



SIMPLIFIED TIR SUBMITTAL TEMPLATE

Public Works Department

Project Name: 502 4th Street South

Date of Submittal: June 24, 2020

Prepared By: Lucas Zirotti, EIT & Brett Pudists, PE

PE License #: 37925

PE stamp (if required per Appendix C.1.1): Not required per Appendix C.1.1

For office use:

City of Kirkland Permit #: PRE-20-XXXXX

SIMPLIFIED TECHNICAL INFORMATION REPORT (TIR)

- Purpose..... 3
- Disclaimer..... 3
- Project Information..... 3
- Simplified Drainage Plan Eligibility..... 4
- Narrative Description..... 5
- Soils report/special studies results..... 6
- Flow control BMP site plan..... 7
- Flow control BMP design & maintenance details..... 8
 - o Full Dispersion..... 9
 - o Full Infiltration..... 10
 - o Limited Infiltration..... 11
 - o Bioretention..... 12
 - o Permeable Pavement..... 13
 - o Basic Dispersion..... 14
- CSWPP plan..... 15
 - o Erosion Sediment Control (ESC) Measures..... 17
 - A. Mark Clearing Limits/Minimize Clearing..... 17
 - B. Minimize Sediment Tracked Offsite..... 18
 - C. Control Sediment..... 19
 - D. Stabilize Exposed Soils..... 20
 - E. Control Runoff..... 21
 - F. Control Dewatering..... 23
 - G. Control Other Pollutants..... 24
 - H. Final Stabilization..... 25
 - o Stormwater Pollution Prevention and Spill (SWPPS) Measures..... 26
 - 1. Effective Pollutant Handling & Disposal Procedures..... 26
 - 2. Cover and Containment for Pollutants..... 26
 - 3. Maintenance /Repair of Heavy Equipment and Vehicles..... 27
 - 4. Fertilizer /Pesticides Application..... 27
 - 5. pH Modification of Runoff..... 28
 - 6. Permanent Structures and Features..... 28

Appendix A – Geotechnical Report

Appendix B – WWHM 2012 Report

PURPOSE AND INSTRUCTIONS FOR USE

This Simplified TIR template is based on the requirements of Appendix C of the 2016 King County Storm Water Design Manual (KCSWDM) and City of Kirkland's Addendum to the KCSWDM (Policy D-10), together known as "The Manual". Permit applicants are required to complete and submit the Simplified TIR for all simplified drainage review projects proposed within the City of Kirkland. Instructions for use are given throughout the document in italics. All page numbers reference the manual, unless otherwise specified.

DISCLAIMER

It is the responsibility of the applicant to ensure that all applicable codes and regulations have been addressed. Use of this template does not relieve the applicant of meeting all of the project's legal obligations, even if they are related to erosion sediment control and stormwater pollution prevention and do not appear in the template. Any conflicts between this document and 2016 KCSWDM shall defer to the manual.

PROJECT INFORMATION

Applicant contact

Name: Beau Development

Site address: 11250 Kirkland Way, Suite 103

Phone number: (206) 362-7695

Project

Name: 502 4th Street South

Site address: 502 4th Street South

Phone number: (206) 362-7695

Stormwater values

Total project size (sf): Onsite:5,000, Offsite:2,567

Existing impervious (sf): Onsite:1,349, Offsite:409

Percentage impervious on site (%): Onsite:27.0 , Offsite:15.9

New impervious (sf): Onsite:1,360, Offsite:409

Replaced impervious (sf): Onsite:1,551, Offsite:1,492

Total proposed impervious (sf): Onsite:2,911, Offsite:1,901

New pervious (sf): Onsite:2,089, Offsite:666

New PGIS (sf): Onsite:1,590, Offsite:800

New PGPS (acres): 0 SF

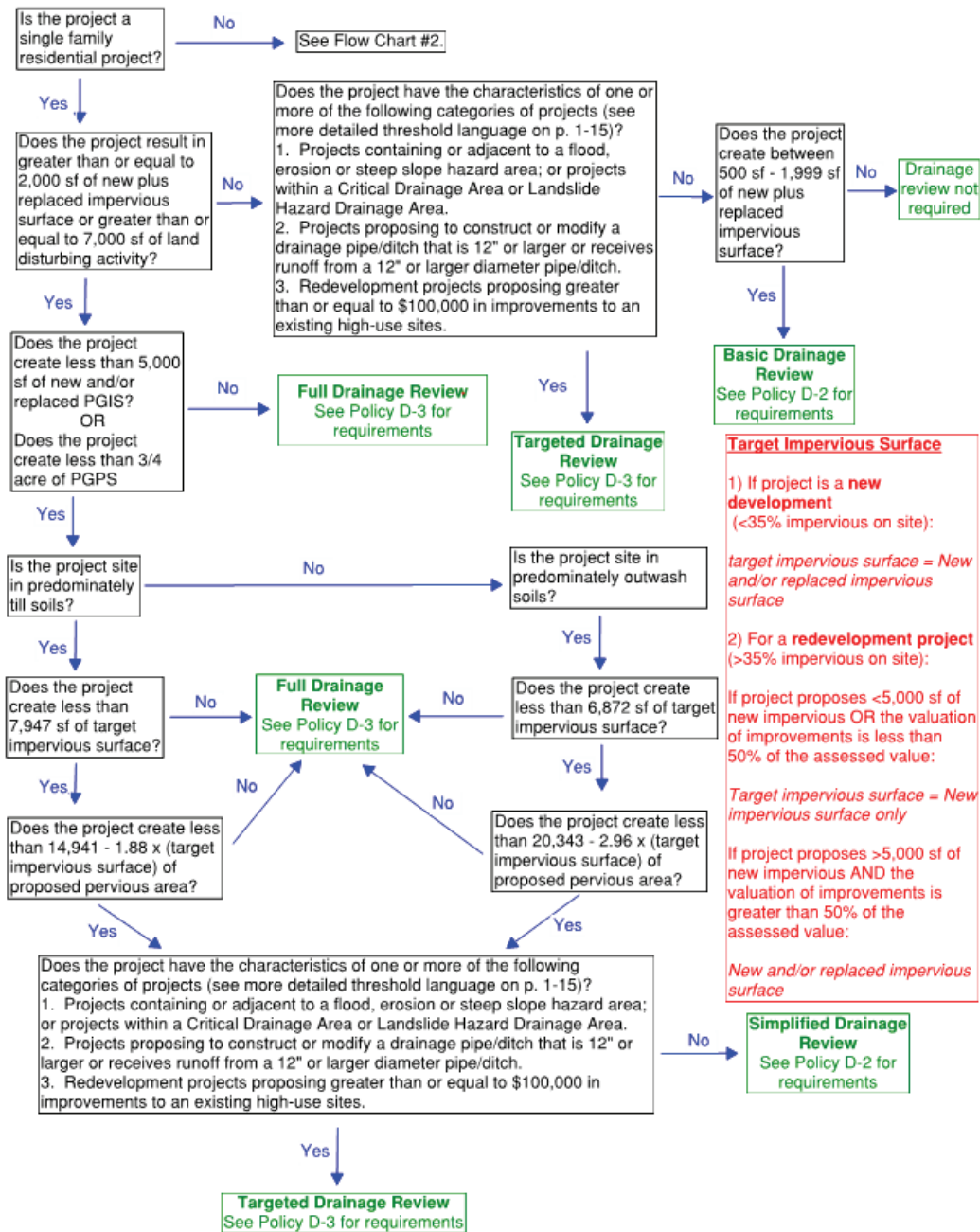
Predominant soil type (Till or Outwash?): Outwash

SIMPLIFIED DRAINAGE PLAN ELIGIBILITY

Before submittal, review the following flow chart to confirm that the project is eligible for simplified drainage review.

