOR. ALL TESTS, AS REQUIRED, SHALL BE AT THE EXPENSE OF THE CONTRACTOR OR DEVELOPER THROUGH ANY LICENSED TESTING LAB OF THEIR CHOICE. THE MINIMUM COMPACTION SHALL BE 95% OF MAXIMUM RELATIVE DENSITY (PER ASTM D1557) ON BOTH SUBGRADE AND ROCK SURFACES.
4. ADJUSTMENT OF CATCH BASIN LIDS OR GRATES, MANHOLE LIDS, MONUMENT CASES, VALVE BOXES, ETC., SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR OR DEVELOPER AS REQUIRED AND SHALL BE ADJUSTED AFTER THE FINAL LIFT OF ASPHALT HAS BEEN PLACED. REFER TO CK-D.06 THROUGH D.11 FOR PROPER GROUTING AND CASTING INFORMATION.
5. PRIOR TO INSTALLING 2" ASPHALT OVERLAY, PRE-EMERGENCE HERBICIDE MUST BE APPLIED OVER THE COMPACTED BASE COURSE MATERIAL AND BELOW SHOULDER.
6. ACCESS ROADS WITH CURVES MUST BE EVALUATED WITH TURNING TEMPLATES AND MADE WIDER AS NEEDED.

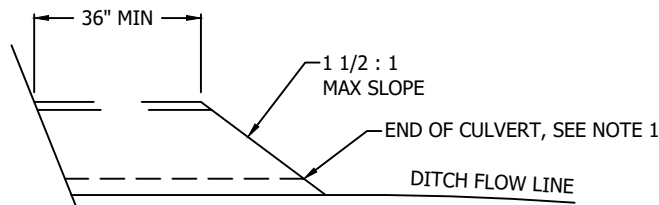
CITY OF KIRKLAND	
PLAN NO. CK - D.37	
	UTILITY ACCESS ROAD CROSS-SECTION



PLAN




SECTION A-A

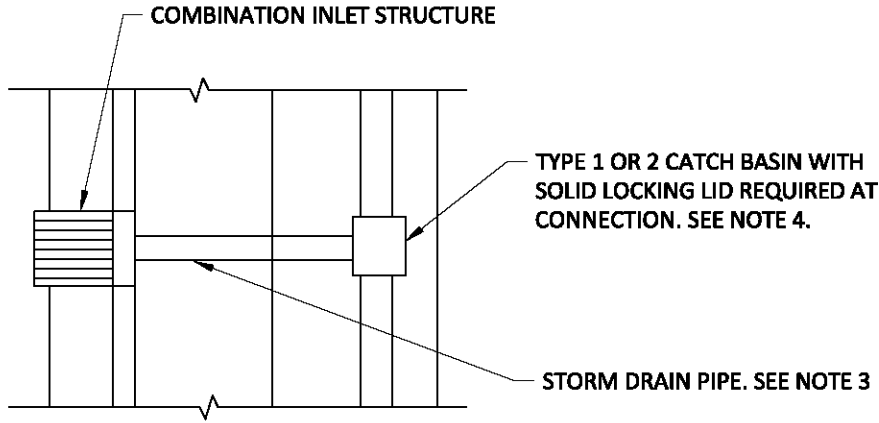


DETAIL

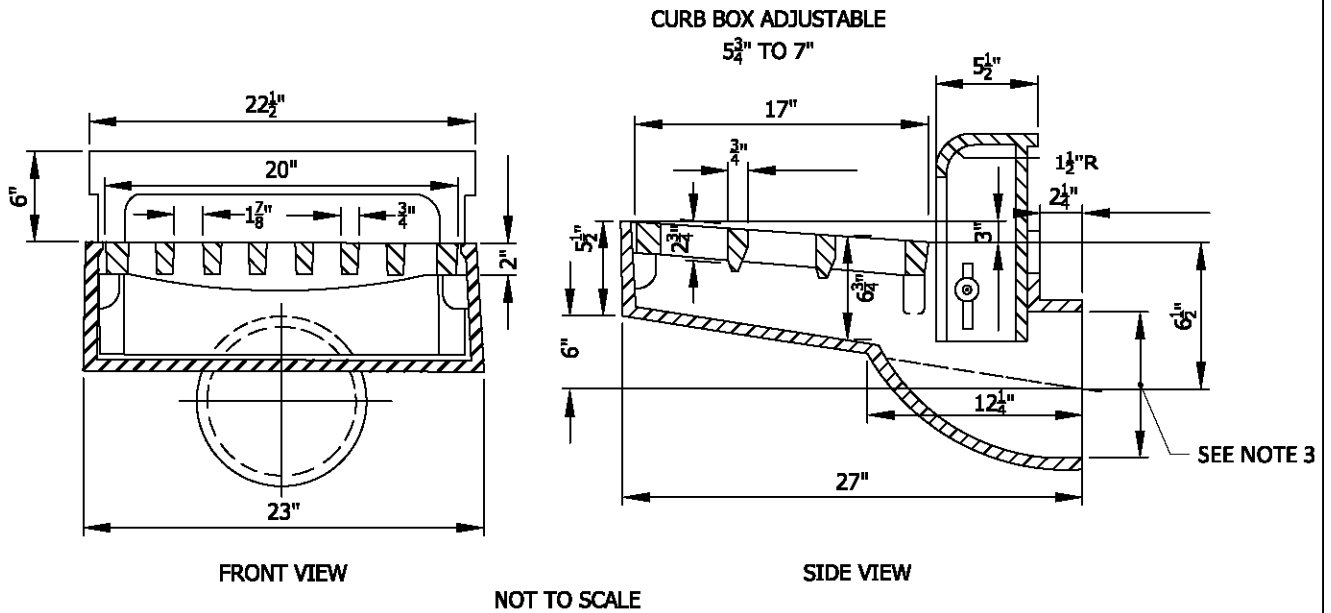
NOTES:

1. USE PVC 3034 PIPE. FOR LESS THAN 18 INCHES OF COVER, USE C900 OR DI CLASS 50 OR ABOVE.
2. USE 5/8 INCH CRUSHED ROCK, WITH A MINIMUM OF 0.1 FEET UNDER THE PIPE AND 100% CRUSHED ROCK BACKFILL.
3. ONLY ASPHALT PAVING IS ALLOWED IN THE RIGHT OF WAY.


