

Pavement Sections

The performance of site pavements is largely related to the condition of the underlying subgrade. To ensure adequate pavement performance, the subgrade should be in a firm and unyielding condition when subjected to proofrolling with a loaded dump truck. Structural fill in pavement areas should be compacted to the specifications detailed in the "Site Preparation and Earthwork" section of this report. Areas of unsuitable or yielding subgrade should be re-compacted or overexcavated and replaced with suitable structural fill or crushed rock.

For relatively lightly loaded pavements subjected to automobiles and occasional heavy truck traffic, the following pavement sections can be considered:

- Three inches of hot-mix asphalt (HMA) placed over six inches of crushed rock base (CRB), or;
- Three inches of HMA placed over three inches of asphalt treated base (ATB).

The HMA, ATB and CRB materials should conform to WSDOT specifications. All base material should be compacted to at least 95 percent of the maximum dry density.

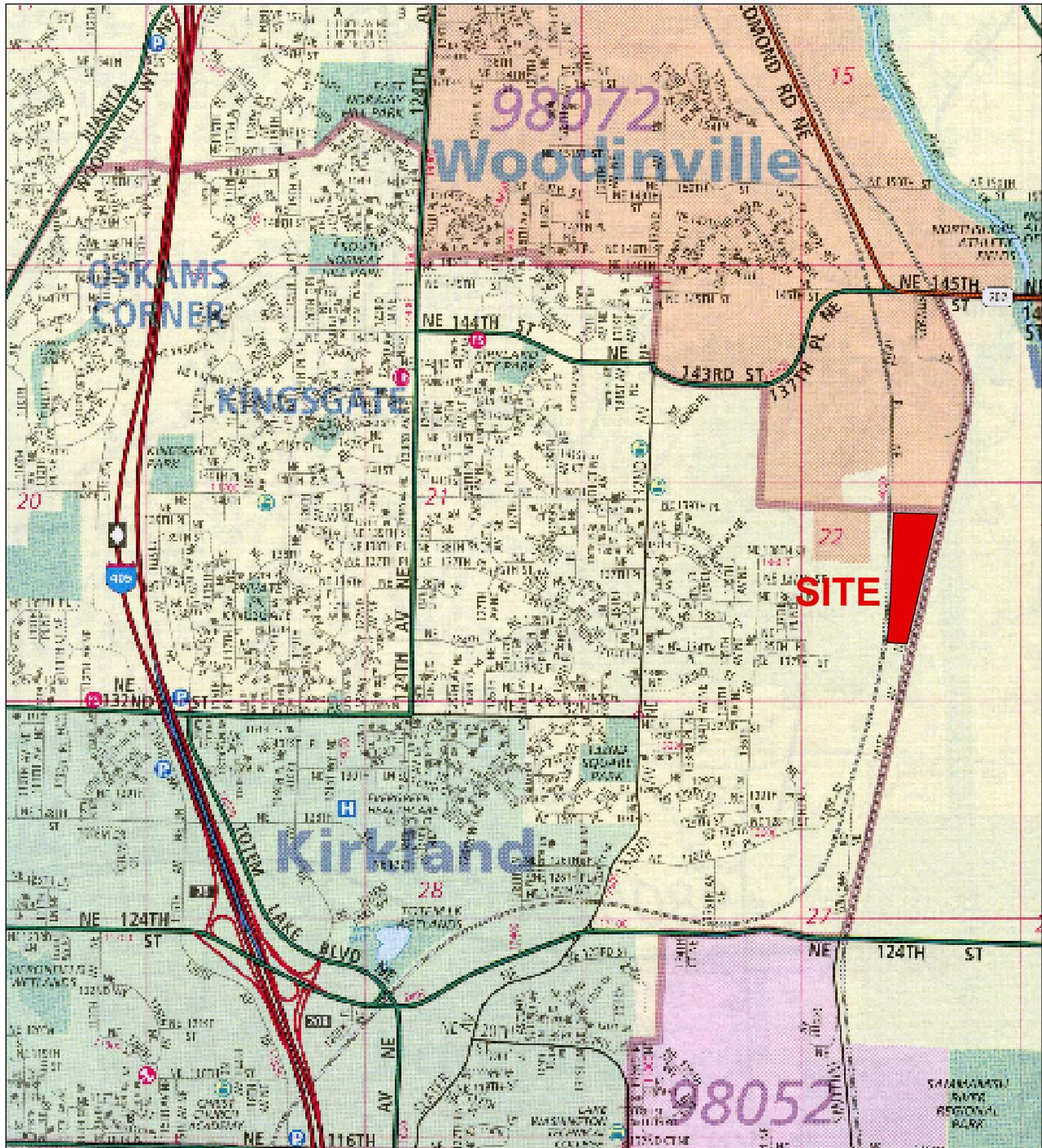
Areas with increased frequency of heavy truck-traffic generally require thicker pavement sections depending on site usage, pavement life expectancy, and site traffic. ESNW can provide appropriate pavement section design recommendations for truck traffic areas and right-of-way improvements, as necessary. Additionally, minimum pavement sections specified by City of Kirkland and King County Road Standards may supersede the recommendation in this study.

LIMITATIONS

The recommendations and conclusions provided in this geotechnical engineering study are professional opinions consistent with the level of care and skill that is typical of other members in the profession currently practicing under similar conditions in this area. A warranty is not expressed or implied. Variations in the soil and groundwater conditions observed at the test sites may exist, and may not become evident until construction. ESNW should reevaluate the conclusions in this geotechnical engineering study if variations are encountered.

Additional Services

ESNW should have an opportunity to review the final design with respect to the geotechnical recommendations provided in this preliminary report. ESNW should also be retained to provide testing and consultation services during construction.



Reference:
 King County, Washington
 Map 506
 By The Thomas Guide
 Rand McNally
 32nd Edition



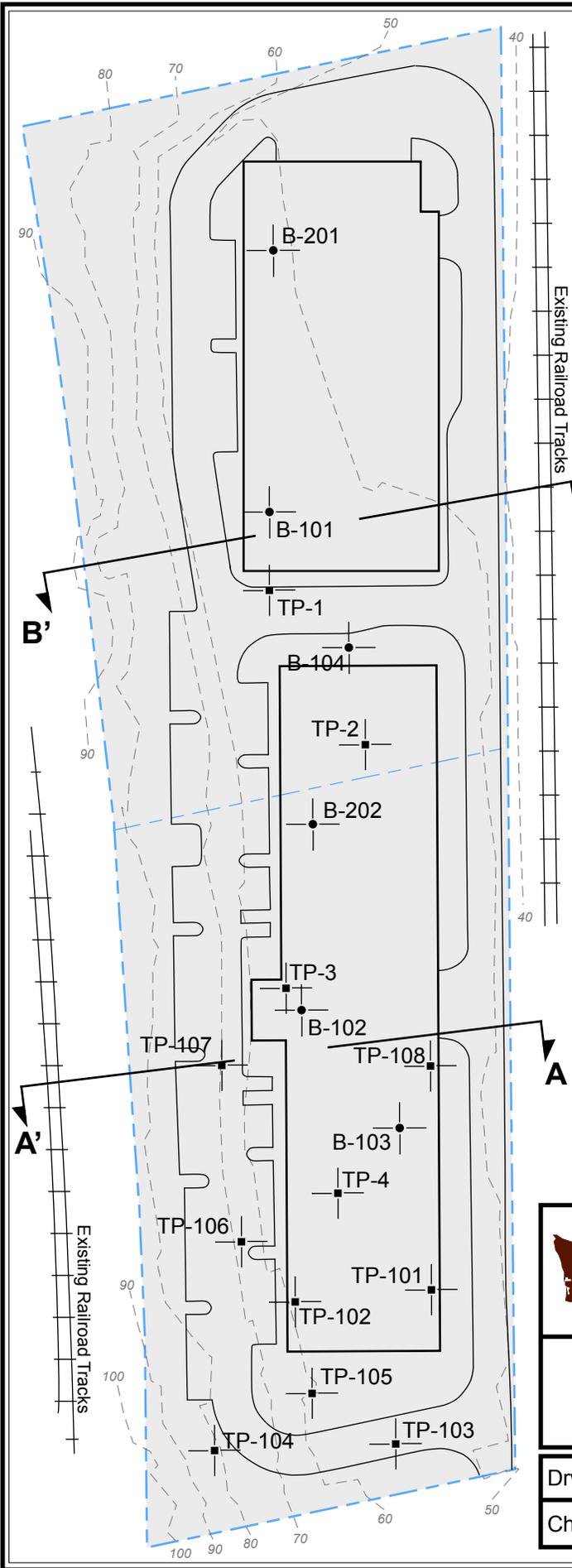


Earth Solutions NW LLC
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Vicinity Map
Astronics North Building Addition
Kirkland, Washington

| | | | |
|---------|-----|-----------------|-------------------|
| Drwn. | GLS | Date 03/11/2015 | Proj. No. 0736.10 |
| Checked | BTS | Date Mar. 2015 | Plate 1 |

NOTE: This plate may contain areas of color. ESNW cannot be responsible for any subsequent misinterpretation of the information resulting from black & white reproductions of this plate.



LEGEND

- B-201 | Approximate Location of ESNW Boring, Proj. No. ES-0736.10, Feb. 2015
- TP-101 | Approximate Location of ESNW Test Pit, Proj. No. ES-0736.08, April 2013
- B-101 | Approximate Location of ESNW Boring, Proj. No. ES-0736, March 2007
- TP-1 | Approximate Location of ESNW Test Pit, Proj. No. ES-0736, Feb. 2007

- Subject Site
- Proposed Building

NOTE: This plate may contain areas of color. ESNW cannot be responsible for any subsequent misinterpretation of the information resulting from black & white reproductions of this plate.