Last Revised: March 2017

Flow Chart #1 - Single Family Residential Projects



NARRATIVE DESCRIPTION

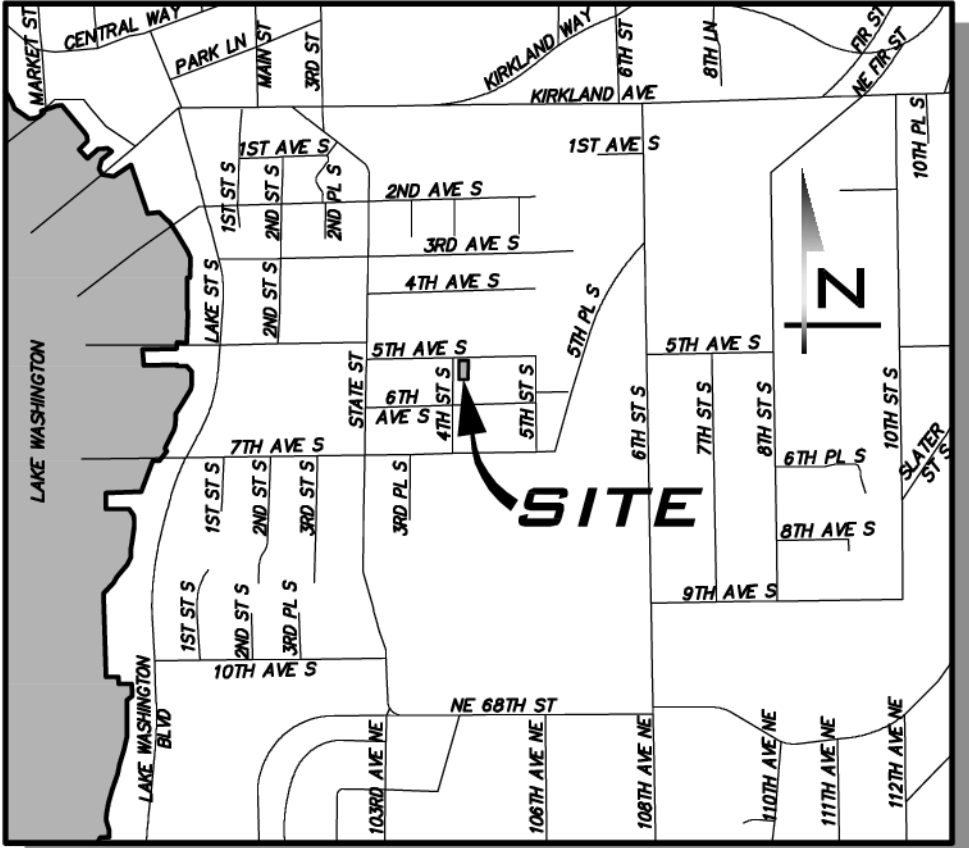
Include a written description of project in the space below. See C.4.4.1 (p. C-144) for an example.

The project is located at 502 4th Street South, Kirkland, WA. More generally, the site is located in NW ¼ of Section 8, Township 25 N, Range 5 E, W.M. See the vicinity map provided on the following page.

Refer to the Existing & Developed Conditions Exhibits included on the following pages. The project consists of one parcel, parcel #180790-0325, at approximately 0.11 acres and an additional 0.06 acres of frontage improvements along 4th St S and 5th Ave S. The site contains an existing single-family residence with a dirt/gravel driveway and a mix of pervious lawn and residential landscaping. The site is part of one drainage basin that generally sheet flows northwest prior to entering the tightline conveyance system within 5th Ave S. Flows continue west along the south side of 5th Ave S within the existing storm conveyance system, then travel north along the west side of State St S to the quarter-mile downstream location. A Downstream Drainage Exhibit is provided on the following pages. The site is bounded by single-family residences to the south and east, 4th St S to the west, and 5th Ave S to the north. The existing residence will be demolished and replaced with two single-family units and supporting infrastructure.

The project will meet the Small Lot BMP Requirement per Section 1.2.9.2.1 of the 2016 KCSWDM by evaluating flow control BMPs for the target areas and apply BMPs to the maximum extent feasible. Full and basic dispersion is infeasible as the site is unable to provide a viable 100-foot and 25-foot flow path, respectively. Per the Geotechnical Engineering Report prepared by The Riley Group Inc, the site soil and groundwater conditions would meet the King County Manual Appendix C criteria for limited infiltration with a soil class of sandy loam. Refer to the Geotechnical Engineering Report prepared by The Riley Group Inc dated May 21, 2020 included in Appendix A of this report. Due to 5-foot infiltration facility setbacks from structures, a limited infiltration drywell with an overflow was sized for Unit 1 roof area. Remaining onsite runoff will be collected and routed to the existing 8" storm system running along the east side of 4th St S.

For office use: Note any post-revision or field changes in the space below.

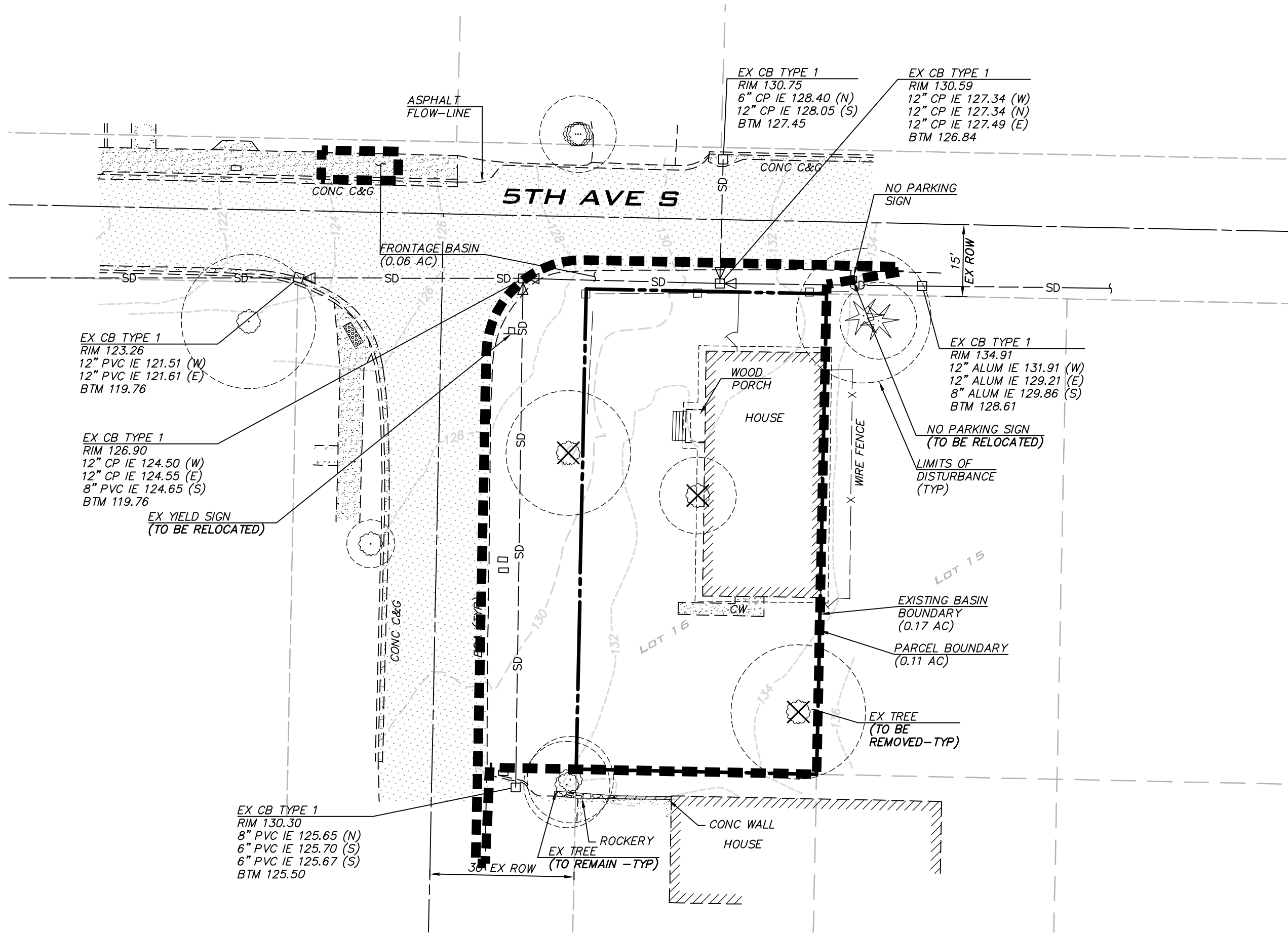
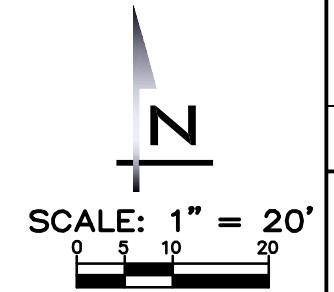