CITY OF KIRKLAND	
PLAN NO. CK - D.40	
	CULVERT UNDER RESIDENTIAL DRIVEWAY

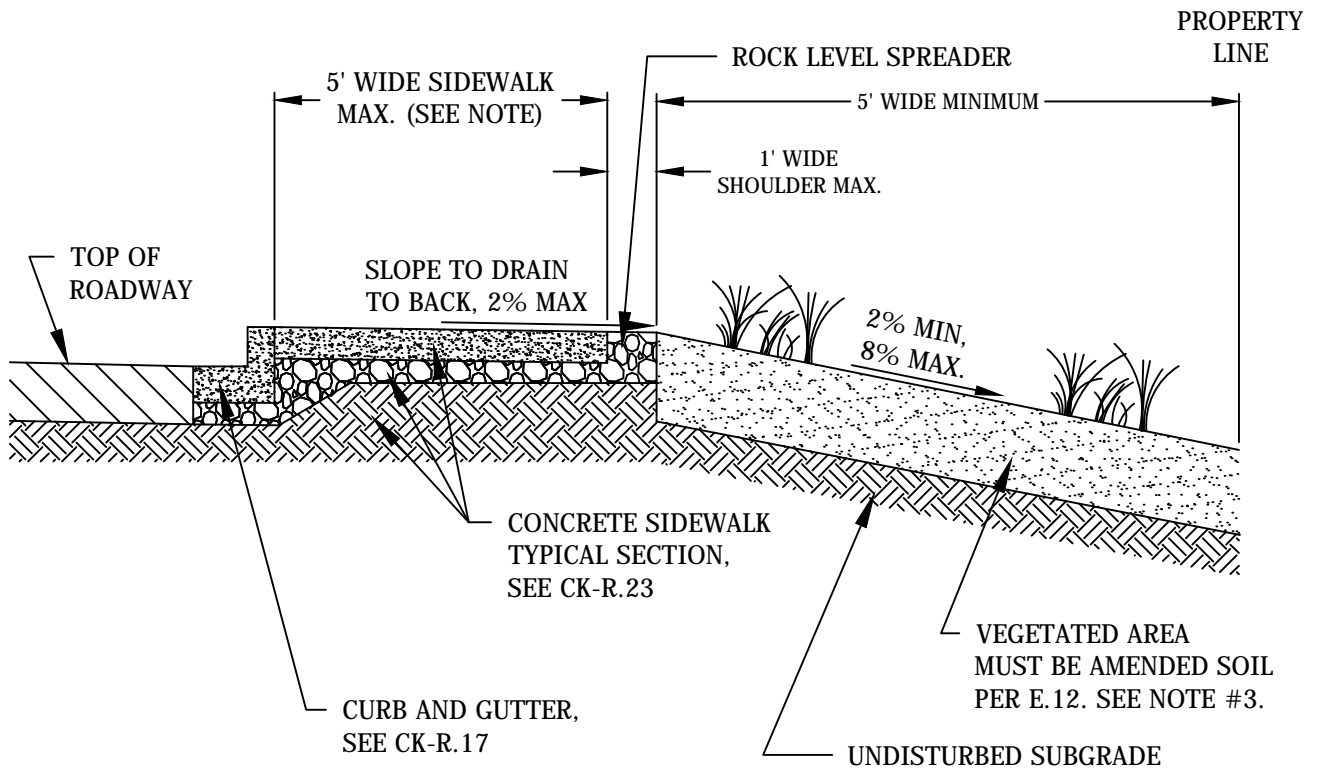


PLAN VIEW
NOT TO SCALE



1. FOR USE WHERE CONDITIONS DO NOT PERMIT USE OF A CATCH BASIN UNDER INLET. COK PUBLIC WORKS APPROVAL REQUIRED.
2. DUCTILE IRON GRATE AND CASTING.
3. 12" REAR OUTLET ONLY. 8" IF APPROVED BY PUBLIC WORKS DEPARTMENT.
4. CONNECTION MUST BE MADE AT A STRUCTURE NO BLIND TEES.
5. PRODUCT SUPPLIED BY NEENAH OR APPROVED EQUAL