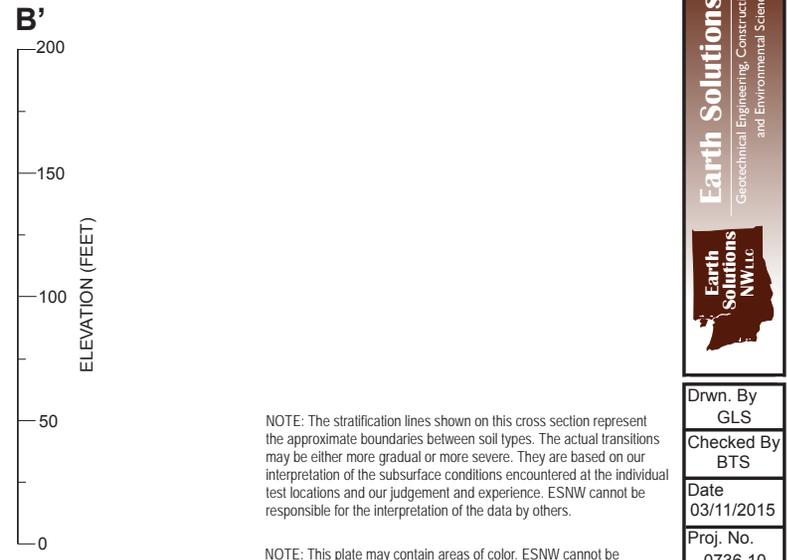
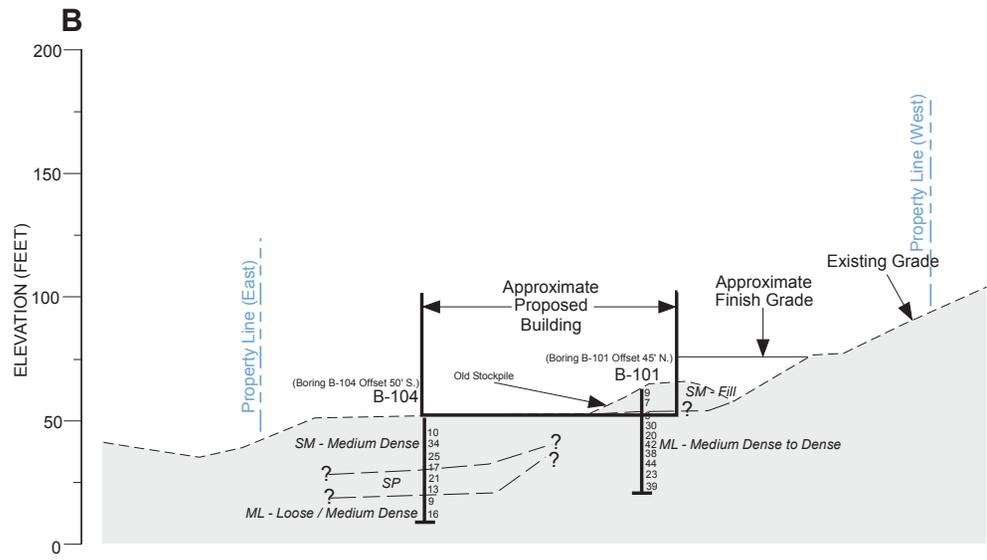
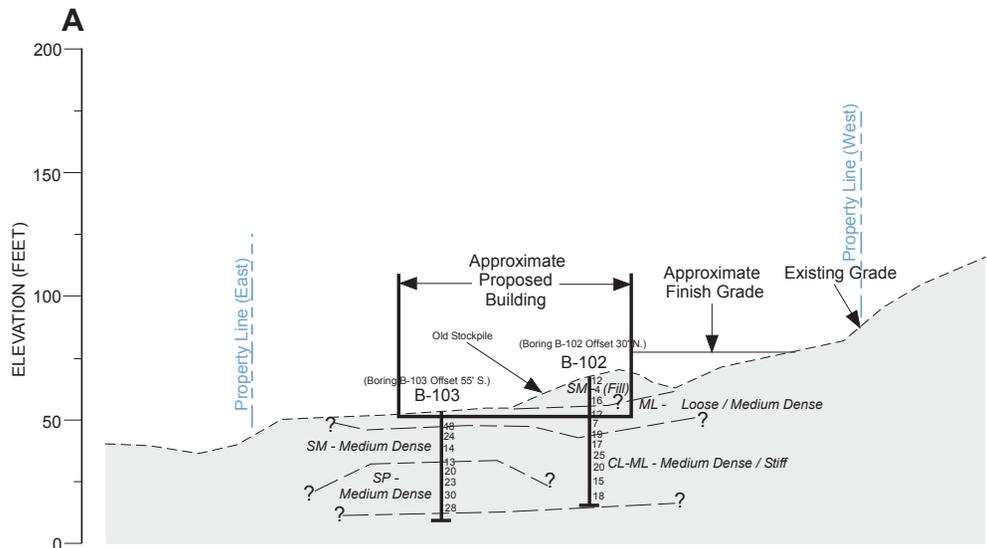
NOTE: The graphics shown on this plate are not intended for design purposes or precise scale measurements, but only to illustrate the approximate test locations relative to the approximate locations of existing and / or proposed site features. The information illustrated is largely based on data provided by the client at the time of our study. ESNW cannot be responsible for subsequent design changes or interpretation of the data by others.

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**Boring and Test Pit Location Plan
Astronics North Building Addition
Kirkland, Washington**

| | | |
|-------------|-----------------|-------------------|
| Drwn. GLS | Date 03/11/2015 | Proj. No. 0736.10 |
| Checked BTS | Date Mar. 2015 | Plate 2 |



NOTE: The stratification lines shown on this cross section represent the approximate boundaries between soil types. The actual transitions may be either more gradual or more severe. They are based on our interpretation of the subsurface conditions encountered at the individual test locations and our judgement and experience. ESNW cannot be responsible for the interpretation of the data by others.

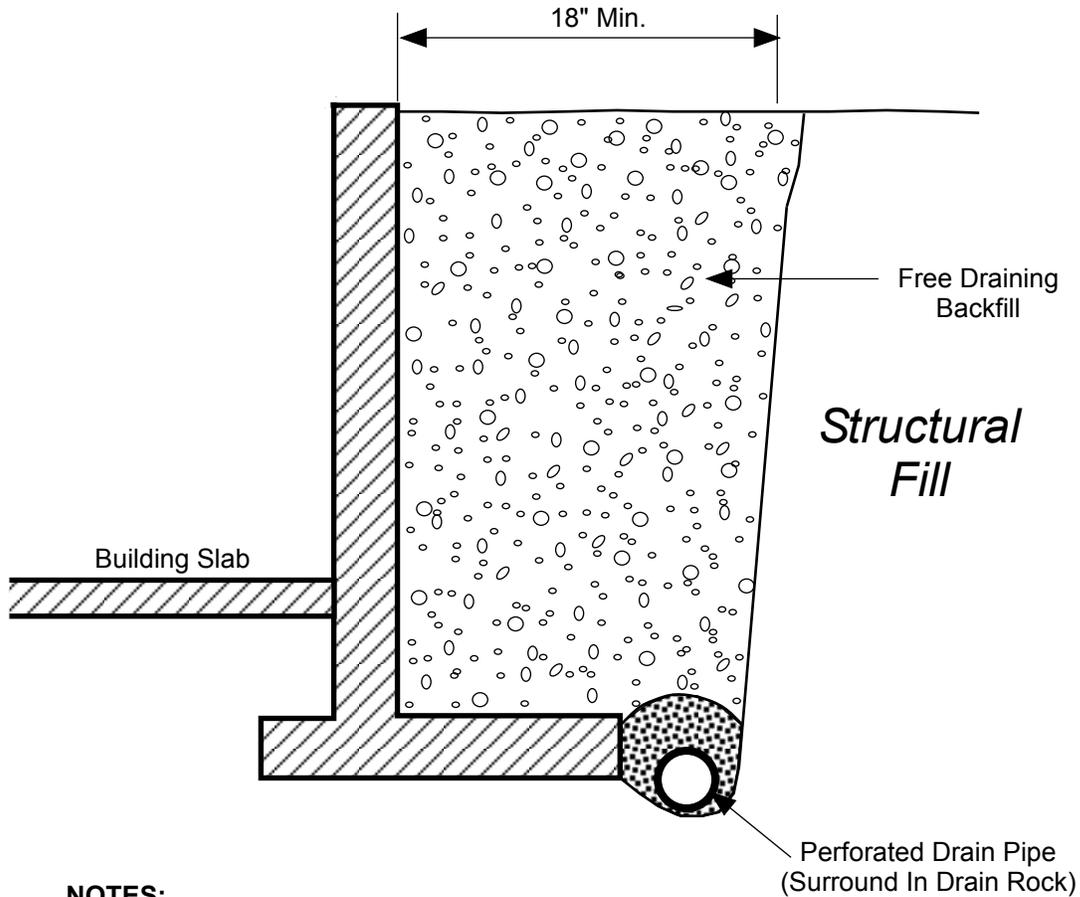
NOTE: This plate may contain areas of color. ESNW cannot be responsible for any subsequent misinterpretation of the information resulting from black & white reproductions of this plate.

Cross Sections A-A' & B-B'
Astronics North Building Addition
Kirkland, Washington

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| |
|----------------------|
| Drwn. By GLS |
| Checked By BTS |
| Date 03/11/2015 |
| Proj. No. 0736.10 |
| Plate 3 |



NOTES:

- Free Draining Backfill should consist of soil having less than 5 percent fines. Percent passing #4 should be 25 to 75 percent.
- Sheet Drain may be feasible in lieu of Free Draining Backfill, per ESNW recommendations.
- Drain Pipe should consist of perforated, rigid PVC Pipe surrounded with 1" Drain Rock.

SCHMATIC ONLY - NOT TO SCALE
NOT A CONSTRUCTION DRAWING

LEGEND:

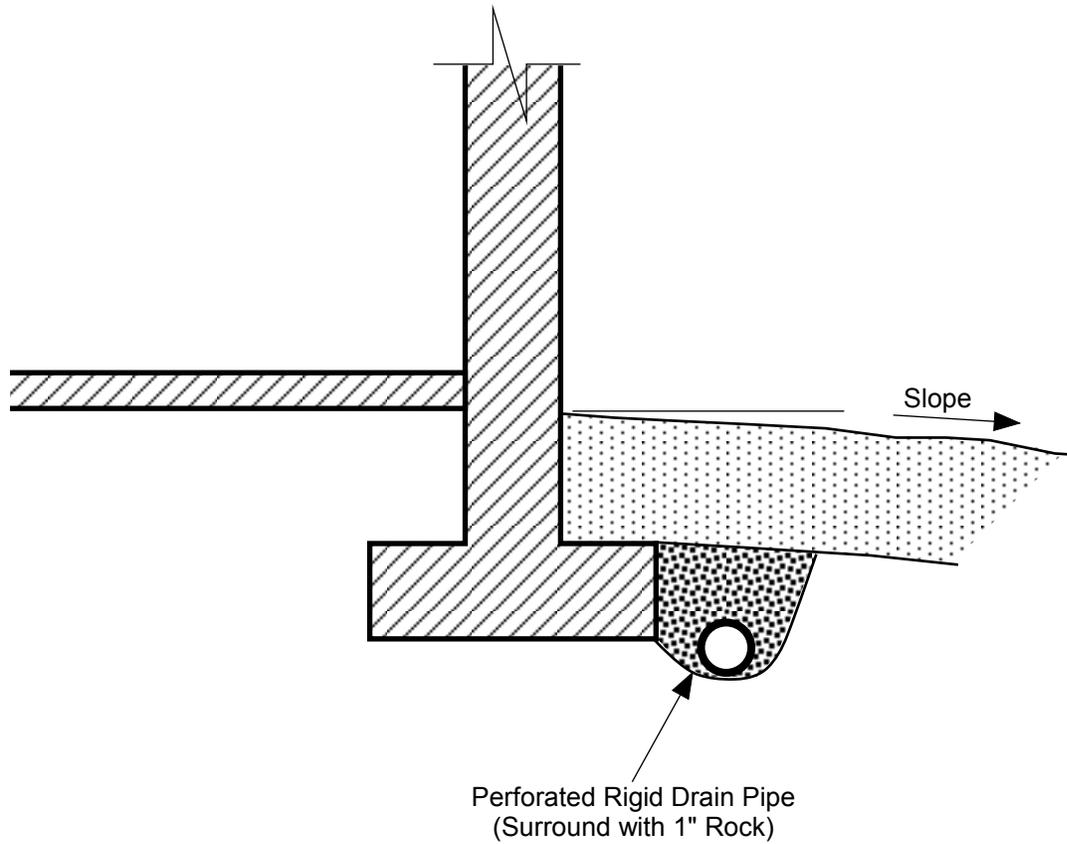


Free Draining Structural Backfill



1 inch Drain Rock

| | | | |
|---|-----|--|-------------------|
|  | | Earth Solutions NW_{LLC} Geotechnical Engineering, Construction Monitoring and Environmental Sciences | |
| RETAINING WALL DRAINAGE DETAIL Astronics North Building Addition Kirkland, Washington | | | |
| Drwn. | GLS | Date 03/13/2015 | Proj. No. 0736.10 |
| Checked | RAC | Date Mar. 2015 | Plate 4 |

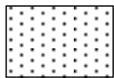
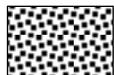


NOTES:

- Do NOT tie roof downspouts to Footing Drain.
- Surface Seal to consist of 12" of less permeable, suitable soil. Slope away from building.