VICINITY MAP

NOT TO SCALE



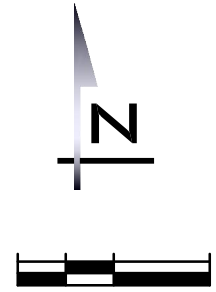
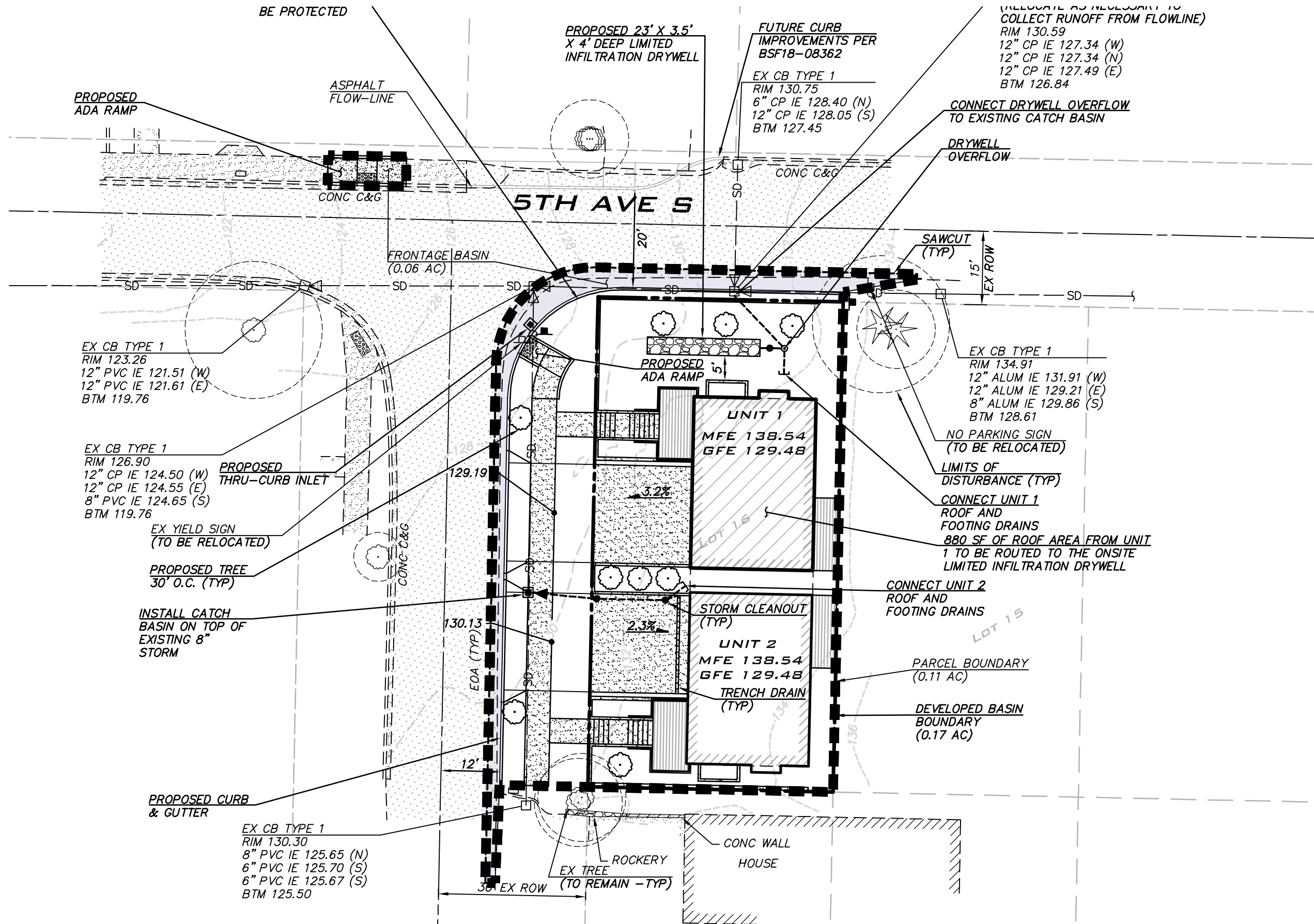
EXISTING CONDITIONS EXHIBIT



EXISTING CONDITIONS EXHIBIT
502 4TH STREET SOUTH
 PRELIMINARY TECHNICAL INFORMATION REPORT
 © 2020 BLUELINE

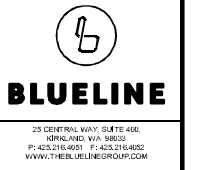
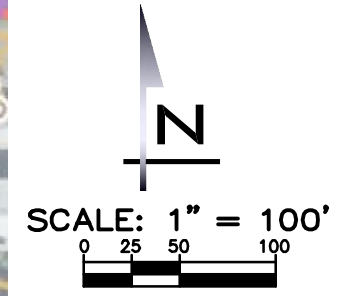
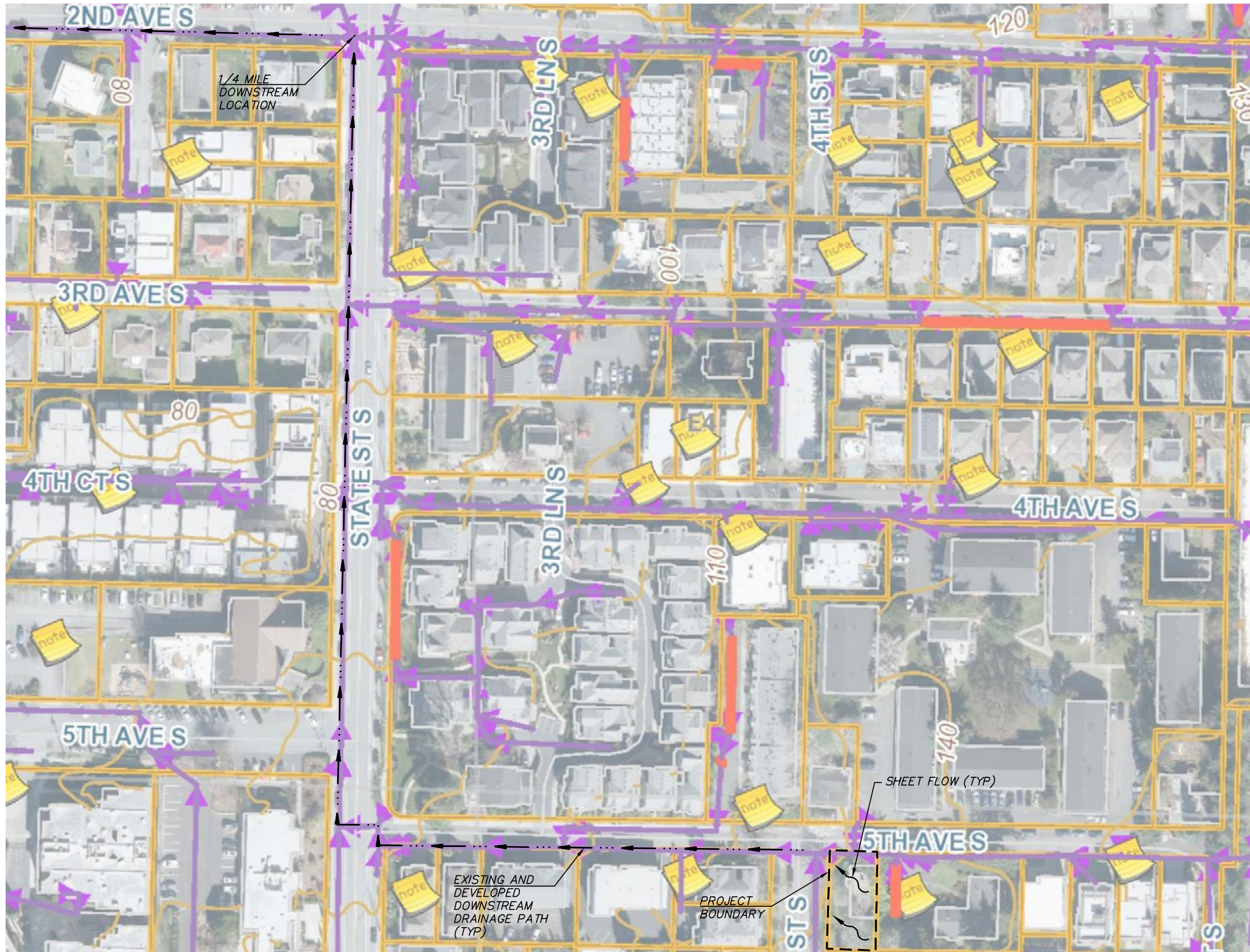
SCALE	AS NOTED
PROJECT MANAGER	BRETT PUDISTS, PE
DESIGNED BY	ALLEN BREWER
DRAWN BY	LUCAS ZIROTTI, EIT
PLOT DATE	June 24, 2020
JOB NUMBER:	19-355
FIGURE:	EC

EXISTING CONDITIONS EXHIBIT



SCALE	AS NOTED
PROJECT MANAGER	BRETT PUDISTS, PE
DESIGNED BY	ALLEN BREWER
DRAWN BY	LUCAS ZIROTTI, EIT
PLOT DATE	June 24, 2020
JOB NUMBER:	19-355
FIGURE:	EC

DOWNSTREAM DRAINAGE EXHIBIT



DOWNSTREAM DRAINAGE EXHIBIT 502 4TH STREET TECHNICAL INFORMATION REPORT

© 2019 BLUELINE

SCALE	AS NOTED
PROJECT MANAGER	ADAM KAY
DESIGNED BY	ADAM KAY
DRAWN BY	LUCAS ZIROTTI, EIT
PLOT DATE	December 30, 2019
JOB NUMBER:	19-355
FIGURE:	DS

SOILS REPORT/SPECIAL STUDIES RESULTS

Include a full geotechnical report prepared by or under the direction of a licensed onsite sewage system designer or geotechnical professional with your submittal. The report must meet the requirements of COK Policy D-8: Soil Information for Stormwater Development to Meet Flow Control BMP Requirements. Copy and paste the main recommendations regarding LID BMP feasibility in the space below.

The geotechnical report prepared by The Riley Group Inc states onsite soils are identified as sandy loam, also classified as outwash soils. According to Section 4.6 of the geotechnical report, the site does not contain geologically hazardous areas based on review of the Kirkland Municipal Code. Refer to the geotechnical report for analysis and recommendations. Main geotechnical recommendations regarding LID BMP feasibility for infiltration is included below. A copy of the Geotechnical Engineering Report prepared by The Riley Group Inc dated May 21, 2020 is provided in Appendix A at the end of this report.

5.6.3 Infiltration

Infiltration feasibility was evaluated under City of Kirkland Policy D-8 “Soil Information for Stormwater Development to Meet Flow Control BMP Requirements” and King County Surface Water Design Manual Appendix C. Site soil types were logged in the field per ASTM D-2487 soil description protocol and evaluated under USDA soil classification guidelines from grain size analysis.