CITY OF KIRKLAND	
PLAN NO. CK- D.41	
	COMBINATION INLET FRAME, GRATE & CURB BOX DETAIL



PROFILE VIEW

NOT TO SCALE

NOTE:

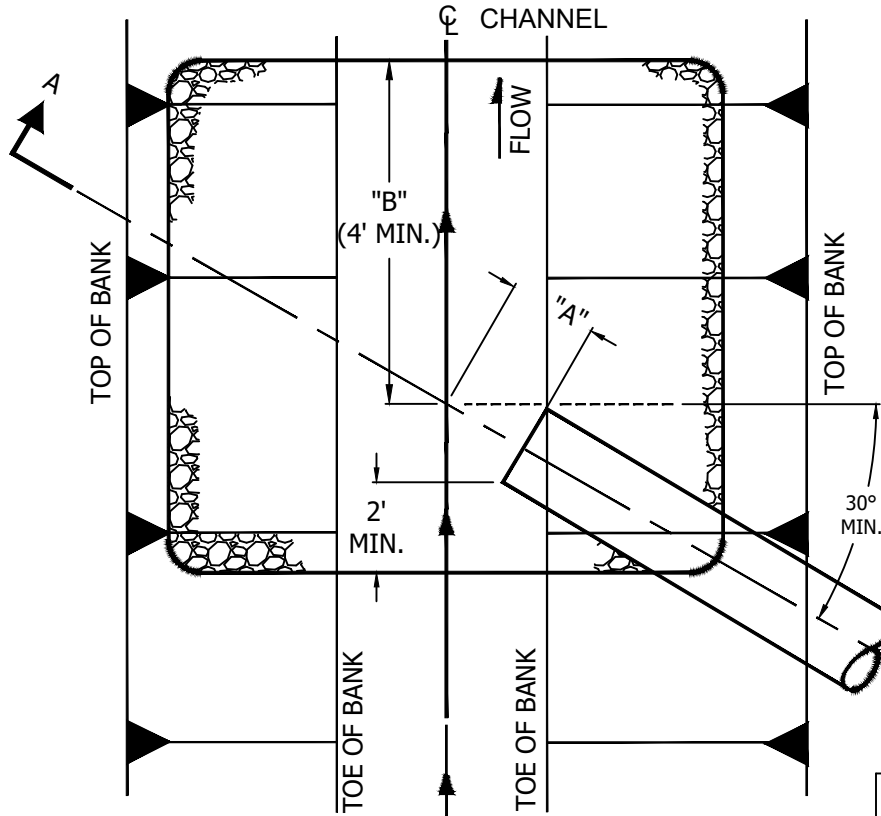
1. LONGITUDINAL SLOPE SHALL BE 10% MAXIMUM.
2. THE USE OF REVERSE SLOPE SIDEWALK REQUIRES APPROVAL FROM COK PUBLIC WORKS DEPARTMENT ON CASE-BY-CASE BASIS.
3. IF THIS AREA REMAINS UNDISTURBED AND NATIVE VEGETATION REMAINS, AMENDED SOILS ARE NOT REQUIRED.