SCHEMATIC ONLY - NOT TO SCALE
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LEGEND:

-  Surface Seal; native soil or other low permeability material.
-  1" Drain Rock

| | | |
|---|--|-------------------|
|  | Earth Solutions NW LLC Geotechnical Engineering, Construction Monitoring and Environmental Sciences | |
| | FOOTING DRAIN DETAIL Astronics North Building Addition Kirkland, Washington | |
| Drwn. GLS | Date 03/13/2015 | Proj. No. 0736.10 |
| Checked RAC | Date Mar. 2015 | Plate 5 |

Appendix A
Subsurface Exploration
ES-0736.10

The subsurface conditions at the site were explored by excavating 12 test pits and drilling 6 borings. The approximate locations of the test sites are illustrated on Plate 2 of this report. The test log data and dates of completion are provided in this Appendix.

Earth Solutions NW_{LLC} SOIL CLASSIFICATION CHART

| MAJOR DIVISIONS | | | SYMBOLS | | TYPICAL DESCRIPTIONS | |
|---|--|---|---------------------------|-----------|---|--|
| | | | GRAPH | LETTER | | |
| COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE | GRAVEL AND GRAVELLY SOILS | CLEAN GRAVELS (LITTLE OR NO FINES) | | GW | WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES | |
| | | GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES) | | GP | POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES | |
| | | GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES) | | GM | SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES | |
| | SAND AND SANDY SOILS | CLEAN SANDS (LITTLE OR NO FINES) | | SW | WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES | |
| | | | | SP | POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES | |
| | | SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES) | | SM | SILTY SANDS, SAND - SILT MIXTURES | |
| | | | | SC | CLAYEY SANDS, SAND - CLAY MIXTURES | |
| | FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE | SILTS AND CLAYS | LIQUID LIMIT LESS THAN 50 | | ML | INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY |
| | | | | | CL | INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS |
| | | | | | OL | ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY |
| SILTS AND CLAYS | | LIQUID LIMIT GREATER THAN 50 | | MH | INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS | |
| | | | | CH | INORGANIC CLAYS OF HIGH PLASTICITY | |
| | | | | OH | ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS | |
| HIGHLY ORGANIC SOILS | | | | PT | PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS | |

DUAL SYMBOLS are used to indicate borderline soil classifications.

The discussion in the text of this report is necessary for a proper understanding of the nature of the material presented in the attached logs.



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| | |
|--|--|
| CLIENT <u>Astronics AES</u> | PROJECT NAME <u>Astronic North Building Addition</u> |
| PROJECT NUMBER <u>ES-0736.10</u> | PROJECT LOCATION <u>Kirkland, Washington</u> |
| DATE STARTED <u>2/15/15</u> COMPLETED <u>2/15/15</u> | GROUND ELEVATION _____ HOLE SIZE _____ |
| DRILLING CONTRACTOR <u>Boretac</u> | GROUND WATER LEVELS: |
| DRILLING METHOD <u>HSA</u> | AT TIME OF DRILLING <u>---</u> |
| LOGGED BY <u>BTS</u> CHECKED BY <u>BTS</u> | AT END OF DRILLING <u>---</u> |
| NOTES <u>0" - 4" topsoil: grass</u> | AFTER DRILLING <u>---</u> |

| DEPTH (ft) | SAMPLE TYPE NUMBER | RECOVERY % | BLOW COUNTS (N VALUE) | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION |
|------------|--------------------|------------|-----------------------|----------|-------------|---|
| 0 | | | | | | |
| | | | | SM | | Brown silty SAND with gravel, loose to medium dense, moist to wet (Fill) -becomes gray |
| 5 | SS | 100 | 21-50/3" | SM | | 5.5 Brown silty SAND, dense, moist (Native) -fibrous wood fragment within sample |
| | SS | 100 | 13-14-18 (32) | | | 8.0 Gray SILT, dense, moist -silty sand layer |
| 10 | SS | 100 | 13-16-20 (36) | | | |
| | SS | 100 | 12-10-10 (20) | ML | | -becomes medium dense -increased fine sand content |
| 15 | SS | 100 | 10-8-10 (18) | | | -thin layers of fine sand |
| 20 | | | | | | |

GENERAL BH / TP / WELL / WELL 0736.10.GPJ GINT US.GDT 3/12/15



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CLIENT Astronics AES

PROJECT NAME Astronic North Building Addition

PROJECT NUMBER ES-0736.10

PROJECT LOCATION Kirkland, Washington

| DEPTH (ft) | SAMPLE TYPE NUMBER | RECOVERY % | BLOW COUNTS (N VALUE) | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION |
|------------|--------------------|------------|-----------------------|----------|-------------|--|
| 20 | | | | | | |
| | SS | 100 | 8-12-11 (23) | | | Gray SILT, dense, moist <i>(continued)</i> |
| 25 | | | | | | |
| | SS | 100 | 6-6-9 (15) | ML | | -becomes medium dense |
| 30 | | | | | | |
| | SS | 100 | 6-8-14 (22) | | | -thin sand layer |
| 34.0 | | | | | | |
| | | | | | | Becomes gray Clay, stiff, moist |
| 35 | | | | | | |
| | SS | 100 | 4-5-5 (10) | | | |
| 40 | | | | CL | | |
| | SS | 100 | 6-5-9 (14) | | | |

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(Continued Next Page)



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PROJECT NAME Astronic North Building Addition

PROJECT NUMBER ES-0736.10

PROJECT LOCATION Kirkland, Washington

| DEPTH (ft) | SAMPLE TYPE NUMBER | RECOVERY % | BLOW COUNTS (N VALUE) | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION |
|------------|--------------------|------------|-----------------------|----------|-------------|--|
| 45 | | | | CL | | Becomes gray Clay, stiff, moist (continued) |
| | SS | 100 | 6-6-9 (15) | | | -becomes very stiff |
| | | | | | | 46.5 Boring terminated at 46.5 feet below existing grade. No groundwater encountered during drilling. Boring backfilled with bentonite. Bottom of hole at 46.5 feet. |

GENERAL BH / TP / WELL_0736.10.GPJ GINT US GDT 3/12/15

BORING NUMBER B-202



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| | |
|-------------------------------------|--|
| CLIENT Astronics AES | PROJECT NAME Astronic North Building Addition |
| PROJECT NUMBER ES-0736.10 | PROJECT LOCATION Kirkland, Washington |
| DATE STARTED 2/15/15 | COMPLETED 2/15/15 |
| DRILLING CONTRACTOR Borettec | GROUND ELEVATION _____ |
| DRILLING METHOD HSA | HOLE SIZE _____ |
| LOGGED BY BTS | CHECKED BY BTS |
| NOTES 4" topsoil: grass | GROUND WATER LEVELS: |
| | AT TIME OF DRILLING -- |
| | AT END OF DRILLING -- |
| | AFTER DRILLING -- |

| DEPTH (ft) | SAMPLE TYPE NUMBER | RECOVERY % | BLOW COUNTS (N VALUE) | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION |
|------------|--------------------|------------|-----------------------|----------|-------------|---|
| 0 | | | | | | |
| 0 | | | | SM | | Gray silty SAND with gravel, loose, moist to wet (Fill) |
| 5 | SS | 100 | 3-3-3 (6) | | | -no recovery |
| 7.0 | | | | ML | | Brown sandy SILT with gravel and trace organic "topsoil" debris, medium dense, moist (Fill) |
| 10 | SS | 100 | 6-8-10 (18) | | | -brown silt at bottom of sample (Native) |
| 10.0 | | | | ML | | Gray SILT with trace gravel, dense, moist (Native) |
| 15 | SS | 100 | 9-9-12 (21) | | | -becomes gray |
| 15 | SS | 100 | 6-8-11 (19) | | | |
| 20 | SS | 100 | 7-9-13 (22) | | | |

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BORING NUMBER B-202

CLIENT Astronics AES

PROJECT NAME Astronic North Building Addition

PROJECT NUMBER ES-0736.10

PROJECT LOCATION Kirkland, Washington

| DEPTH (ft) | SAMPLE TYPE NUMBER | RECOVERY % | BLOW COUNTS (N VALUE) | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION |
|------------|--------------------|------------|-----------------------|----------|-------------|--|
| 20 | SS | 100 | 5-7-12 (19) | ML | | Gray SILT with trace gravel, dense, moist (Native) (continued) -trace gravel within silt matrix |
| 25 | SS | 100 | 5-6-8 (14) | | | -decreased gravel content |
| 30 | SS | 100 | 5-6-11 (17) | | | |
| 35 | SS | 100 | 7-13-20 (33) | | | -becomes dense -sand layers within sample |
| 40 | SS | 100 | 8-9-12 (21) | | | -becomes medium dense -sand layer within sample |
| 41.5 | | | | | | Boring terminated at 41.5 feet below existing grade. No groundwater encountered during drilling. Boring backfilled with bentonite. Bottom of hole at 41.5 feet. |

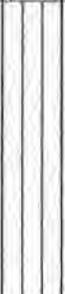
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TEST PIT NUMBER TP-101

| | |
|--|--|
| CLIENT <u>Astronics</u> | PROJECT NAME <u>Astronics - Parking Addition</u> |
| PROJECT NUMBER <u>0736.08</u> | PROJECT LOCATION <u>King County, Washington</u> |
| DATE STARTED <u>4/29/13</u> COMPLETED <u>4/29/13</u> | GROUND ELEVATION _____ TEST PIT SIZE _____ |
| EXCAVATION CONTRACTOR <u>NW Excavating</u> | GROUND WATER LEVELS: |
| EXCAVATION METHOD _____ | AT TIME OF EXCAVATION <u>—</u> |
| LOGGED BY <u>BTS</u> CHECKED BY <u>BTS</u> | AT END OF EXCAVATION <u>—</u> |
| NOTES <u>2"-4" Quarry Spalls</u> | AFTER EXCAVATION <u>—</u> |

| DEPTH (ft) | SAMPLE TYPE NUMBER | TESTS | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION |
|------------|--------------------|-------------|----------|---|--|
| 0 | | | | | |
| | | MC = 17.90% | SM |  | Dark brown silty SAND with gravel, loose to medium dense, moist (Fill) |
| | | MC = 23.50% | | | 2.0 -trace straw and organic material Becomes gray SILT, dense, moist to wet (Fill) |
| 5 | | | ML |  | -some organic debris -light seepage at 4' |
| | | MC = 4.80% | | | 6.0 Gray poorly graded SAND with silt, medium dense to dense, moist (Fill) |
| | | MC = 16.50% | SP |  | 7.0 -increased organic debris |
| | | | SM |  | 8.0 Brown to black TOPSOIL / silty SAND with gravel, dense, moist to wet (Native) |
| 10 | | | GP |  | Brown poorly graded GRAVEL and cobbles, dense, moist -occasional log debris |
| | | MC = 40.30% | | | 11.0 -light seepage at 11' |
| | | | SM |  | Brown to black silty SAND and peat like organics, medium dense, moist to wet |
| 15 | | MC = 16.90% | | | 15.5 Gray poorly graded SAND, medium dense, moist |
| | | MC = 17.20% | SP |  | 17.5 |
| | | | | | Test pit terminated at 17.5 feet below existing grade. Groundwater seepage encountered at 4.0 and 11.0 feet during excavation. Bottom of test pit at 17.5 feet. |