The silty sand with gravel soils encountered are a sandy loam under the USDA classification. This soil classification meets the City of Kirkland soil textural requirement of Sand, Loam, Sandy Loam or Loamy Sand for stormwater Best Management Practices.

The site soil and groundwater conditions would meet the King County Manual Appendix C criteria for limited infiltration with a soil class of sandy loam.

FLOW CONTROL BMP SITE PLAN

Paste the flow control BMP site plan drawing in the space below (does not need to be to scale). The plan must show all target impervious surfaces, new pervious surfaces and required flow control BMPs proposed for the project site. Refer to City of Kirkland Policy G-7 for required plan elements. See Figure C.4.2.A (p. C-141) for an example site plan.

Refer to the DC Exhibit provided on the pages following the "Narrative Description"

FLOW CONTROL BMP DESIGN

This section provides descriptions of approved BMPs based on Section C.2 (p. C-31). Use the following pages of this section to provide design specifications and maintenance instructions for each flow control BMP proposed. Indicate in the checkbox lists if a BMP will not be used. Refer to Section C.2 (p. C-31) for guidance.

This project will: apply flow control BMPs as specified in the following section; OR

demonstrate compliance with the LID Performance Standard of KCSWDM Section 1.2.9.

If applying flow control BMPs, indicate which types will be employed from the following checklist:

- Full Dispersion
- Full Infiltration
- Limited Infiltration
- Bioretention
- Permeable Pavement
- Basic Dispersion

FULL DISPERSION (Reference KCSWDM C.2.1, p. C-32 for additional information)

Select the type of Full Dispersion BMP to be applied, or indicate that Full Dispersion will not be applied.

- Check if Full Dispersion will not be applied to this project
- Splash Blocks (Section C.2.1.3, p. C-34)
- Rock Pads (Section C.2.1.4, p. C-35)
- 10-foot Gravel Trench (Section C.2.1.5, p. C-35)
- 50-foot Gravel Trench (Section C.2.1.5, p. C-35)
- Sheet Flow from Impervious Surface (Section C.2.1.6, p. C-37)
- Sheet Flow from Non-Native Pervious Surface (Section C.2.1.6, p. C-37)

Feasibility

Use the space below to describe how the proposed Full Dispersion BMP meets the minimum design requirements of C.2.1.1 (p. C-32 & -33) and COK Storm Drainage Pre-approved Plans; OR explain why it is infeasible or inapplicable to apply full dispersion.

The site is bounded by single-family residences to the south and east, 4th St S to the west, and 5th Ave S to the north. As such, the project is unable to provide a viable 100-foot native vegetated flowpath. This BMP is therefore infeasible.

Design

If determined feasible, describe the device(s) used for Full Dispersion and how the relevant design specifications and native growth retention requirements of C.2.1.2-C.2.1.8 (p. C-34 through C-46) have been achieved in the space below.

N/A

FULL INFILTRATION (Reference KCSWDM C.2.2, p. C-48 for additional information)

Select the type of Full Infiltration BMP to be applied, or indicate that Full Infiltration will not be applied.

- Check if Full Infiltration will not be applied to this project
- Gravel Filled Trenches (Section C.2.2.3, p. C-50)
- Drywells (Section C.2.2.4, p. C-51)
- Ground Surface Depressions (Section C.2.2.5, p. C-51)

Feasibility

Use the space below to describe how the proposed Full Infiltration BMP meets the minimum design requirements of C.2.2.2 (p. C-48 through C-50) and COK Storm Drainage Pre-approved Plans; OR explain why it is infeasible or inapplicable to apply full infiltration.

According to Geotechnical Engineering Report prepared by The Riley Group Inc, site soil and groundwater conditions do not meet the King County Manual Appendix C criteria for full infiltration, but instead, meet criteria for limited infiltration with a soil class of sandy loam. This BMP is therefore infeasible. A copy of the Geotechnical Engineering Report prepared by The Riley Group Inc dated May 21, 2020 is provided in Appendix A at the end of this report.

Design

If determined feasible, describe the device(s) used for Full Infiltration and how the relevant design specifications of C.2.2.3-C.2.2.5 (p. C-50 through C-56) have been achieved in the space below.

N/A

LIMITED INFILTRATION (Reference KCSWDM C.2.3, p. C-57 for additional information)

Select the type of Limited Infiltration BMP to be applied, or indicate that Limited Infiltration will not be applied.

- Check if Limited Infiltration will not be applied to this project
- Gravel Filled Trenches (Section C.2.3.3, p. C-58)
- Drywells (Section C.2.3.4, p. C-58)

Feasibility

Use the space below to describe how the proposed Limited Infiltration BMP meets the minimum design requirements of C.2.3.2 (p. C-57) and COK Storm Drainage Pre-approved Plans; OR explain why it is infeasible or inapplicable to apply limited infiltration.

According to Geotechnical Engineering Report prepared by The Riley Group Inc, site soil and groundwater conditions do not meet the King County Manual Appendix C criteria for limited infiltration with a soil class of sandy loam. A copy of the Geotechnical Engineering Report prepared by The Riley Group Inc dated May 21, 2020 is provided in Appendix A at the end of this report.

Minimum 5-foot setback is maintained between any part of the limited infiltration drywell and any structure or property line. The overflow invert elevation is designed to be below crawl space or basement elevations.

Design

If determined feasible, describe the device(s) used for Limited Infiltration and how the relevant design specifications requirements of C.2.3.3-C.2.3.4 (p. C-57 through C-58) have been achieved in the space below.

According to Section C.2.3.4 of the 2016 KCSWDM, the required volume of gravel to infiltrate 1,000 sf of impervious surface for limited infiltration with soil classifications of sandy loam is 360 cf.

Preliminary limited infiltration drywell is sized to accomodate 880 sf of roof area from Unit 1, requiring 317 cf of drywell volume. The preliminary infiltration drywell will measure 23' x 3.5' x 4' deep, totaling a volume of 322 cf.

BIORETENTION (Reference KCSWDM C.2.6, p. C-73 for additional information)

Select the type of Bioretention BMP to be applied, or indicate that Bioretention will not be applied.

- Check if Bioretention will not be applied to this project
- Bioretention Cells
- Bioretention Swales
- Bioretention Planters
- Road-side Bioretention Ditch

Feasibility

Use the space below to describe how the proposed Bioretention BMP meets the feasibility requirements of C.2.6 (p. C-73 through C-76) and COK Storm Drainage Pre-approved Plans; OR explain why it is infeasible or inapplicable to apply bioretention.

The site is proposing a limited infiltration drywell for Unit 1 roof runoff. The project is unable to provide additional infiltration facilities as there is insufficient space that meets facility setbacks from structures.

Design

Describe how the relevant design specifications requirements of C.2.6.1-C.2.6.2 (p. C-77 through C-81) have been achieved in the space below.

N/A

PERMEABLE PAVEMENT (Reference KCSWDM C.2.7, p. C-86 for additional information)

Select the type of Permeable Pavement BMP to be applied, or indicate that Permeable Pavement will not be applied.

- Check if Permeable Pavement will not be applied to this project
- Porous Concrete (Section C.2.7.2, p. C-90)
- Porous Asphaltic Concrete (Section C.2.7.3, p. C-91)
- Permeable Pavers (Section C.2.7.4, p. C-91)
- Other permeable pavement BMP per Appendix C, modified by Policy D-10

Feasibility

Use the space below to describe how the proposed permeable pavement BMP meets the minimum design requirements of C.2.7 and C.2.7.1 (p. C-86 through C-90) and COK Storm Drainage Pre-approved Plans; OR explain why it is infeasible or inapplicable to apply permeable pavement.

Permeable pavement will be analysed at final engineering.

Design

Describe the proposed type of Permeable Pavement and how the relevant design specifications requirements of C.2.7.2-C.2.7.6 (p. C-90 through C-92) have been achieved in the space below.

N/A

BASIC DISPERSION (Reference KCSWDM C.2.4, p. C-60 for additional information)

Select the type of Basic Dispersion BMP to be applied, or indicate that Basic Dispersion will not be applied.

- Check if Basic Dispersion will not be applied to this project
- Splash Blocks (Section C.2.4.2, p. C-61)
- Rock Pads (Section C.2.4.3, p. C-62)
- Gravel Filled Trenches (Section C.2.4.4, p. C-62)
- Sheet Flow (Section C.2.4.5, p. C-63)

Feasibility

Use the space below to describe how the proposed Basic Dispersion BMP meets the minimum design requirements of C.2.4.1 (p. C-60 through C-61) and COK Storm Drainage Pre-approved Plans; OR explain why it is infeasible or inapplicable to apply basic dispersion.

The site is bounded by single-family residences to the south and east, 4th St S to the west, and 5th Ave S to the north. As such, the project is unable to provide a viable 25-foot native vegetated flowpath. This BMP is therefore infeasible.

Design

Describe the device(s) used for Basic Dispersion and how the relevant design specifications requirements of C.2.4.2-C.2.4.5 (p. C-61 through C-69) have been achieved in the space below.