CITY OF KIRKLAND

PLAN NO. CK- D.42



**REVERSE SLOPE
SIDEWALK**

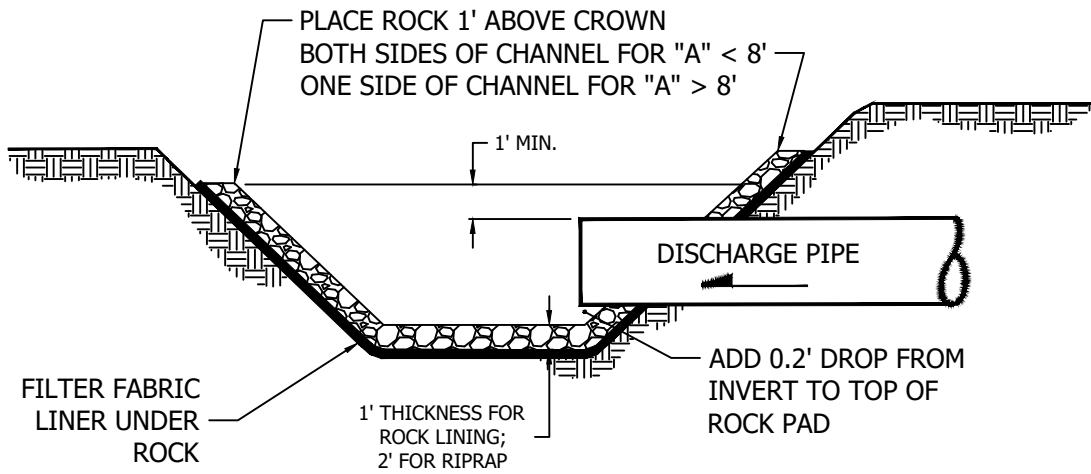


NOTE: "A" IS DISTANCE FROM END OF PIPE TO CENTER OF CHANNEL. "B" IS DISTANCE DOWNSTREAM FROM "A" TO END OF OUTFALL PROTECTION.

IF DISCHARGE VELOCITY IS LESS THAN OR EQUAL TO 5 FPS, USE ROCK LINING. IF DISCHARGE VELOCITY IS GREATER THAN 5 BUT EQUAL OR LESS THAN 10 FPS, USE RIPRAP. (TO BE DETERMINED BY ENGINEER)