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TEST PIT NUMBER TP-102

ATTACHMENT 21

PAGE 1 OF 1

| | |
|---|--|
| CLIENT <u>Astronics</u> | PROJECT NAME <u>Astronics - Parking Addition</u> |
| PROJECT NUMBER <u>0736.08</u> | PROJECT LOCATION <u>King County, Washington</u> |
| DATE STARTED <u>4/29/13</u> COMPLETED <u>4/29/13</u> | GROUND ELEVATION _____ TEST PIT SIZE _____ |
| EXCAVATION CONTRACTOR <u>NW Excavating</u> | GROUND WATER LEVELS: |
| EXCAVATION METHOD _____ | AT TIME OF EXCAVATION <u>—</u> |
| LOGGED BY <u>BTS</u> CHECKED BY <u>BTS</u> | AT END OF EXCAVATION <u>—</u> |
| NOTES <u>Depth of Topsoil & Sod 2"- 4": grass</u> | AFTER EXCAVATION <u>—</u> |

| DEPTH (ft) | SAMPLE TYPE NUMBER | TESTS | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION |
|------------|--------------------|----------------------------|----------|-------------|--|
| 0 | | | | | Brown silty SAND with gravel, medium dense, moist (Fill) |
| 5 | | MC = 19.20% | SM | | -slight caving upper 4'- 6' -becomes gray -becomes dark brown silty sand with increased organics mixed into soil, medium dense, wet -becomes loose, wet |
| 10 | | MC = 22.00% MC = 23.40% | ML | | -decreased organics, increased silt content -wood branches within soil matrix |
| 11.0 | | | ML | | Gray SILT with sand, medium dense, wet (Fill) -wood debris (branches) |
| 13.0 | | | SM | | Blue gray silty SAND with gravel, medium dense, wet (Fill) |
| 15 | | | SM | | |
| 16.0 | | | ML | | Brownish gray SILT, medium dense to dense, moist (Native) -mottled texture |
| 18.0 | | MC = 31.30% MC = 32.50% | ML | | Test pit terminated at 18.0 feet below existing grade. No groundwater encountered during excavation. Bottom of test pit at 18.0 feet. |

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| | |
|---|--|
| CLIENT <u>Astronics</u> | PROJECT NAME <u>Astronics - Parking Addition</u> |
| PROJECT NUMBER <u>0736.08</u> | PROJECT LOCATION <u>King County, Washington</u> |
| DATE STARTED <u>4/29/13</u> COMPLETED <u>4/29/13</u> | GROUND ELEVATION _____ TEST PIT SIZE _____ |
| EXCAVATION CONTRACTOR <u>NW Excavating</u> | GROUND WATER LEVELS: |
| EXCAVATION METHOD _____ | AT TIME OF EXCAVATION <u>—</u> |
| LOGGED BY <u>BTS</u> CHECKED BY <u>BTS</u> | AT END OF EXCAVATION <u>—</u> |
| NOTES <u>Depth of Topsoil & Sod 4"- 6": grass</u> | AFTER EXCAVATION <u>—</u> |

| DEPTH (ft) | SAMPLE TYPE NUMBER | TESTS | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION |
|------------|--------------------|-------------|----------|---|--|
| 0 | | | | | |
| 5 | | MC = 27.00% | SM |  | Brownish gray silty SAND with gravel, loose to medium dense, moist (Fill) -trace wood debris -light seepage at 3.5' -becomes gray, moist to wet -becomes dark brown loose to medium dense, wet |
| 10 | | | | | |
| 12.0 | | MC = 25.60% | ML |  | Becomes blue gray SILT, dense, moist to wet (Fill) |
| 14.0 | | | | | |
| 15 | | MC = 28.60% | ML |  | Brown SILT, dense, moist (Native) |
| 17.0 | | | | | Test pit terminated at 17.0 feet below existing grade. Groundwater seepage encountered at 3.5 feet during excavation. Bottom of test pit at 17.0 feet. |

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TEST PIT NUMBER TP-104
 PAGE 1 OF 1

| | |
|---|--|
| CLIENT <u>Astronics</u> | PROJECT NAME <u>Astronics - Parking Addition</u> |
| PROJECT NUMBER <u>0736.08</u> | PROJECT LOCATION <u>King County, Washington</u> |
| DATE STARTED <u>4/29/13</u> COMPLETED <u>4/29/13</u> | GROUND ELEVATION _____ TEST PIT SIZE _____ |
| EXCAVATION CONTRACTOR <u>NW Excavating</u> | GROUND WATER LEVELS: |
| EXCAVATION METHOD _____ | AT TIME OF EXCAVATION <u>—</u> |
| LOGGED BY <u>BTS</u> CHECKED BY <u>BTS</u> | AT END OF EXCAVATION <u>—</u> |
| NOTES <u>Depth of Topsoil & Sod 2"- 4": grass</u> | AFTER EXCAVATION <u>—</u> |

| DEPTH (ft) | SAMPLE TYPE NUMBER | TESTS | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION | |
|------------|--------------------|-------------|----------|-------------|--|---|
| 0 | | | | | | |
| | | | SM | | Brownish gray silty SAND with gravel, medium dense, moist (Fill) | |
| | | MC = 22.60% | | | 3.0 | Becomes brownish gray SILT with sand, medium dense, moist to wet (Fill) |
| 5 | | MC = 25.80% | ML | | -becomes gray | |
| | | | | | -light seepage at 6' | |
| | | | SM | | 7.0 | Brownish gray silty SAND, medium dense, moist to wet (Fill) |
| 10 | | | | | -becomes loose to medium dense, wet | |
| | | | | | -increased silt content | |
| | | MC = 23.90% | ML | | 13.0 | Brownish gray SILT, medium dense, moist to wet (Fill) |
| 15 | | | | | -chain debris | |
| | | | | | 18.0 | Test pit terminated at 18.0 feet below existing grade. Groundwater seepage encountered at 6.0 feet during excavation. |
| | | | | | | Bottom of test pit at 18.0 feet. |

GENERAL BH / TP / WELL_0736-8.GPJ_GINT US.GDT_5/14/13



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| | |
|---|--|
| CLIENT <u>Astronics</u> | PROJECT NAME <u>Astronics - Parking Addition</u> |
| PROJECT NUMBER <u>0736.08</u> | PROJECT LOCATION <u>King County, Washington</u> |
| DATE STARTED <u>4/29/13</u> COMPLETED <u>4/29/13</u> | GROUND ELEVATION _____ TEST PIT SIZE _____ |
| EXCAVATION CONTRACTOR <u>NW Excavating</u> | GROUND WATER LEVELS: |
| EXCAVATION METHOD _____ | AT TIME OF EXCAVATION <u>—</u> |
| LOGGED BY <u>BTS</u> CHECKED BY <u>BTS</u> | AT END OF EXCAVATION <u>—</u> |
| NOTES <u>Depth of Topsoil & Sod 4"- 6": grass</u> | AFTER EXCAVATION <u>—</u> |

| DEPTH (ft) | SAMPLE TYPE NUMBER | TESTS | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION |
|------------|--------------------|-------------|----------|-------------|--|
| 0 | | | | | Brownish gray silty SAND with gravel, medium dense, moist to wet |
| 5 | | MC = 24.60% | SM | | -light seepage at 4' -becomes dense, medium dense, wet -becomes loose |
| 10 | | MC = 30.80% | | | -light seepage at 8' |
| | | MC = 15.50% | | | -becomes medium dense, moist |
| | | MC = 33.10% | ML | | 12.0 Blue gray SILT with sand, medium dense, moist to wet (Fill) |
| 15 | | MC = 30.10% | ML | | 13.5 Brown SILT, dense, moist to wet (Native) |
| | | | | | 18.0 Test pit terminated at 18.0 feet below existing grade. Groundwater seepage encountered at 4.0 and 8.0 feet during excavation. Bottom of test pit at 18.0 feet. |

GENERAL BH / TP / WELL 0736-8.GPJ CINT US.GDT 5/14/13

TEST PIT NUMBER TP-106



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|--|--|
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| PROJECT NUMBER <u>0736.08</u> | PROJECT LOCATION <u>King County, Washington</u> |
| DATE STARTED <u>4/29/13</u> COMPLETED <u>4/29/13</u> | GROUND ELEVATION _____ TEST PIT SIZE _____ |
| EXCAVATION CONTRACTOR <u>NW Excavating</u> | GROUND WATER LEVELS: |
| EXCAVATION METHOD _____ | AT TIME OF EXCAVATION <u>---</u> |
| LOGGED BY <u>BTS</u> CHECKED BY <u>BTS</u> | AT END OF EXCAVATION <u>---</u> |
| NOTES <u>Depth of Topsoil & Sod 6"-8": grass</u> | AFTER EXCAVATION <u>---</u> |

| DEPTH (ft) | SAMPLE TYPE NUMBER | TESTS | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION |
|------------|--------------------|-------------|----------|---|---|
| 0 | | | | | |
| | | MC = 22.70% | SM |  | Brown to black silty SAND with gravel and organic material, medium dense, moist (Fill) -light seepage at 2.5' |
| 5 | | | | | |
| | | MC = 19.60% | ML |  | 6.5 -BBQ grate and concrete debris Bluish gray SILT, dense to medium dense, moist to wet (Fill) |
| | | | | | |
| 10 | | | | | |
| | | MC = 10.50% | SP-SM |  | 8.0 Brown to black silty SAND with mixed organic content, loose, moist to wet (Fill) 13.5 Bluish gray poorly graded SAND with silt, medium dense, moist (Fill) |
| 15 | | | | | |
| | | MC = 15.10% | SM |  | 15.0 Gray silty SAND with gravel, medium dense, moist (Native) -mottled texture |
| | | MC = 11.50% | | | 18.0 Test pit terminated at 18.0 feet below existing grade. Groundwater seepage encountered at 2.5 feet during excavation. Bottom of test pit at 18.0 feet. |

GENERAL BH / TP / WELL 0736-8.GPJ_GINT US.GDT_5/1/13



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| CLIENT <u>Astronics</u> | PROJECT NAME <u>Astronics - Parking Addition</u> |
| PROJECT NUMBER <u>0736.08</u> | PROJECT LOCATION <u>King County, Washington</u> |
| DATE STARTED <u>4/29/13</u> COMPLETED <u>4/29/13</u> | GROUND ELEVATION _____ TEST PIT SIZE _____ |
| EXCAVATION CONTRACTOR <u>NW Excavating</u> | GROUND WATER LEVELS: |
| EXCAVATION METHOD _____ | AT TIME OF EXCAVATION _____ |
| LOGGED BY <u>BTS</u> CHECKED BY <u>BTS</u> | AT END OF EXCAVATION _____ |
| NOTES <u>Depth of Topsoil & Sod 4"-6": grass</u> | AFTER EXCAVATION _____ |

| DEPTH (ft) | SAMPLE TYPE NUMBER | TESTS | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION |
|------------|--------------------|-------------|----------|---|--|
| 0 | | | | | |
| 5 | | | SM |  | Brown silty SAND with gravel and trace organic material mixed in dense to medium dense, moist (Fill) -becomes loose to medium dense, moist to wet -becomes medium dense, increased gravel, moist |
| 10 | | MC = 31.50% | | | |
| | | MC = 31.40% | ML |  | 10.5 Brownish gray SILT, medium dense, moist (Fill) |
| 15 | | | ML |  | 12.0 Brown SILT with sand, dense to very dense, moist (Native) -mottled texture |
| | | | | | 16.0 Test pit terminated at 16.0 feet below existing grade. No groundwater encountered during excavation. Bottom of test pit at 16.0 feet. |