N/A

SITE CSWPP PLAN

Introduction

The following Simplified Construction Stormwater Pollution Prevention (CSWPP) plan conforms to Core Requirement #5 from the 2016 King County Stormwater Design Manual and City of Kirkland Pre-approved Plans regarding erosion and sediment control and pollution prevention. These rules require the submittal of a CSWPP plan for review and approval by Kirkland staff. This plan consists of two parts: an Erosion and Sediment Control (ESC) plan and a Stormwater Pollution Prevention and Spill Control (SWPPS) plan.

The placement and type of proposed ESC and SWPPS measures are shown in the following section. The contractor or other persons performing construction activities shall comply with the stormwater pollution prevention and spill control measures/BMPs specified for such activities in Appendix D, the King County Stormwater Pollution Prevention Manual and/or Section E of COK Pre-approved plans.

Compliance Contact Person: _____

Address: _____

Phone Number: _____

Email: _____

Both the applicant and contractor are responsible for implementation and maintenance of the approved Simplified site CSWPP plan and any additional measures required by COK.

The Simplified site CSWPP plan shall be retained onsite or within reasonable access to the site. The plan shall be modified whenever there is a significant change in the design, construction, operation, or maintenance at the construction site that has, or could have, a significant effect on the discharge of pollutants to surface waters. The plan shall be modified, if during inspections or investigations conducted by the City, it is determined that the plan is ineffective in eliminating or significantly minimizing pollutants in stormwater discharges from the site. The plan shall be modified as necessary to include additional or modified measures designed to correct problems identified.

CSWPP PLAN

Paste the CSWPP Plan in the space below. See CK-E.04 for an example.

TESC Plan will be provided at final engineering.

CSWPP Plan will be provided at final engineering.

EROSION AND SEDIMENT CONTROL PLAN

A. MARK CLEARING LIMITS/MINIMIZE CLEARING (Reference KCSWDM D.3.2.A, p. D-126 for additional information)

Prior to beginning land disturbing activities, all clearing limits, sensitive areas and their buffers, trees that are to be preserved within the construction area and any existing or proposed flow control BMP areas shall be clearly marked, both in the field and on the small site CSWPP plan, to prevent damage and offsite impacts. Also, clearing shall be minimized to the maximum extent practicable. See "Mark Clearing Limits/Minimize Clearing," Section D.3.4.1 (p. D-129), for more detailed specifications.

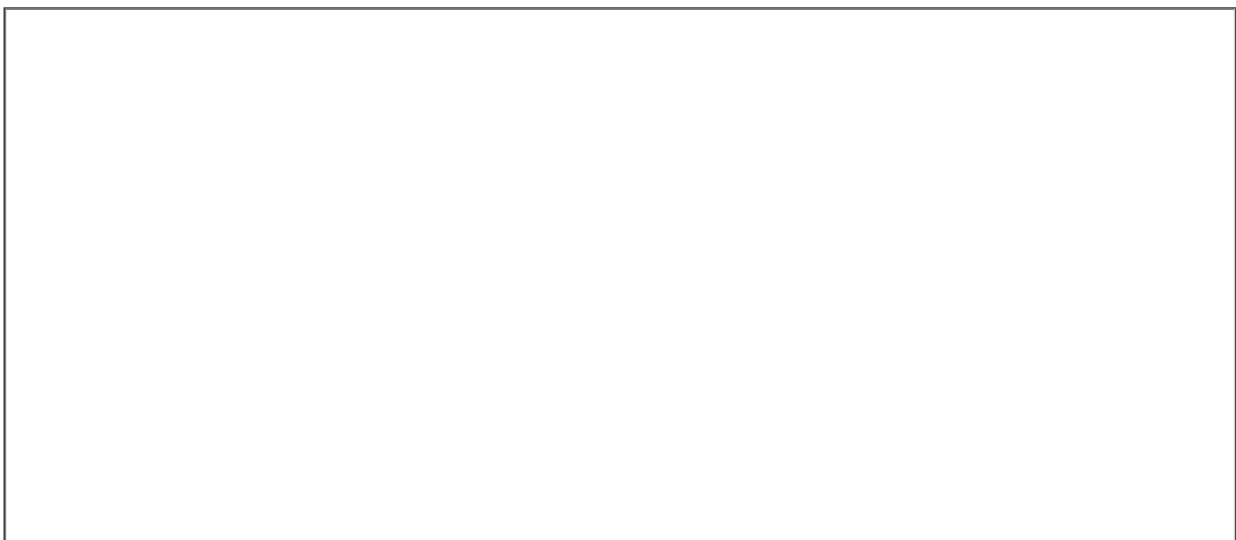
Design & Installation

Use the following space to specify how clearing limits are to be delineated, and instructions on their installation.



Maintenance

Use the following space to specify maintenance requirements for the clearing limits measures.



CSWPP Plan will be provided at final engineering.

B. MINIMIZE SEDIMENT TRACKED OFFSITE (Reference KCSWDM D.3.2.B, p. D-126 and COK pre-approved plans CK-3.01 & .02 for additional information)

1. Establish a stabilized entrance for construction vehicle access to minimize the tracking of sediment onto public roads. Entrance and exit shall be limited to one route, if possible. See "Stabilized Construction Entrance," Section D.2.1.4.1 (p. D-42), for detailed specifications.
2. If sediment is tracked offsite, public roads shall be cleaned thoroughly at the end of each day, or more frequently during wet weather, if necessary to prevent sediment from entering waters of the state. Sediment shall be removed from roads by shoveling or pickup sweeping and shall be transported to a controlled sediment disposal area. Street washing will be allowed only after sediment is removed in this manner. Street wash wastewater shall be controlled by pumping back onsite, or otherwise be prevented from discharging into drainage systems tributary to surface waters. This requirement shall be included as a note on the small site CSWPP plan.

Specification

Use the following space to describe how offsite sediment tracking will be minimized.

CSWPP Plan will be provided at final engineering.

C. CONTROL SEDIMENT (Reference KCSWDM D.3.2.C, p. D-126 for additional information)

Runoff from disturbed areas must pass through a sediment control measure to prevent the transport of sediment downstream until the disturbed area is fully stabilized. Sediment controls must be installed as one of the first steps in grading and shall be functional before other land disturbing activities take place. One or more the following sediment controls may be used to meet this requirement:

- Silt Fence (See COK Pre-approved plan CK-E.03)
- Vegetated Strip (See Section D.2.1.3.3, p. D-37)
- Triangular Silt Dike (See Section D.2.1.3.4, p. D-37)
- Storm Drain Inlet Protection (See Section D.2.1.5.3, p. D-53)

Design & Installation

Use the following space to specify the measures to be employed for sediment control.

Maintenance

Use the following space to specify maintenance requirements for sediment control measures.

D. STABILIZE EXPOSED SOILS (Reference KCSWDM D.3.2.D, p. D-126 for additional information)

All exposed and unworked soils shall be stabilized through the application of cover measures to protect the soil from the erosive forces of raindrop impact, flowing water, and wind erosion. One or more of the following cover measures may be used to meet this requirement during the construction phase:

- Mulching (See Section D.2.1.2.2, p. D-16)
- Plastic Covering (See COK Pre-approved plan CK-E.05)
- Nets and Blankets (See COK Pre-approved plan CK-E.06)
- Seeding (See Section D.2.1.2.6, p. D-24)
- Sodding (See Section D.2.1.2.7, p. D-28)

Cover measures shall be applied in accordance with the following requirements:

1. Cover measures must be installed if an area is to remain unworked for more than seven days during the dry season (May 1 to September 30) or for more than two consecutive working days during the wet season (October 1 to April 30). These time limits may be relaxed if an area poses a low risk of erosion due to soil type, slope gradient, anticipated weather conditions, or other factors. Conversely, the City may reduce these time limits if site conditions warrant greater protection (e.g., adjacent to significant aquatic resources or highly erosive soils) or if significant precipitation is expected.
2. Any area to remain unworked for more than 30 days shall be seeded or sodded unless the City determines that winter weather makes vegetation establishment infeasible. During the wet season, exposed ground slopes and stockpile slopes with an incline of 3 horizontal to 1 vertical (3H:1V) or steeper and with more than ten feet of vertical relief shall be covered if they are to remain unworked for more than 12 hours. Also during the wet season, the material necessary to cover all disturbed areas must be stockpiled on site. The intent of these cover requirements is to have as much area as possible covered during any period of precipitation.

Design & Installation

Use the following space to specify the measures to be employed for stabilization of exposed soils.

Maintenance

Use the following space to specify maintenance requirements for sediment control measures.

CSWPP Plan will be provided at final engineering.