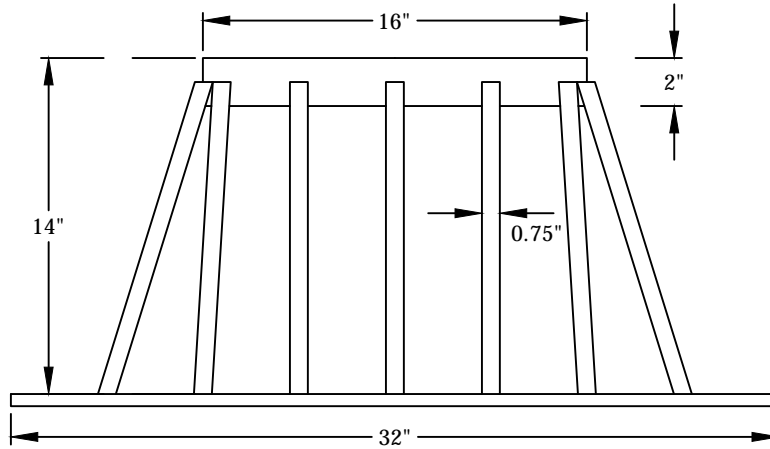
PLAN
NTS

REQUIRED DIMENSIONS	
"A" + "B"	8' FOR ROCK LINING
	12' FOR RIP RAP

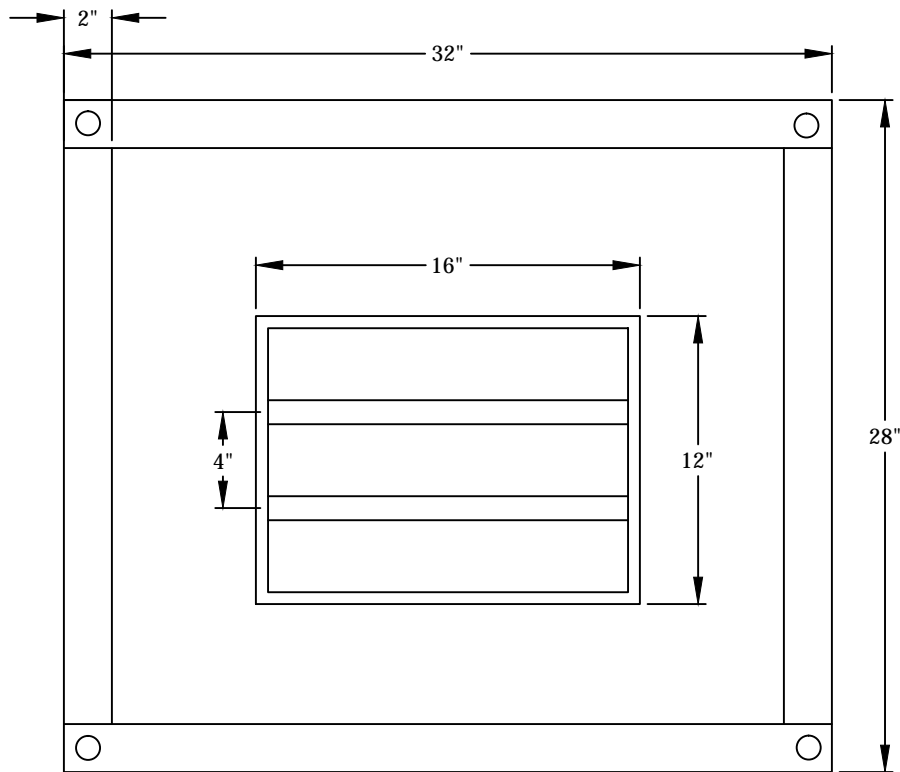


SECTION A-A
NTS

CITY OF KIRKLAND	
PLAN NO. CK - D.43	
<p>CITY OF KIRKLAND WASHINGTON</p>	<p>OUTFALL PROTECTION</p>




DETAIL
NTS

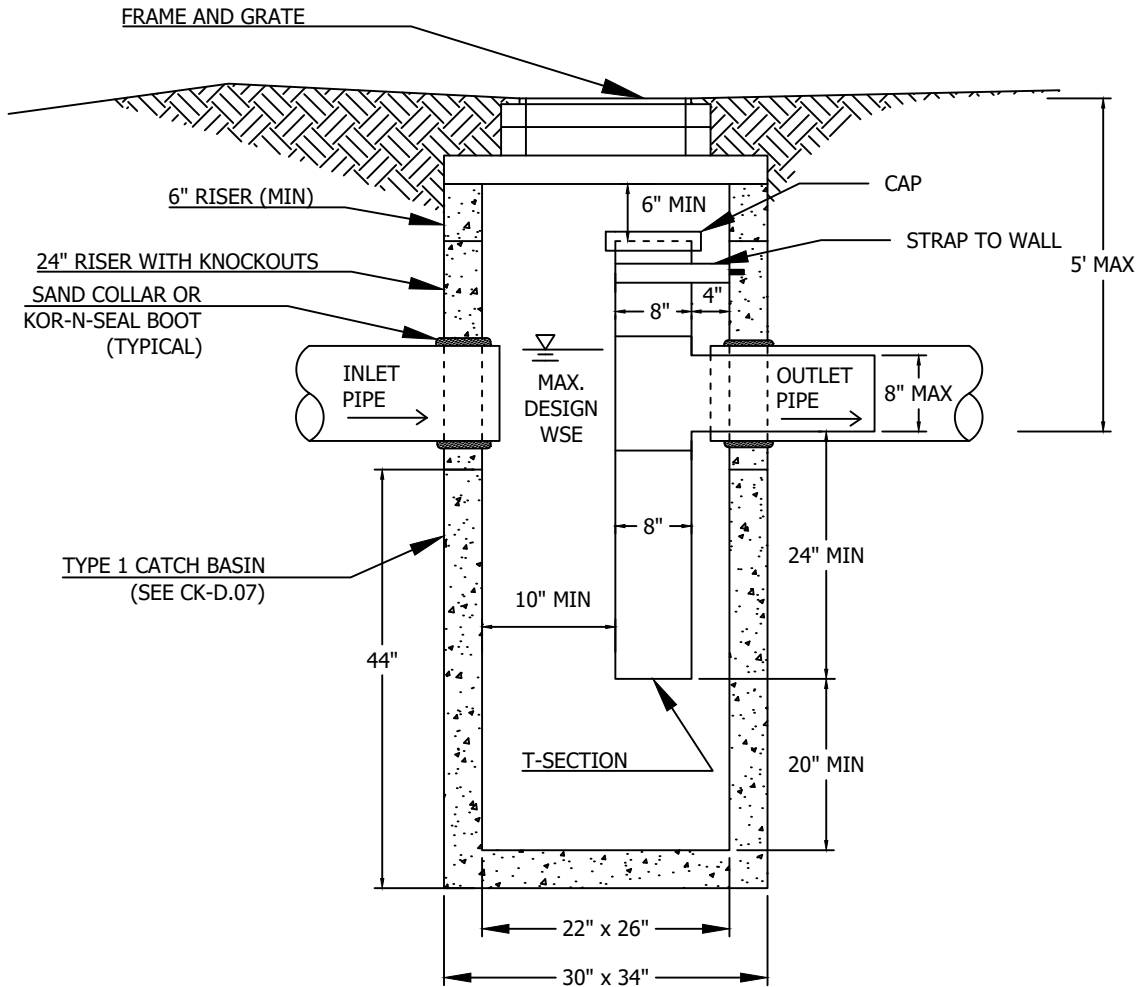


PLAN
NTS

NOTES

1. TO BE PLACED ON TOP OF VERTICAL OVERFLOW STRUCTURES, I.E., WITHIN BIORETENTION CELLS
2. 3/8" x 2 FLAT BAR
3. 3/4" ROUND BAR
4. 4-5/8" HOLE FOR MOUNTING
5. ALL MATERIAL 6061 ALUMINUM
6. MUST BE ANCHORED TO CONCRETE IN REMOVABLE FASHION WITH CORROSION-RESISTANT HARDWARE
7. PRODUCT: ATWOOD FABRICATION OR EQUAL