GENERAL BH / TP / WELL / WELL-8-GPJ GINT-US-GDT 5/14/13

TEST PIT NUMBER TP-108



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| PROJECT NUMBER <u>0736.08</u> | PROJECT LOCATION <u>King County, Washington</u> |
| DATE STARTED <u>4/29/13</u> COMPLETED <u>4/29/13</u> | GROUND ELEVATION _____ TEST PIT SIZE _____ |
| EXCAVATION CONTRACTOR <u>NW Excavating</u> | GROUND WATER LEVELS: |
| EXCAVATION METHOD _____ | AT TIME OF EXCAVATION <u>---</u> |
| LOGGED BY <u>BTS</u> CHECKED BY <u>BTS</u> | AT END OF EXCAVATION <u>---</u> |
| NOTES <u>Grass</u> | AFTER EXCAVATION <u>---</u> |

| DEPTH (ft) | SAMPLE TYPE NUMBER | TESTS | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION |
|------------|--------------------|-------------|----------|-------------|--|
| 0 | | | | | Gray silty SAND with gravel, dense, moist (Fill) |
| 5 | | MC = 18.80% | SM | | -becomes medium dense, moist to wet |
| 7.5 | | MC = 6.10% | SP-SM | | Gray poorly graded SAND with silt and gravel, dense, moist (Fill) -asphalt debris |
| 10 | | MC = 4.90% | GP | | Well graded GRAVEL and cobbles, dense, moist (Fill) |
| 11.0 | | | SP-SM | | Gray poorly graded SAND with silt, medium dense, moist (Fill) |
| 12.0 | | | TPSL | | Brown to black TOPSOIL, loose, wet (12" thick) |
| 13.0 | | MC = 30.30% | SM | | Grades to silty SAND with gravel, dense, moist to wet (Native) |
| 15 | | MC = 11.40% | SM | | |
| 17.0 | | MC = 8.40% | SP | | Brown poorly graded SAND, medium dense to dense, moist |
| | | | | | Test pit terminated at 17.0 feet below existing grade. No groundwater encountered during excavation. Bottom of test pit at 17.0 feet. |

GENERAL BH / TP / WELL 0736-8.GPJ GINT U.S.GDT 5/14/13



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|--|---|
| CLIENT <u>Anastasios</u> | PROJECT NAME <u>Willows Tech Center</u> |
| PROJECT NUMBER <u>0736</u> | PROJECT LOCATION <u>King County, Washington</u> |
| DATE STARTED <u>3/27/07</u> COMPLETED <u>3/27/07</u> | GROUND ELEVATION _____ HOLE SIZE _____ |
| DRILLING CONTRACTOR <u>Boretec</u> | GROUND WATER LEVELS: |
| DRILLING METHOD <u>HSA</u> | AT TIME OF DRILLING <u>---</u> |
| LOGGED BY <u>WLR</u> CHECKED BY <u>WLR</u> | AT END OF DRILLING <u>---</u> |
| NOTES <u>Bare Soil</u> | AFTER DRILLING <u>---</u> |

| DEPTH (ft) | SAMPLE TYPE NUMBER | RECOVERY % | BLOW COUNTS (N VALUE) | TESTS | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION |
|------------|--------------------|------------|-----------------------|-------------------------------|----------|-------------|---|
| 0 | | | | | | | |
| | | | | | | | Brown silty SAND, loose, moist to wet |
| | SS | 100 | 6-4-5 (9) | MC = 25.20% | SM | | |
| 5 | | | | | | 5.0 | |
| | SS | 100 | 2-3-4 (7) | MC = 24.70% Fines = 73.40% | ML | | Brown sandy SILT, loose, moist |
| | SS | 100 | 2-1-2 (3) | MC = 35.40% | | 7.5 | Gray SILT, loose, moist to wet |
| 10 | | | | | | | |
| | SS | 100 | 7-15-15 (30) | | | | -no sample - rock in tip of spoon -becomes dense |
| 15 | | | | | | | |
| | SS | 100 | 7-9-11 (20) | MC = 24.10% Fines = 93.00% | ML | | -becomes medium dense |
| 20 | | | | | | 20.0 | |

GENERAL BH / TP / WELL 0736.GPJ GINT US GDT 2/21/08

BORING NUMBER B-101
PAGE 2 OF 2



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CLIENT Anastasiou PROJECT NAME Willows Tech Center
PROJECT NUMBER 0736 PROJECT LOCATION King County, Washington

| DEPTH (ft) | SAMPLE TYPE NUMBER | RECOVERY % | BLOW COUNTS (N VALUE) | TESTS | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION | |
|------------|--------------------|------------|-----------------------|-------------|----------|-------------|-----------------------|---|
| 20 | SS | 100 | 10-20-22 (42) | MC = 28.10% | | | Gray SILT, dense, wet | |
| 25 | SS | 100 | 10-16-22 (38) | MC = 27.40% | | | | |
| 30 | SS | 100 | 16-19-25 (44) | MC = 18.60% | ML | | | |
| 35 | SS | 100 | 14-10-13 (23) | MC = 24.80% | | | | |
| 40 | SS | 100 | 9-16-23 (39) | MC = 19.50% | | | | |
| | | | | | | | 41.5 | Boring terminated at 41.5 feet below existing grade. No groundwater encountered during drilling. Boring backfilled with bentonite. Bottom of hole at 41.5 feet. |

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-becomes medium dense



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| CLIENT <u>Anastasiou</u> | PROJECT NAME <u>Willows Tech Center</u> |
| PROJECT NUMBER <u>0736</u> | PROJECT LOCATION <u>King County, Washington</u> |
| DATE STARTED <u>3/27/07</u> COMPLETED <u>3/27/07</u> | GROUND ELEVATION _____ HOLE SIZE _____ |
| DRILLING CONTRACTOR <u>Boretac</u> | GROUND WATER LEVELS: |
| DRILLING METHOD <u>HSA</u> | AT TIME OF DRILLING <u>—</u> |
| LOGGED BY <u>WLR</u> CHECKED BY <u>WLR</u> | AT END OF DRILLING <u>—</u> |
| NOTES <u>Bare Soil</u> | AFTER DRILLING <u>—</u> |

| DEPTH (ft) | SAMPLE TYPE NUMBER | RECOVERY % | BLOW COUNTS (N VALUE) | TESTS | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION |
|------------|--------------------|------------|-----------------------|-------------------------------|----------|-------------|---|
| 0 | | | | | | | |
| | SS | 100 | 3-6-6 (12) | | | SM | Brown silty SAND, loose, moist -becomes medium dense -no sample |
| 5 | SS | 100 | 4-2-2 (4) | MC = 24.00% | | | -very loose zone |
| 10 | SS | 100 | 12-13-3 (16) | MC = 44.70% Fines = 54.30% | | ML | Brown sandy SILT, medium dense, moist to wet |
| 15 | SS | 100 | 8-6-6 (12) | MC = 34.20% | | | |
| 20 | | | | | | | |

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BORING NUMBER B-102

ATTACHMENT 21
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CLIENT Anastasiou

PROJECT NAME Willows Tech Center

PROJECT NUMBER 0736

PROJECT LOCATION King County, Washington

GENERAL BH / TP / WELL / WELL 0736.GPJ GINT US.GDT 2/21/08

| DEPTH (ft) | SAMPLE TYPE NUMBER | RECOVERY % | BLOW COUNTS (N VALUE) | TESTS | U.S.C.S. GRAPHIC LOG | MATERIAL DESCRIPTION |
|------------|--------------------|------------|-----------------------|-----------------------------------|----------------------|--|
| 20 | | | | | | |
| | SS | 100 | 2-3-4 (7) | MC = 16.90% | SP | Brown poorly graded fine to medium SAND, loose, moist to wet |
| 25 | | | | | | |
| | SS | 100 | 5-7-12 (19) | MC = 23.80% | ML | Brown SILT, medium dense, moist to wet |
| 30 | | | | | | |
| | SS | 100 | 4-7-10 (17) | MC = 28.30% | CL | Brown lean CLAY, medium dense, moist to wet |
| 35 | | | | | | |
| | SS | 100 | 6-10-15 (25) | MC = 22.60% LL = 48 PL = 20 | ML | |
| 40 | | | | | | |
| | SS | 100 | 6-9-11 (20) | MC = 26.40% | | Brown SILT, medium dense, moist |



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CLIENT Anastasiou

PROJECT NAME Willows Tech Center

PROJECT NUMBER 0736

PROJECT LOCATION King County, Washington

| DEPTH (ft) | SAMPLE TYPE NUMBER | RECOVERY % | BLOW COUNTS (N VALUE) | TESTS | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION |
|------------|--------------------|------------|-----------------------|-------------|----------|-------------|---|
| 45 | SS | 100 | 4-6-9 (15) | MC = 23.70% | ML | | Brown SILT, medium dense, moist (continued) |
| 50 | SS | 100 | 6-8-10 (16) | MC = 27.20% | | | |
| | | | | | | 51.5 | Boring terminated at 51.5 feet below existing grade. No groundwater encountered during drilling. Boring backfilled with bentonite. Bottom of hole at 51,5 feet. |

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CLIENT Anastasiou PROJECT NAME Willows Tech Center
 PROJECT NUMBER 0736 PROJECT LOCATION King County, Washington
 DATE STARTED 3/27/07 COMPLETED 3/27/07 GROUND ELEVATION _____ HOLE SIZE _____
 DRILLING CONTRACTOR Boretac GROUND WATER LEVELS:
 DRILLING METHOD HSA ∇ AT TIME OF DRILLING 28.5 ft
 LOGGED BY WLR CHECKED BY WLR AT END OF DRILLING ---
 NOTES Bare Soil AFTER DRILLING ---

| DEPTH (ft) | SAMPLE TYPE NUMBER | RECOVERY % | BLOW COUNTS (N VALUE) | TESTS | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION |
|------------|--------------------|------------|-----------------------|-------------------------------|----------|-------------|-------------------------------|
| 0 | | | | | | | Gray SILT, dense, moist |
| 5 | | | | | ML | | |
| | SS | 100 | 12-17-31 (48) | MC = 15.10% | | 5.5 | Gray silty SAND, dense, moist |
| 10 | | | | | | | -becomes medium dense |
| | SS | 100 | 15-12-12 (24) | MC = 12.80% Fines = 22.10% | SM | | |
| 15 | | | | | | | -no sample recovered |
| | SS | 100 | 9-5-9 (14) | | | | |
| 20 | | | | | | 20.0 | |

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CLIENT Anastasios

PROJECT NAME Willows Tech Center

PROJECT NUMBER 0736

PROJECT LOCATION King County, Washington

| DEPTH (ft) | SAMPLE TYPE NUMBER | RECOVERY % | BLOW COUNTS (N VALUE) | TESTS | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION |
|------------|--------------------|------------|-----------------------|-------------|----------|-------------|---|
| 20 | SS | 100 | 4-6-7 (13) | MC = 8.00% | | | Gray poorly graded medium to coarse SAND with gravel, medium dense, moist |
| 25 | SS | 100 | 4-15-5 (20) | MC = 16.10% | | | |
| 30 | SS | 100 | 3-6-17 (23) | MC = 11.80% | SP | | ∇ -becomes wet, water table encountered |
| 35 | SS | 100 | 15-14-16 (30) | MC = 6.80% | | | -becomes dense |
| 40 | SS | 100 | 8-10-18 (28) | MC = 11.30% | | | |
| | | | | | | | 41.5 Boring terminated at 41.5 feet below existing grade. Groundwater table encountered at 28.5 feet during drilling. Boring backfilled with bentonite. Bottom of hole at 41.5 feet. |

GENERAL BH / TP / WELL 0736.GPJ GINT US.GDT 2/21/08



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CLIENT Anastasios PROJECT NAME Willows Tech Center
 PROJECT NUMBER 0736 PROJECT LOCATION King County, Washington
 DATE STARTED 3/27/07 COMPLETED 3/27/07 GROUND ELEVATION _____ HOLE SIZE _____
 DRILLING CONTRACTOR Boretac GROUND WATER LEVELS:
 DRILLING METHOD HSA AT TIME OF DRILLING 26.0 ft
 LOGGED BY WLR CHECKED BY WLR AT END OF DRILLING _____
 NOTES Bare Soil AFTER DRILLING _____

| DEPTH (ft) | SAMPLE TYPE NUMBER | RECOVERY % | BLOW COUNTS (N VALUE) | TESTS | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION |
|------------|--------------------|------------|-----------------------|-------------------------------|----------|-------------|---|
| 0 | | | | | | | |
| | | | | | SM | | Brown silty SAND, loose, moist |
| 5 | SS | 100 | 10-6-4 (10) | MC = 23.80% Fines = 68.70% | ML | | Gray SILT, loose to medium dense, moist |
| 10 | SS | 100 | 25-25-9 (34) | MC = 10.00% Fines = 41.50% | | | Gray silty SAND with gravel, dense, moist |
| 15 | SS | 100 | 14-16-9 (25) | MC = 11.90% | SM | | -becomes medium dense |
| 20 | | | | | | | |