E. CONTROL RUNOFF (Reference KCSWDM D.3.2.E, p. D-127 for additional information)

Stormwater runoff originating on the site and/or entering the site from offsite areas must be controlled so as to minimize erosion of disturbed areas and exposed cut and fill slopes, and to minimize erosive impacts on existing or proposed flow control BMP areas. The following runoff control measures shall be used as needed per the conditions of use and specifications for each measure:

- Interceptor Dikes and Swales (see Section D.2.1.6.1, p. D-60 for conditions of use and specifications)
- Ditches (see Section D.3.4.2, p. D-129 for conditions of use and specifications)
- Pipe Slope Drain (see Section D.3.4.3, p. D-130 for conditions of use and specifications)
- Check Dams (COK Pre-approved Plan CK-E.07)
- Catch Basin/Inlet Sedimentation Trap (COK Pre-approved Plan CK-E.08)
- Temporary Sediment Pond (COK Pre-approved Plan CK-E.09)
- Temporary Sediment Trap (COK Pre-approved Plan CK-E.09A)
- Straw Wattles (COK Pre-approved Plan CK-E.10)
- Storm Drain Protection Insert (COK Pre-approved Plan CK-E.11)

Design & Installation

Use the following space to specify the design and installation of runoff control measures. Show sizing for temporary sediment pond for both the 2 and 10 year storm events.

Maintenance

Use the following space to specify maintenance requirements for the runoff control measures.

Sizing Calculations

In the space below, paste an image of the report from WWHM stating the 2- and 10-year peak flows.

In the space below, paste calculations showing the sizing requirements.

CSWPP Plan will be provided at final engineering.

F. CONTROL DEWATERING (Reference KCSWDM D.3.2.F, p. D-127 for additional information)

All surface water from disturbed areas shall be intercepted, conveyed to a sediment pond or trap, and discharged downslope of any disturbed areas. The purpose of surface water control is to collect and convey surface water so that erosion is minimized, and runoff from disturbed areas is treated by a sediment pond or trap.

Design & Installation

Use the following space to specify the design and installation of dewatering control measures. If not applicable, include language from geotechnical report stating that no groundwater will be present on site. Note if there are contaminated soils on site.

Maintenance

Use the following space to specify maintenance requirements for the dewatering control measures.

CSWPP Plan will be provided at final engineering.

G. CONTROL OTHER POLLUTANTS (Reference KCSWDM D.3.2.G, p. D-127 for additional information)

The requirements for this section are covered in the Stormwater Pollution Prevention and Spill (SWPPS) Plan, beginning on p. 27 of this document.

CSWPP Plan will be provided at final engineering.

H. FINAL STABILIZATION (Reference KCSWDM D.3.2.H, p. D-127 for additional information)

1. Prior to final construction approval, the project site shall be stabilized to prevent sediment-laden water from leaving the project site after project completion. All disturbed areas of the project site shall be vegetated or otherwise permanently stabilized. At a minimum, disturbed areas must be seeded and mulched to ensure that sufficient cover will develop shortly after final approval. Mulch without seeding is adequate for small areas to be landscaped before October 1.
2. All temporary ESC and SWPPS measures shall be removed within 30 days after final site stabilization is achieved or after the temporary measures are no longer needed. Trapped sediment shall be removed or stabilized onsite. Flow control BMPs impacted during construction shall be restored. Disturbed soil areas resulting from removal of measures or vegetation shall be permanently stabilized with seeding or sodding.

Design & Installation

Use the following space to specify the measures to be employed for final stabilization.

Maintenance

Use the following space to specify maintenance requirements for final stabilization measure.

CSWPP Plan will be provided at final engineering.

**STORMWATER POLLUTION PREVENTION AND SPILL (SWPPS) MEASURES
(Reference KCSWDM D.3.5, p. D-131 for additional information)**

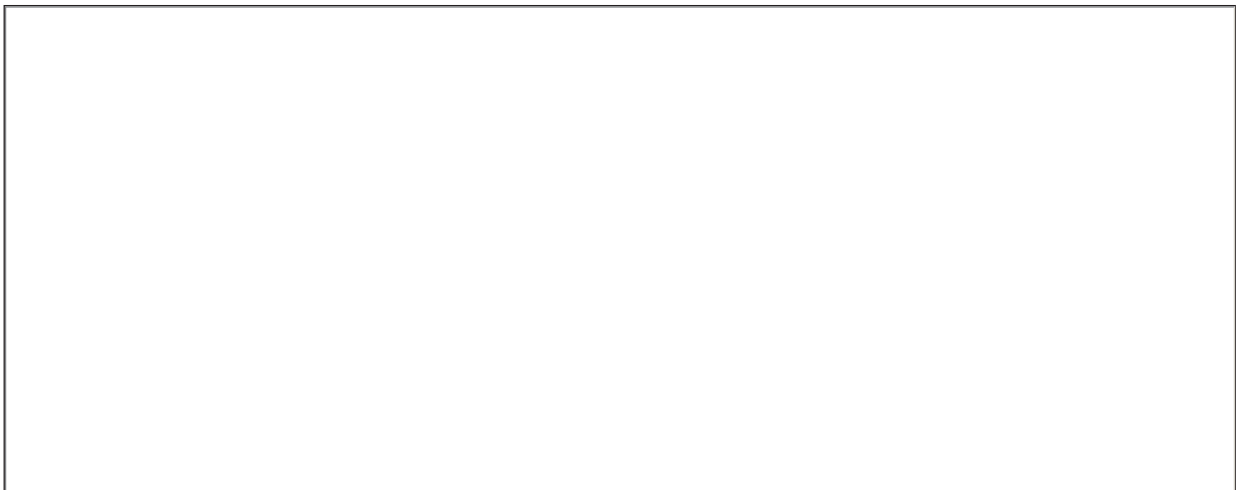
The purpose of stormwater pollution prevention and spill control is to prevent, reduce, or eliminate the discharge of pollutants to onsite or adjacent stormwater systems or watercourses from construction-related activities such as materials delivery and storage, onsite equipment fueling and maintenance, demolition of existing buildings and disposition of demolition materials and other waste, and concrete handling, washout and disposal.

The implementation of this SWPPS plan and the construction, maintenance, replacement, and upgrading of the SWPPS facilities is the responsibility of the Permittee/Contractor until all construction is approved.

1. All pollutants, including waste materials, that occur onsite shall be handled and disposed of in a manner that does not cause contamination of stormwater. Describe how effective pollutant handling and disposal procedures will be achieved.




2. Cover, containment, and protection from vandalism shall be provided for all chemicals, liquid products, petroleum products, and non-inert wastes present on the site. Onsite fueling tanks shall include secondary containment. Describe how cover and containment for materials, fuel and other pollutants will be achieved.



CSWPP Plan will be provided at final engineering.

3. Maintenance and repair of heavy equipment and vehicles involving oil changes, hydraulic system drain down, solvent and de-greasing cleaning operations, fuel tank drain down and removal, and other activities may result in discharge or spillage of pollutants to the ground or into stormwater runoff must be conducted using spill prevention measures, such as drip pans. Contaminated surfaces shall be cleaned immediately following any discharge or spill incident. Emergency repairs may be performed onsite using temporary plastic placed beneath and, if raining, over the vehicle. Describe additional measures that will be employed to protect the environment from spills and drips of petroleum products and other pollutants.



4. Application of agricultural chemicals, including fertilizers and pesticides, shall be conducted in a manner and at application rates that will not result in loss of chemical to stormwater runoff. Manufacturers' recommendations for application rates and procedures shall be followed. Describe any additional measures that will be employed to prevent the over-application and untimely application of chemicals and fertilizers.



CSWPP Plan will be provided at final engineering.

5. Stormwater discharges shall not cause or contribute to a violation of the water quality standard for pH in the receiving water. Measures shall be used to prevent or treat contamination of stormwater runoff by pH modifying sources. Describe any additional measures that will be employed to prevent or treat contamination of stormwater runoff by pH modifying sources.



6. For full compliance with KMC 15.52.110 - Water Quality Standards, the project may need to include measures for the permanent structures and features constructed under other permits. Describe any additional measures that must be employed during construction.



Appendix A & B

Please include the geotechnical report and WWHM 2012 report with your submittal.



GEOTECHNICAL ENGINEERING REPORT

PREPARED BY:

**THE RILEY GROUP, INC.
17522 BOTHELL WAY NORTHEAST
BOTHELL, WASHINGTON 98011**

PREPARED FOR:

**IMAGINE HOMES, INC.
11250 KIRKLAND WAY, SUITE 103
KIRKLAND, WASHINGTON 98033**

RGI PROJECT No. 2020-229-1

**IMAGINE HOMES 4TH STREET
502 4TH STREET SOUTH
KIRKLAND, WASHINGTON**

MAY 21, 2020



May 21, 2020

Mr. Beau Granger
Imagine Homes, Inc.
11250 Kirkland Way, Suite 103
Kirkland, Washington 98033

**Subject: Geotechnical Engineering Report
Imagine Homes 4th Street
502 4th Street South
Kirkland, Washington
RGI Project No. 2020-229-1**

Dear Mr. Granger:

As requested, The Riley Group, Inc. (RGI) has performed a Geotechnical Engineering Report (GER) for the Imagine Homes 4th Street project located at 502 4th Street South, Kirkland, Washington. Our services were completed in accordance with our proposal 2020-229-PRP1 dated May 1, 2020 and authorized by you on May 5, 2020. The information in this GER is based on our understanding of the proposed construction, and the soil and groundwater conditions encountered in the test probes completed by RGI at the site on May 13, 2020.

RGI recommends that you submit the project plans and specifications to RGI for a general review so that we may confirm that the recommendations in this GER are interpreted and implemented properly in the construction documents. RGI also recommends that a representative of our firm be present on site during portions of the project construction to confirm that the soil and groundwater conditions are consistent with those that form the basis for the engineering recommendations in this GER.