CITY OF KIRKLAND	
PLAN NO. CK- D.44	
	TYPE 1 CB DEBRIS (BIRD) CAGE

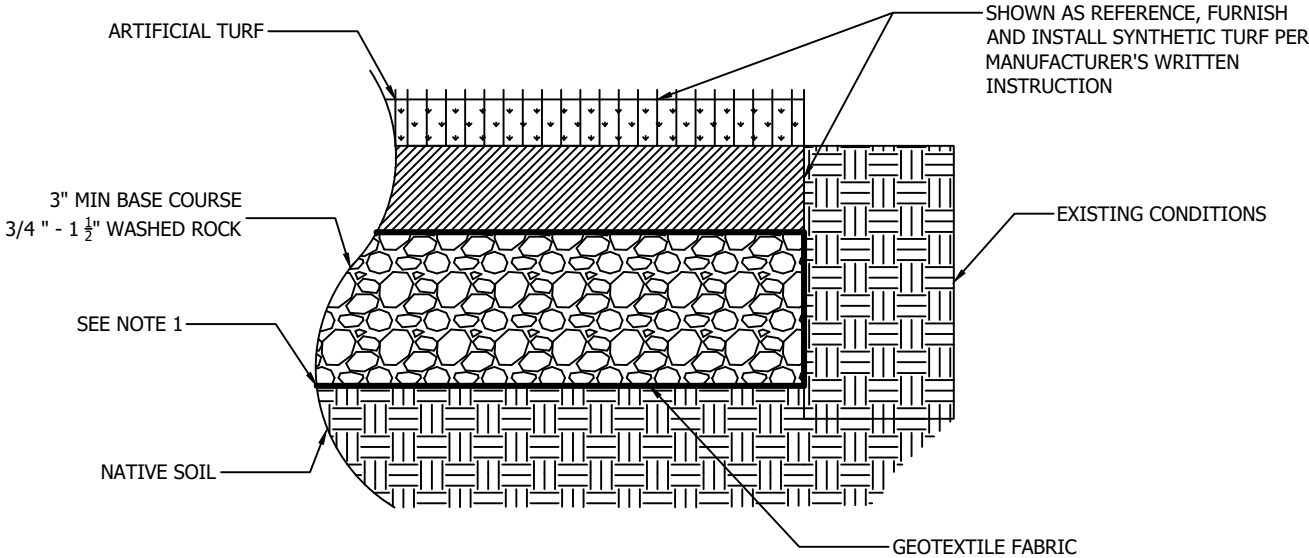


**DETAIL
NTS**

NOTES

1. MAX. OUTLET PIPE DIAMETER IS 8 INCHES. VERTICAL RISER SECTION SHALL BE ALIGNED PLUMB VERTICALLY. HORIZONTAL RISER SECTION SHALL MATCH OUTLET PIPE SLOPE.
2. ALL METAL PARTS AND SURFACES MUST BE CORROSION RESISTANT. STEEL HARDWARE SHALL BE GALVANIZED. PIPES SHALL BE PVC. COMPLETE CORROSION PROTECTION MUST BE ASSURED.
3. APPLY NON-SHRINK GROUT TO INSIDE AND OUTSIDE OF ALL JOINTS, RINGS, RISERS AND FRAMES.
4. SLIP SMOOTH-BORE HORIZONTAL LEG OF FLOW CONTROL TEE INSIDE CARRIER PIPE.
5. NO FLOW CONTROL JOINT OUTSIDE OF STRUCTURE.

CITY OF KIRKLAND	
PLAN NO. CK- D.45	
	PRIVATE TYPE 1 W/ SPILL CONTROL




ARTIFICIAL TURF SECTION

NOT TO SCALE

NOTES:

- 1. SCARIFY SOIL PRIOR TO LAYING GEOTEXTILE FABRIC AND 3" BASE COURSE OF WASHED ROCK.
- 2. IF AN UNDERDRAIN IS REQUIRED, APPROVAL MUST BE OBTAINED FROM THE ENGINEER AND THE CITY OF KIRKLAND.
- 3. THE 3" MIN BASE COURSE SHALL BE INSPECTED BEFORE TURF INSTALL.

CITY OF KIRKLAND	
PLAN NO. CK - D.46	
	RESIDENTIAL PERVIOUS ARTIFICIAL TURF DETAIL