GENERAL BH / TP / WELL 0736.GPJ GINT US.GDT 2/21/08



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CLIENT Anastasiou

PROJECT NAME Willows Tech Center

PROJECT NUMBER 0736

PROJECT LOCATION King County, Washington

| DEPTH (ft) | SAMPLE TYPE NUMBER | RECOVERY % | BLOW COUNTS (N VALUE) | TESTS | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION | |
|------------|--------------------|------------|-----------------------|-------------|----------|-------------|---|---|
| 20 | SS | 100 | 5-8-9 (17) | MC = 10.70% | | | Gray poorly graded SAND with gravel, medium dense to dense, moist | |
| 25 | SS | 100 | 7-10-11 (21) | MC = 21.80% | SP | | -water table encountered | |
| 30 | SS | 100 | 5-5-8 (13) | MC = 50.80% | | | Gray SILT, medium dense, wet | |
| 35 | SS | 100 | 3-4-5 (9) | MC = 42.40% | ML | | -becomes loose -becomes wet | |
| 40 | SS | 100 | 5-5-11 (16) | MC = 42.70% | | | | |
| | | | | | | | 41.5 | Boring terminated at 41.5 feet below existing grade. Groundwater table encountered at 26.0 feet during drilling. Boring backfilled with bentonite. Bottom of hole at 41.5 feet. |

GENERAL BH / TP / WELL 0736.GPJ GINT US.GDT 2/21/08



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CLIENT Anastasiou PROJECT NAME Willows Tech Center
 PROJECT NUMBER 0736 PROJECT LOCATION King County, Washington
 DATE STARTED 2/12/07 COMPLETED 2/12/07 GROUND ELEVATION _____ TEST PIT SIZE _____
 EXCAVATION CONTRACTOR NW Excavating GROUND WATER LEVELS:
 EXCAVATION METHOD _____ AT TIME OF EXCAVATION —
 LOGGED BY WLR CHECKED BY WLR AT END OF EXCAVATION —
 NOTES Bare Soil AFTER EXCAVATION —

| DEPTH (ft) | SAMPLE TYPE NUMBER | TESTS | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION |
|------------|--------------------|-------------------------------|----------|-------------|--|
| 0 | | | | | Blue sandy SILT, medium dense to dense, moist |
| 5 | | MC = 24.70% | ML | | -becomes with gravel |
| 9.0 | | MC = 19.70% Fines = 50.60% | | | |
| 10 | | | ML | | Brown SILT, dense, moist |
| | | MC = 28.00% | | | -interbedded fine sand layers |
| | | MC = 23.20% | | | |
| | | | | | 13.0 Test pit terminated at 13.0 feet below existing grade. No groundwater encountered during excavation. Bottom of test pit at 13.0 feet. |

GENERAL BH / TP / WELL 0736.GPJ GINT US.GDT 2/21/08



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ATTACHMENT 21
TEST PIT NUMBER TP-2

PAGE 1 OF 1

CLIENT Anastasiou PROJECT NAME Willows Tech Center
 PROJECT NUMBER 0736 PROJECT LOCATION King County, Washington
 DATE STARTED 2/12/07 COMPLETED 2/12/07 GROUND ELEVATION _____ TEST PIT SIZE _____
 EXCAVATION CONTRACTOR NW Excavating GROUND WATER LEVELS:
 EXCAVATION METHOD _____ AT TIME OF EXCAVATION --
 LOGGED BY WLR CHECKED BY WLR AT END OF EXCAVATION --
 NOTES Bare Soil AFTER EXCAVATION --

| DEPTH (ft) | SAMPLE TYPE NUMBER | TESTS | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION |
|------------|--------------------|-------------|----------|---|--|
| 0 | | | | | |
| | | MC = 31.50% | SM |  | Black silty SAND, loose, moist (Fill) |
| 5 | | MC = 5.60% | |  | Bluish gray silty SAND with gravel, medium dense to dense, moist -occasional cobbles up to 8" |
| 10 | | MC = 4.60% | SM |  | |
| 15 | | MC = 5.60% | |  | Test pit terminated at 15.0 feet below existing grade. No groundwater encountered during excavation. Bottom of test pit at 15.0 feet. |

GENERAL BH / TP / WELL 0736.CPJ GINT US.GDT 2/21/08



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|--|---|
| CLIENT <u>Anastasiou</u> | PROJECT NAME <u>Willows Tech Center</u> |
| PROJECT NUMBER <u>0736</u> | PROJECT LOCATION <u>King County, Washington</u> |
| DATE STARTED <u>2/12/07</u> COMPLETED <u>2/12/07</u> | GROUND ELEVATION _____ TEST PIT SIZE _____ |
| EXCAVATION CONTRACTOR <u>NW Excavating</u> | GROUND WATER LEVELS: |
| EXCAVATION METHOD _____ | AT TIME OF EXCAVATION _____ |
| LOGGED BY <u>WLR</u> CHECKED BY <u>WLR</u> | AT END OF EXCAVATION _____ |
| NOTES <u>Bare Soil</u> | AFTER EXCAVATION _____ |

| DEPTH (ft) | SAMPLE TYPE NUMBER | TESTS | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION |
|------------|--------------------|-------------|----------|-------------|--|
| 0 | | | | | Dark brown silty SAND, medium dense, moist (Fill) |
| 5 | | MC = 22.20% | | | -high organic content |
| 10 | | | SM | | |
| 15 | | MC = 24.60% | | | |
| | | MC = 30.60% | | ML | Bluish gray SILT, medium dense, moist |
| | | | | | Test pit terminated at 18.0 feet below existing grade. No groundwater encountered during excavation. Bottom of test pit at 18.0 feet. |

GENERAL BH / TP / WELL: 0736.GPJ GINT US.GDT: 2/21/08



Earth Solutions NW
 2881 152nd Avenue N.E.
 Redmond, Washington 98052
 Telephone: 425-284-3300
 Fax: 425-284-2855

| | |
|--|---|
| CLIENT <u>Anastasiou</u> | PROJECT NAME <u>Willows Tech Center</u> |
| PROJECT NUMBER <u>0736</u> | PROJECT LOCATION <u>King County, Washington</u> |
| DATE STARTED <u>2/12/07</u> COMPLETED <u>2/12/07</u> | GROUND ELEVATION _____ TEST PIT SIZE _____ |
| EXCAVATION CONTRACTOR <u>NW Excavating</u> | GROUND WATER LEVELS: |
| EXCAVATION METHOD _____ | AT TIME OF EXCAVATION <u>—</u> |
| LOGGED BY <u>WLR</u> CHECKED BY <u>WLR</u> | AT END OF EXCAVATION <u>—</u> |
| NOTES <u>Bare Soil</u> | AFTER EXCAVATION <u>—</u> |

| DEPTH (ft) | SAMPLE TYPE NUMBER | TESTS | U.S.C.S. | GRAPHIC LOG | MATERIAL DESCRIPTION |
|------------|--------------------|-------------|----------|-------------|--|
| 0 | | | | | |
| | | MC = 23.30% | ML | | Bluish gray sandy SILT, medium dense to dense, moist |
| 5 | | MC = 2.90% | | | |
| | | | | 5.5 | Test pit terminated at 5.5 feet below existing grade due to possible buried utility. No groundwater encountered during excavation. |
| | | | | | Bottom of test pit at 9.5 feet. |

GENERAL BH / TP / WELL 0736.GPJ GINT US.GDT 2/21/06

Appendix B
Laboratory Test Results
ES-0736.10



Earth Solutions NW
 1805 - 136th Place N.E., Suite 201
 Bellevue, WA 98005
 Telephone: 425-284-3300