If you have any questions or require additional information, please contact us.

Respectfully submitted,

THE RILEY GROUP, INC.

A blue ink signature of Eric L. Woods, consisting of a stylized, cursive 'E' followed by 'L. Woods'.

Eric L. Woods, LG
Project Geologist

A circular professional engineer seal for Kristina Marie Weller, State of Washington, Registered Professional Engineer, No. 33182. The seal features a portrait of George Washington. A blue ink signature of Kristina M. Weller is written across the seal, and the date '5/21/2020' is written in blue ink to the right of the seal.

Kristina M. Weller, PE
Principal Geotechnical Engineer

TABLE OF CONTENTS

1.0	INTRODUCTION.....	1
2.0	PROJECT DESCRIPTION	1
3.0	FIELD EXPLORATION AND LABORATORY TESTING.....	1
3.1	FIELD EXPLORATION	1
3.2	LABORATORY TESTING	2
4.0	SITE CONDITIONS.....	2
4.1	SURFACE.....	2
4.2	GEOLOGY	2
4.3	SOILS.....	2
4.4	GROUNDWATER	2
4.5	SEISMIC CONSIDERATIONS	3
4.6	GEOLOGIC HAZARD AREAS	4
5.0	DISCUSSION AND RECOMMENDATIONS.....	4
5.1	GEOTECHNICAL CONSIDERATIONS	4
5.2	EARTHWORK.....	4
5.2.1	Erosion and Sediment Control	4
5.2.2	Stripping and Subgrade Preparation	5
5.2.3	Excavations.....	5
5.2.4	Structural Fill.....	6
5.2.5	Wet Weather Construction Considerations.....	7
5.3	FOUNDATIONS	8
5.4	RETAINING WALLS	9
5.5	SLAB-ON-GRADE CONSTRUCTION	9
5.6	DRAINAGE.....	10
5.6.1	Surface	10
5.6.2	Subsurface.....	10
5.6.3	Infiltration	10
5.7	UTILITIES.....	10
6.0	ADDITIONAL SERVICES.....	11
7.0	LIMITATIONS.....	11

LIST OF FIGURES AND APPENDICES

Figure 1	Site Vicinity Map
Figure 2	Geotechnical Exploration Plan
Figure 3	Retaining Wall Drainage Detail
Figure 4	Typical Footing Drain Detail
Appendix A.....	Field Exploration and Laboratory Testing

Executive Summary

This Executive Summary should be used in conjunction with the entire Geotechnical Engineering Report (GER) for design and/or construction purposes. It should be recognized that specific details were not included or fully developed in this section, and the GER must be read in its entirety for a comprehensive understanding of the items contained herein. Section 7.0 should be read for an understanding of limitations.

RGI's geotechnical scope of work included the advancement of five test probes to approximate depths of 12 feet below existing site grades.

Based on the information obtained from our subsurface exploration, the site is suitable for development of the proposed project. The following geotechnical considerations were identified:

Soil Conditions: The soils encountered during field exploration include medium dense to very dense silty sand with varying amounts of gravel and sand with some silt.

Groundwater: No groundwater seepage was encountered during our subsurface exploration.

Foundations: Foundations for the proposed building may be supported on conventional spread footings bearing on medium dense to dense native soil or structural fill.

Slab-on-grade: Slab-on-grade floors and slabs for the proposed building can be supported on medium dense to dense native soil or structural fill.

1.0 Introduction

This Geotechnical Engineering Report (GER) presents the results of the geotechnical engineering services provided for the Imagine Homes 4th Street in Kirkland, Washington. The purpose of this evaluation is to assess subsurface conditions and provide geotechnical recommendations for the construction of a single family residence. Our scope of services included field explorations, laboratory testing, engineering analyses, and preparation of this GER.

The recommendations in the following sections of this GER are based upon our current understanding of the proposed site development as outlined below. If actual features vary or changes are made, RGI should review them in order to modify our recommendations as required. In addition, RGI requests to review the site grading plan, final design drawings and specifications when available to verify that our project understanding is correct and that our recommendations have been properly interpreted and incorporated into the project design and construction.

2.0 Project description

The project site is located at 502 4th Street South in Kirkland, Washington. The approximate location of the site is shown on Figure 1.

The site is currently occupied by a single family residence. RGI understands that the existing residence will be demolished, and a new single family residence will be constructed on the site.

At the time of preparing this GER, building plans were not available for our review. Based on our experience with similar construction, RGI anticipates that the proposed building will be supported on perimeter walls with bearing loads of two to six kips per linear foot, and a series of columns with a maximum load up to 30 kips. Slab-on-grade floor loading of 250 pounds per square foot (psf) are expected.

3.0 Field Exploration and Laboratory Testing

3.1 FIELD EXPLORATION

On May 13, 2020, RGI observed the drilling of five test probes. The approximate exploration locations are shown on Figure 2.

Field logs of each exploration were prepared by the geologist that continuously observed the drilling. These logs included visual classifications of the materials encountered during drilling as well as our interpretation of the subsurface conditions between samples. The test probe logs included in Appendix A represent an interpretation of the field logs and include modifications based on laboratory observation and analysis of the samples.

3.2 LABORATORY TESTING

During the field exploration, a representative portion of each recovered sample was sealed in containers and transported to our laboratory for further visual and laboratory examination. Selected samples retrieved from the test probes were tested for moisture content and grain size analysis to aid in soil classification and provide input for the recommendations provided in this GER. The results and descriptions of the laboratory tests are enclosed in Appendix A.

4.0 Site Conditions

4.1 SURFACE

The subject site is a rectangular-shaped parcel of land approximately 0.11 acres in size. The site is bound to the east and south by residential properties, to the west by 4th Street South, and to the north by 5th Avenue South.

The existing site is occupied by a single family residence. The site slopes west at gradients of about 10 percent, with a total elevation change across the site of about five feet. The site is vegetated with grass, decorative plants and shrubs, and several medium- to large-diameter trees.

4.2 GEOLOGY

Review of the *Geologic Map of the Kirkland Quadrangle, Washington*, by James P. Minard (1983) indicates that the soil in the project vicinity is mapped as Till (Qvt), which is a nonstratified mixture of clay, silt, sand, and gravel deposited by the Vashon ice sheet. These descriptions are generally similar to the findings in our field explorations.

4.3 SOILS

The soils encountered during field exploration include medium dense to very dense silty sand with varying amounts of gravel and sand with some silt.

More detailed descriptions of the subsurface conditions encountered are presented in the test probes included in Appendix A. Sieve analysis was performed on three selected soil samples. Grain size distribution curves are included in Appendix A.

4.4 GROUNDWATER

No groundwater seepage was encountered during our subsurface exploration.

It should be recognized that fluctuations of the groundwater table will occur due to seasonal variations in the amount of rainfall, runoff, and other factors not evident at the time the explorations were performed. In addition, perched water can develop within seams and layers contained in fill soils or higher permeability soils overlying less permeable

soils following periods of heavy or prolonged precipitation. Therefore, groundwater levels during construction or at other times in the future may be higher or lower than the levels indicated on the logs. Groundwater level fluctuations should be considered when developing the design and construction plans for the project.

4.5 SEISMIC CONSIDERATIONS

Based on the International Building Code (IBC), RGI recommends the follow seismic parameters for design.

Table 1 IBC

Parameter	2015 Value	2018 Value
Site Soil Class ¹	C ²	
Site Latitude	47.6717	
Site Longitude	-122.2002	
Short Period Spectral Response Acceleration, S_s (g)	1.263	1.273
1-Second Period Spectral Response Acceleration, S_1 (g)	0.486	0.443
Adjusted Short Period Spectral Response Acceleration, S_{MS} (g)	1.263	1.528
Adjusted 1-Sec Period Spectral Response Acceleration, S_{M1} (g)	0.638	0.665
Numeric seismic design value at 0.2 second; S_{DS} (g)	0.842	1.019
Numeric seismic design value at 1.0 second; S_{M1} (g)	0.426	0.443

1. Note: In general accordance with Chapter 20 of ASCE 7-10. The Site Class is based on the average characteristics of the upper 100 feet of the subsurface profile.

2. Note: The 2015 IBC and ASCE 7-10 require a site soil profile determination extending to a depth of 100 feet for seismic site classification. The current scope of our services does not include the required 100 foot soil profile determination. Test probes extended to a maximum depth of 12 feet, and this seismic site class definition considers that similar soil continues below the maximum depth of the subsurface exploration. Additional exploration to deeper depths would be required to confirm the conditions below the current depth of exploration.

Liquefaction is a phenomenon where there is a reduction or complete loss of soil strength due to an increase in water pressure induced by vibrations from a seismic event. Liquefaction mainly affects geologically recent deposits of fine-grained sands that are below the groundwater table. Soils of this nature derive their strength from intergranular friction. The generated water pressure or pore pressure essentially separates the soil grains and eliminates this intergranular friction, thus reducing or eliminating the soil's strength.

RGI reviewed the results of the field and laboratory testing and assessed the potential for liquefaction of the site's soil during an earthquake. Since the site is underlain by glacial till, RGI considers that the possibility of liquefaction during an earthquake is minimal.