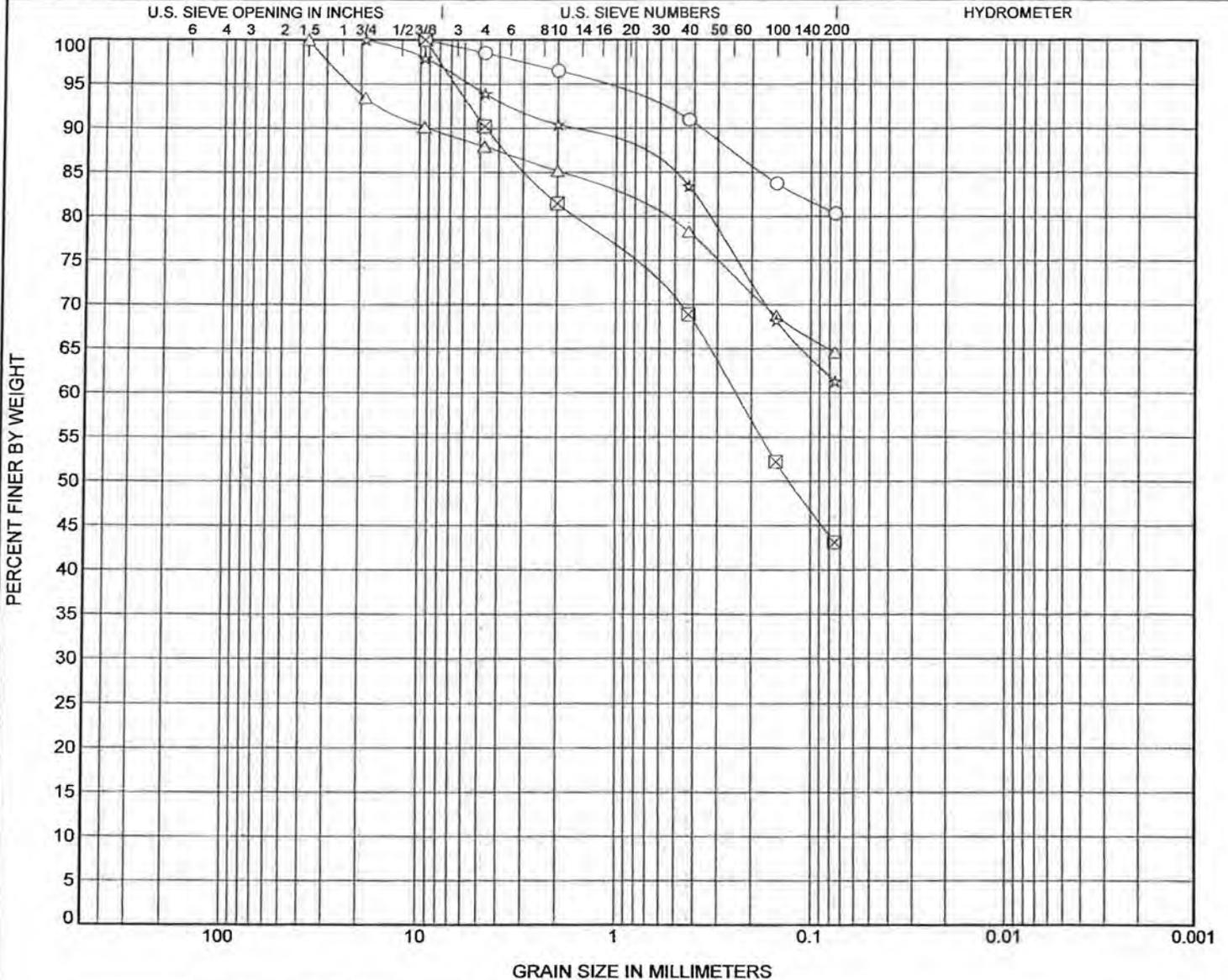
GRAIN SIZE DISTRIBUTION

CLIENT Astrolnics

PROJECT NAME Astrolnics Parking Addition

PROJECT NUMBER ES-736.8

PROJECT LOCATION kirkland



GRAIN SIZE DISTRIBUTION



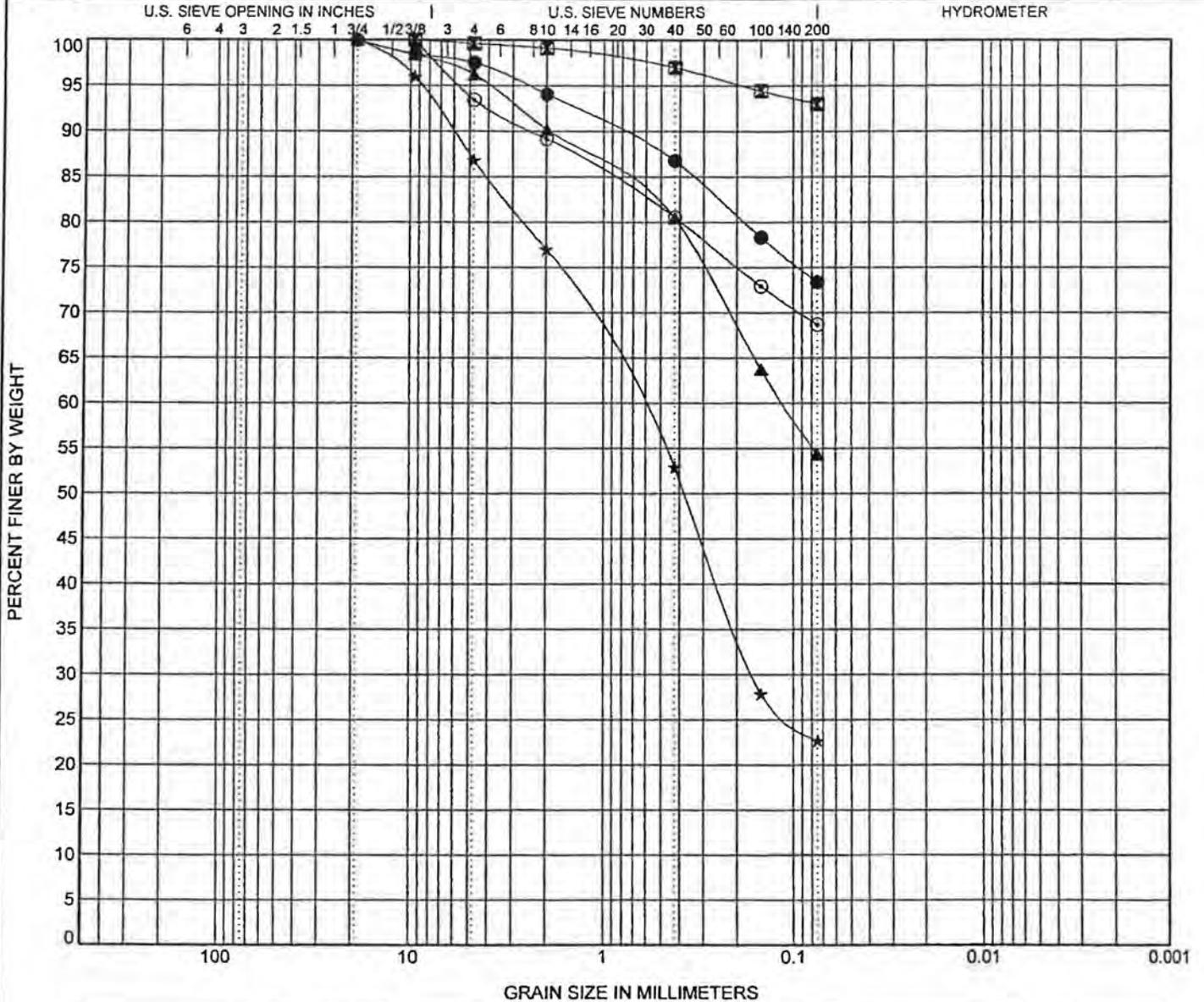
Earth Solutions NW, LLC
 2881 152nd Avenue N.E.
 Redmond, WA 98052
 Telephone: (425) 284-3300
 Fax: (425) 284-2855

CLIENT Ana Stasiou Development

PROJECT NAME Willows Tech Center

PROJECT NUMBER ES-736

PROJECT LOCATION King County



| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |

| Specimen Identification | Classification | LL | PL | PI | Cc | Cu | | |
|-------------------------|----------------------------|-------|-------|-----|---------|-------|-------|-------|
| ● B-101 5.0ft. | Brown sandy SILT, ML | | | | | | | |
| ☐ B-101 15.0ft. | Gray SILT, ML | | | | | | | |
| ▲ B-102 10.0ft. | Dark brown sandy SILT, ML | | | | | | | |
| ★ B-103 10.0ft. | Olive brown silty SAND, SM | | | | | | | |
| ⊙ B-104 5.0ft. | Gray sandy SILT, ML | | | | | | | |
| Specimen Identification | D100 | D60 | D30 | D10 | %Gravel | %Sand | %Silt | %Clay |
| ● B-101 5.0ft. | 19 | | | | 2.5 | 24.1 | 73.4 | |
| ☐ B-101 15.0ft. | 9.5 | | | | 0.4 | 6.6 | 93.0 | |
| ▲ B-102 10.0ft. | 19 | 0.114 | | | 3.8 | 41.9 | 54.3 | |
| ★ B-103 10.0ft. | 19 | 0.67 | 0.164 | | 13.2 | 64.1 | 22.7 | |
| ⊙ B-104 5.0ft. | 9.5 | | | | 6.5 | 24.8 | 68.7 | 215 |

GRAIN SIZE ES-736.GPJ GINT US LAB.GDT 4/4/07

GRAIN SIZE DISTRIBUTION



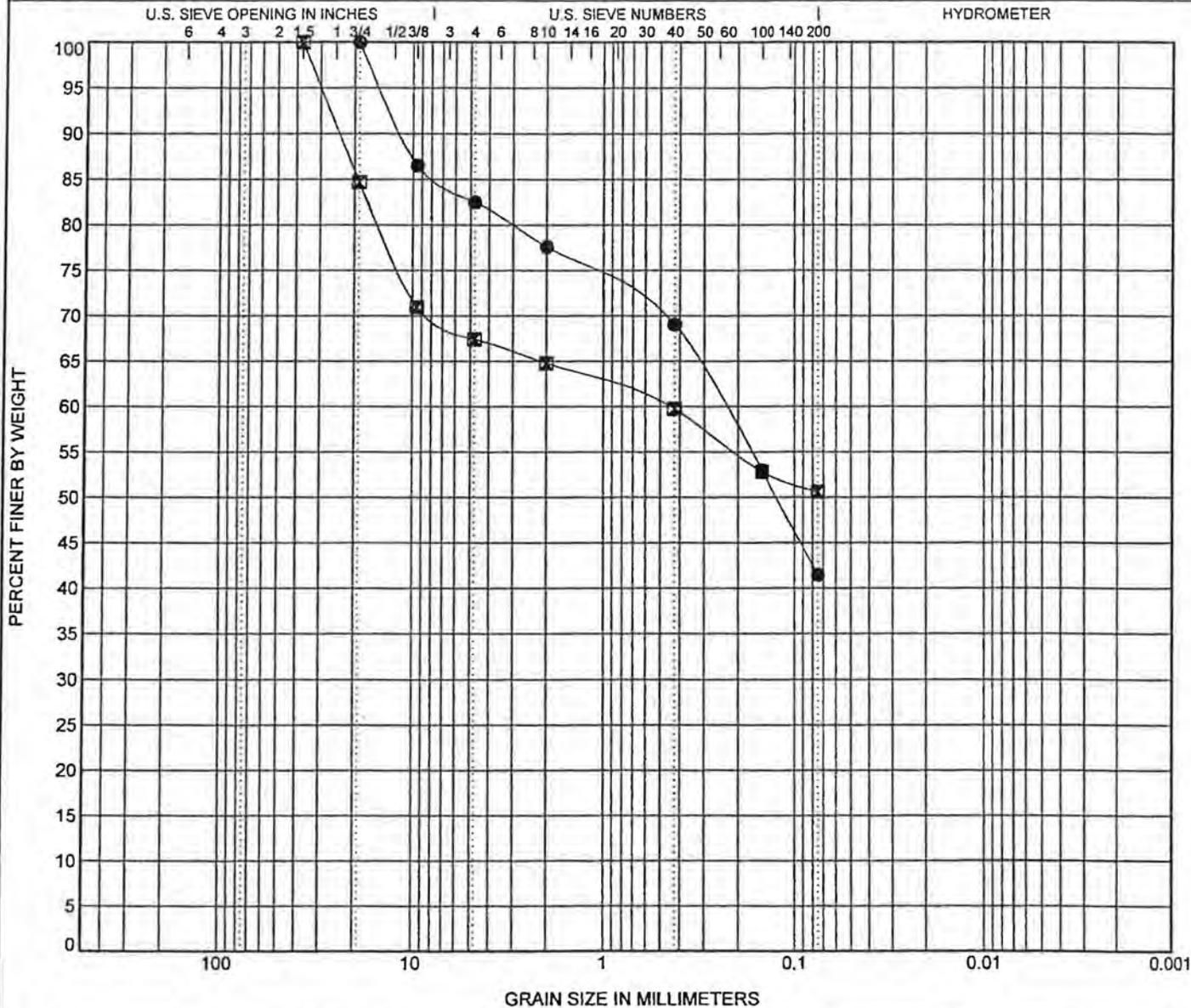
Earth Solutions NW, LLC
 2881 152nd Avenue N.E.
 Redmond, WA 98052
 Telephone: (425) 284-3300
 Fax: (425) 284-2855

CLIENT Ana Stasiou Development

PROJECT NAME Willows Tech Center

PROJECT NUMBER ES-736

PROJECT LOCATION King County



| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---------|--------|------|--------|--------|------|--------------|
| | coarse | fine | coarse | medium | fine | |

| Specimen Identification | Classification | LL | PL | PI | Cc | Cu |
|-------------------------|--|----|----|----|----|----|
| ● B-104 10.0ft. | Gray silty SAND with gravel, SM | | | | | |
| ☒ TP-01 7.0ft. | Olive brown sandy SILT with gravel, ML | | | | | |
| | | | | | | |
| | | | | | | |

| Specimen Identification | D100 | D60 | D30 | D10 | %Gravel | %Sand | %Silt | %Clay |
|-------------------------|------|-------|-----|-----|---------|-------|-------|-------|
| ● B-104 10.0ft. | 19 | 0.236 | | | 17.5 | 41.0 | 41.5 | |
| ☒ TP-01 7.0ft. | 37.5 | 0.458 | | | 32.6 | 16.8 | 50.6 | |
| | | | | | | | | |
| | | | | | | | | |

GRAIN SIZE ES-736.GPJ GINT US LAB.GDT 4/4/07

Report Distribution

ES-0736.10

EMAIL ONLY

**Astronics
12950 Willows Road Northeast
Kirkland, Washington 98034**

Attention: Mr. Timothy Borland

EMAIL ONLY

**Craft Architects
2505 Third Avenue, Suite 324
Seattle, Washington 98121**

Attention: Mr. Paul Engert



May 2, 2014

Jon Regala
City of Kirkland Planning
123 5th Avenue
Kirkland, WA 98033

Re: Kirkland Astronics Property, Wetland Boundary and Rating Review

The Watershed Company Reference Number: 120622.27

Dear Jon:

On April 28, 2014, I visited the Astronics property located on 141st Avenue NE in Kirkland (Parcels #222605-9042, -9053, & 9080). The purpose of the visit was to review and compare wetland ratings and boundaries determined by Talasaea Consultants (August 7, 2013; reporting March 31, 2014) with those determined by The Watershed Company (TWC) (May 14, 2013). This letter addresses relevant discrepancies and a review of wetland boundaries and ratings not included in the May 2013 TWC scope of work.

Findings

Upon reviewing the delineation and rating for *Wetland D*, which is located outside of the original TWC study area (Parcel #2226059080), we agree with the delineated wetland boundary and the classification as a Type 3 wetland. Comparisons between the two studies for features included in the original TWC study area are discussed below.

Wetland Boundaries

Direct comparisons between all wetland boundaries was not feasible. The wetland boundary flags placed by TWC were never surveyed, and very few flags remain in place. The wetland sketch provided by TWC is only intended to be used as a guide to help surveyors locate the flags in the field. The sketch is not intended to substitute for a delineation figure; therefore, comparing the sketched wetland boundaries with those depicted on the surveyed Talasaea figure is not reliable. General observations of the accuracy of the boundaries as delineated by Talasaea were conducted.

Wetland names discussed in this report will be consistent with those provided in the 2013 TWC report unless otherwise indicated. Letters in *italics* represent the identification provided in the 2014 Talasaea report.

Wetland Review Letter
Jon Regala, City of Kirkland
May 2, 2014
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The most substantial boundary discrepancy between the two studies relates to Wetland C (*C, E, F*), which occupies much of Parcel #2226059053 and a small portion of Parcel #2226059080. TWC delineated this feature as one continuous wetland unit, while Talasaea delineated it as three separate wetland units. It was determined during the April 2014 review inspection that Wetland C (*C, E, F*) is one contiguous wetland unit. Shallow ground saturation, hydric soils and a hydrophytic plant community is present continuously between the units delineated by Talasaea as *Wetlands C, E, and F*. Groundwater monitoring well #7 (installed by Talasaea) is located in an area delineated as non-wetland by Talasaea between *Wetlands C* and *E*. Direct observations of monitoring well #7 showed the groundwater level at the soil surface. Similarly, *Wetland E* was delineated as separate from *Wetland C* by a narrow strip (<10 feet) that presently contains shallow ponding and was supporting Pacific tree frog tadpoles and algae. Both these observations are strong, evidence of prolonged inundation (See Figure 1). Soils saturated within 12 inches of the soil surface for two consecutive weeks during the growing season (beginning on or around March 1) are considered to have positive wetland hydrology. Based on this information, we believe it is accurate to consider *Wetlands C, E, and F* as one wetland unit. The areas in question are only seasonally saturated, and wetland hydrology was likely not evident during Talasaea's August 2013 delineation study. The area should be re-delineated this spring to include the areas connecting *Wetlands C, E, and F*.

The southeastern boundary of *Wetland C* excluded an area that contained a high groundwater table, which could be observed in the form of shallow sheet flow, and a prevalence of American brooklime – an obligate wetland plant species. This area should be included within the revised wetland boundary.

Wetland Ratings

Several discrepancies were noted between the wetland ratings provided by TWC and Talasaea. As with any wetland rating systems, some questions on the Kirkland Wetland Field Data Form (Rating Form) are open to different interpretations, and qualified users will often come up with differing scores. Therefore, we will not attempt to address every minor discrepancy, particularly where discrepancies do not result in a different wetland type.

Of all the wetlands delineated and rated on the subject property, only Wetland B (*B*) resulted in a different wetland type. TWC study determined Wetland B to be a Kirkland Type 2 wetland, while the Talasaea study determined it to be a Type 3. The following questions are those in which discrepancies were noted between the two studies. The numbers listed correspond with the enumerated questions on the Rating Form.

2. Determine the number of wetland vegetation classes present in the wetland unit.

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Jon Regala, City of Kirkland
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TWC determined that the wetland unit contained two wetland classes – forested and emergent. Talasaea concluded that the unit contained only one wetland class – forested. Upon further investigation, we maintain our conclusion that the wetland contains forested and emergent vegetation communities. A large emergent community dominated by reed canarygrass is present in an area with no overhanging tree canopy (See Figure 2). We estimate that this area represents approximately half of the total wetland area. Question 2 should receive a total of three points.

3. Plant species diversity: Determine the number of plant species present in each wetland class.

TWC quantified a total of four points based on three to four species present in each of the forested and emergent plant communities. Talasaea quantified a total of one point, noting that red alder and black cottonwood make up the forested community. Since it has been determined that Wetland B contains two vegetation communities, both communities must be taken into account. Furthermore, all species within each plant community must be quantified, not just species that are identified for the particular plant stratum. For example, a forested wetland does not receive credit for only the tree species, as that neglects the value of the structural diversity present in a typical forested wetland. Instead, all species in the forest – tree, shrub, and emergent – should be quantified. The forested component of Wetland B contains red alder, black cottonwood, and Himalayan blackberry, for a total of two points. The emergent component contains reed canarygrass, giant horsetail, catchweed bedstraw, and American brooklime, for a total of three points. The cumulative score for Question 3 should be five points.

4. Structural diversity: Quantify attributes of the forested class.

TWC determined a total of two points based on trees 20-49 feet tall and shrubs present in the forest community. Talasaea concluded a total of three points. We were not provided with the completed Rating Forms from Talasaea, instead receiving only a summary of each rating. It is assumed, based on information provided for other questions, that Talasaea assigned points for trees 20-49 feet tall, shrubs, and herbaceous groundcover. Since it has been determined that the herbaceous/emergent community constitutes a separate vegetation community, it should not be included as a structural component of the forested area. Himalayan blackberry dominates the understory of the forested community, reducing the herbaceous component to insignificant. The cumulative score for Question 4 should be two points.

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Despite being an invasive weed, blackberry qualifies for this question as it provides food resources (berries) and perching/cover resources to wildlife.

6. Habitat features: Add points for each special habitat feature present.

TWC did not observe any special habitat features in Wetland B during our initial study. Talasaea noted that the wetland contained more than three downed logs per acre. After reviewing the site again, we agree with Talasaea that Wetland B does satisfy the criteria for downed logs. The cumulative score for Question 6 should be one point.

8. Buffers: Estimate the extent of each buffer type or adjacent land use to the nearest 5% and quantify score according to the formula provided on the Rating Form.

TWC determined that Wetland B contains a forest or shrub buffer for 100% of the circumference at an average width of 50-100 feet. According to the applicable formula, this calculates to a score of 800 points, equal to three cumulative points on the Rating Form. Talasaea concluded that the forested buffer is less than 50 feet wide, arriving at a score of 400 points (presumably), equal to two cumulative points on the Rating Form.

The buffer exercise is often challenging and relies on a combination of field estimates and mapping estimates using GIS data. In order to improve upon the accuracy of this important question, we divided the wetland circumference into four equal quadrants – north, south, east, and west, and measured the approximate width of the forested buffer for each quadrant. The buffers for each quadrant were of relatively consistent widths, except for the northern quadrant. We estimate that approximately 40% (10% total) of the northern quadrant (northwest portion) has a forest/shrub buffer width of approximately 180 feet. The remaining 60% (15% total) (northeast portion) has a forest/shrub buffer width of approximately 35 feet. This provides an average width of 93 feet for the northern quadrant. The eastern quadrant has a forest/shrub buffer width of approximately 50 feet. The southern quadrant has a forest/shrub buffer width of approximately 30 feet. The western quadrant has a forest/shrub buffer width of approximately 125 feet (including all of Wetland A). The average width of the four quadrants is, therefore, approximately 75 feet, equal to a width factor of two. When applying the noted formula, this equates to 800 points, for a total of three cumulative points on the Rating Form.

9. Connection to other habitat areas: Determine the quality of any corridors to adjacent wetlands or other habitats.

Wetland Review Letter
Jon Regala, City of Kirkland
May 2, 2014
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TWC determined a total of five points for Question 9. Talasaea concluded a total of one point for Question 9, noting that the habitat corridor is less than 100 feet wide and contains low cover. However, the first option on Question 9 asks, "Is there a riparian corridor to other wetlands within 0.25 of a mile, or a corridor >100' wide with good forest or shrub cover to any other habitat area." There is a forested, riparian corridor along Stream A that connects directly to Wetland A, approximately 100 feet northwest of Wetland B. The question requires no qualitative assessment of the riparian corridor or the connected wetlands, nor does it require a minimum width. The cumulative score for Question 9 should be five points.

After reviewing the Rating Form for Wetland B and tallying the adjusted scores, it is the opinion of TWC that the total score for Wetland B is 25 points, equivalent to a Type 2 wetland.

Please call if you have any questions or if we can provide you with any additional information.

Sincerely,



Ryan Kahlo, PWS
Ecologist

Enclosures

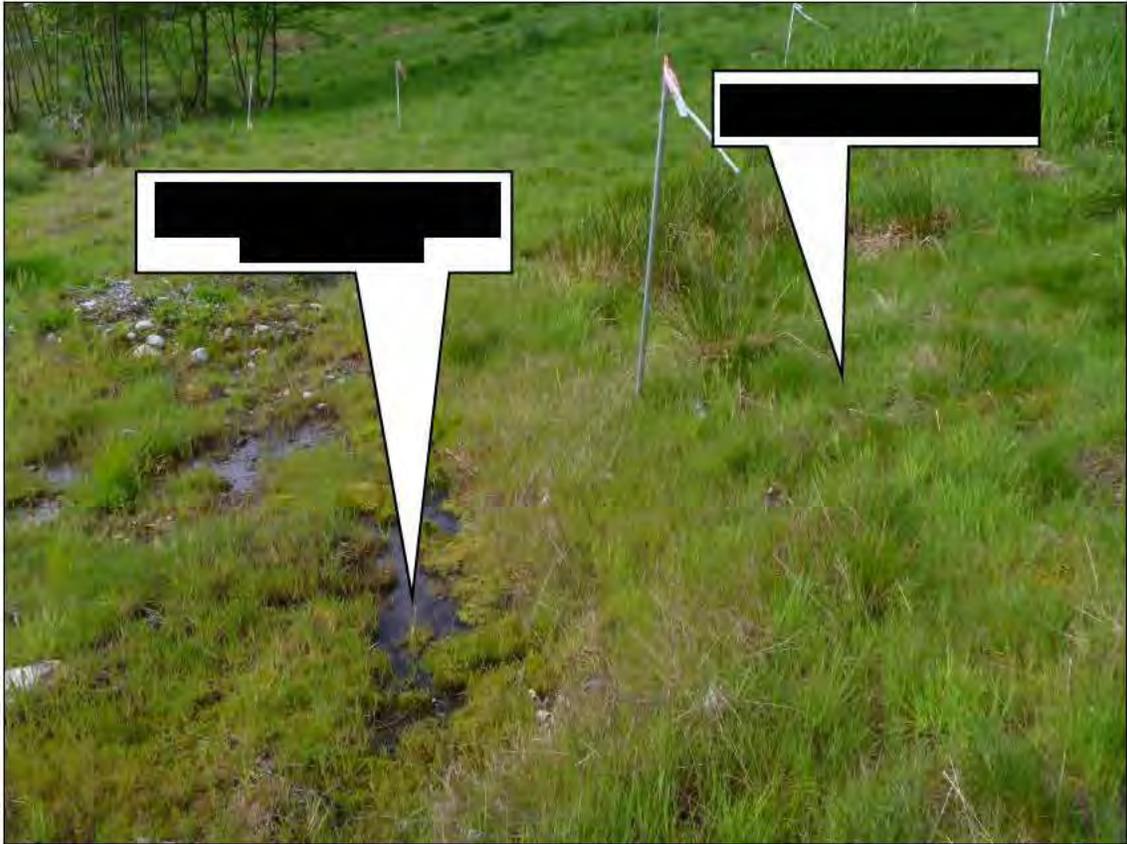


Figure 1: Eastern boundary of *Wetland E*, with wetland areas excluded from the boundary.



Figure 2: Emergent Cowardin vegetation community in *Wetland B (B)*