4.6 GEOLOGIC HAZARD AREAS

Regulated geologically hazardous areas include erosion, landslide, earthquake, or other geological hazards. Based on review of the Kirkland Municipal Code, the site does not contain geologically hazardous areas.

5.0 Discussion and Recommendations

5.1 GEOTECHNICAL CONSIDERATIONS

Based on our study, the site is suitable for the proposed construction from a geotechnical standpoint. Foundations for the proposed building can be supported on conventional spread footings bearing on competent native soil or structural fill. Slab-on-grade floors can be similarly supported.

Detailed recommendations regarding the above issues and other geotechnical design considerations are provided in the following sections. These recommendations should be incorporated into the final design drawings and construction specifications.

5.2 EARTHWORK

The earthwork is expected to include excavating and backfilling the building foundations and preparing slab subgrades.

5.2.1 EROSION AND SEDIMENT CONTROL

Potential sources or causes of erosion and sedimentation depend on construction methods, slope length and gradient, amount of soil exposed and/or disturbed, soil type, construction sequencing and weather. The impacts on erosion-prone areas can be reduced by implementing an erosion and sedimentation control plan. The plan should be designed in accordance with applicable city and/or county standards.

RGI recommends the following erosion control Best Management Practices (BMPs):

- Scheduling site preparation and grading for the drier summer and early fall months and undertaking activities that expose soil during periods of little or no rainfall
- Retaining existing vegetation whenever feasible
- Establishing a quarry spall construction entrance
- Installing siltation control fencing or anchored straw or coir wattles on the downhill side of work areas
- Covering soil stockpiles with anchored plastic sheeting
- Revegetating or mulching exposed soils with a minimum 3-inch thickness of straw if surfaces will be left undisturbed for more than one day during wet weather or one week in dry weather
- Directing runoff away from exposed soils and slopes

- Minimizing the length and steepness of slopes with exposed soils and cover excavation surfaces with anchored plastic sheeting
- Decreasing runoff velocities with check dams, straw bales or coir wattles
- Confining sediment to the project site
- Inspecting and maintaining erosion and sediment control measures frequently (The contractor should be aware that inspection and maintenance of erosion control BMPs is critical toward their satisfactory performance. Repair and/or replacement of dysfunctional erosion control elements should be anticipated.)

Permanent erosion protection should be provided by reestablishing vegetation using hydroseeding and/or landscape planting. Until the permanent erosion protection is established, site monitoring should be performed by qualified personnel to evaluate the effectiveness of the erosion control measures. Provisions for modifications to the erosion control system based on monitoring observations should be included in the erosion and sedimentation control plan.

5.2.2 STRIPPING AND SUBGRADE PREPARATION

Stripping efforts should include removal of pavements, vegetation, organic materials, and deleterious debris from areas slated for building, pavement, and utility construction. The test probes encountered about 6 inches of topsoil and rootmass. Deeper areas of stripping may be required in forested or heavily vegetated areas of the site.

Subgrade soils that become disturbed due to elevated moisture conditions should be overexcavated to reveal firm, non-yielding, non-organic soils and backfilled with compacted structural fill. In order to maximize utilization of site soils as structural fill, RGI recommends that the earthwork portion of this project be completed during extended periods of warm and dry weather if possible. If earthwork is completed during the wet season (typically November through May) it will be necessary to take extra precautionary measures to protect subgrade soils. Wet season earthwork will require additional mitigative measures beyond that which would be expected during the drier summer and fall months.

5.2.3 EXCAVATIONS

All temporary cut slopes associated with the site and utility excavations should be adequately inclined to prevent sloughing and collapse. The site soils consist of medium dense to very dense silty sand with varying amounts of gravel and sand with some silt gravel.

Accordingly, for excavations more than 4 feet but less than 20 feet in depth, the temporary side slopes should be laid back with a minimum slope inclination of 1H:1V (Horizontal:Vertical). If there is insufficient room to complete the excavations in this manner, or excavations greater than 20 feet in depth are planned, using temporary shoring

to support the excavations should be considered. For open cuts at the site, RGI recommends:

- No traffic, construction equipment, stockpiles or building supplies are allowed at the top of cut slopes within a distance of at least five feet from the top of the cut
- Exposed soil along the slope is protected from surface erosion using waterproof tarps and/or plastic sheeting
- Construction activities are scheduled so that the length of time the temporary cut is left open is minimized
- Surface water is diverted away from the excavation
- The general condition of slopes should be observed periodically by a geotechnical engineer to confirm adequate stability and erosion control measures

In all cases, however, appropriate inclinations will depend on the actual soil and groundwater conditions encountered during earthwork. Ultimately, the site contractor must be responsible for maintaining safe excavation slopes that comply with applicable OSHA or WISHA guidelines.

5.2.4 STRUCTURAL FILL

RGI recommends fill below the foundation and floor slab, behind retaining walls, and below pavement and hardscape surfaces be placed in accordance with the following recommendations for structural fill. The structural fill should be placed after completion of site preparation procedures as described above.

The suitability of excavated site soils and import soils for compacted structural fill use will depend on the gradation and moisture content of the soil when it is placed. As the amount of fines (that portion passing the U.S. No. 200 sieve) increases, soil becomes increasingly sensitive to small changes in moisture content and adequate compaction becomes more difficult or impossible to achieve. Soils containing more than about 5 percent fines cannot be consistently compacted to a dense, non-yielding condition when the moisture content is more than 2 percent above or below optimum. Optimum moisture content is that moisture that results in the greatest compacted dry density with a specified compactive effort.

Non-organic site soils are only considered suitable for structural fill provided that their moisture content is within about two percent of the optimum moisture level as determined by American Society of Testing and Materials D1557-09 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (ASTM D1557). Excavated site soils may not be suitable for re-use as structural fill depending on the moisture content and weather conditions at the time of construction. If soils are stockpiled for future reuse and wet weather is anticipated, the stockpile should be protected with plastic sheeting that is securely anchored. Even during dry weather, moisture conditioning (such as, windrowing and drying) of site soils to be reused as structural fill may be required.

The site soils are moisture sensitive and may require moisture conditioning prior to use as structural fill. If on-site soils are or become unusable, it may become necessary to import clean, granular soils to complete site work that meet the grading requirements listed in Table 2 to be used as structural fill.

Table 2 Structural Fill Gradation

U.S. Sieve Size	Percent Passing
4 inches	100
No. 4 sieve	22 to 100
No. 200 sieve	0 to 5*

*Based on minus 3/4 inch fraction.

Prior to use, an RGI representative should observe and test all materials imported to the site for use as structural fill. Structural fill materials should be placed in uniform loose layers not exceeding 12 inches and compacted as specified in Table 3. The soil's maximum density and optimum moisture should be determined by ASTM D1557.

Table 3 Structural Fill Compaction ASTM D1557

Location	Material Type	Minimum Compaction Percentage	Moisture Content Range	
Foundations	On-site granular or approved imported fill soils:	95	+2	-2
Retaining Wall Backfill	On-site granular or approved imported fill soils:	92	+2	-2
Slab-on-grade	On-site granular or approved imported fill soils:	95	+2	-2
General Fill (non-structural areas)	On-site soils or approved imported fill soils:	90	+3	-2

Placement and compaction of structural fill should be observed by RGI. A representative number of in-place density tests should be performed as the fill is being placed to confirm that the recommended level of compaction is achieved.

5.2.5 WET WEATHER CONSTRUCTION CONSIDERATIONS

RGI recommends that preparation for site grading and construction include procedures intended to drain ponded water, control surface water runoff, and to collect shallow subsurface seepage zones in excavations where encountered. It will not be possible to successfully compact the subgrade or utilize on-site soils as structural fill if accumulated

water is not drained prior to grading or if drainage is not controlled during construction. Attempting to grade the site without adequate drainage control measures will reduce the amount of on-site soil effectively available for use, increase the amount of select import fill materials required, and ultimately increase the cost of the earthwork phases of the project. Free water should not be allowed to pond on the subgrade soils. RGI anticipates that the use of berms and shallow drainage ditches, with sumps and pumps in utility trenches, will be required for surface water control during wet weather and/or wet site conditions.

5.3 FOUNDATIONS

Following site preparation and grading, the proposed building foundation can be supported on conventional spread footings bearing on competent native soil or structural fill. Loose, organic, or other unsuitable soils may be encountered in the proposed building footprint. If unsuitable soils are encountered, they should be overexcavated and backfilled with structural fill. If loose soils are encountered, the soils should be moisture conditioned and compacted to a firm and unyielding condition. The foundation design value assumes the foundation is supported on at least two feet of medium dense native soil or structural fill.

Perimeter foundations exposed to weather should be at a minimum depth of 18 inches below final exterior grades. Interior foundations can be constructed at any convenient depth below the floor slab. Finished grade is defined as the lowest adjacent grade within 5 feet of the foundation for perimeter (or exterior) footings and finished floor level for interior footings.

Table 4 Foundation Design

Design Parameter	Value
Allowable Bearing Capacity	2,000 psf ¹
Friction Coefficient	0.30
Passive pressure (equivalent fluid pressure)	250 pcf ²
Minimum foundation dimensions	Columns: 24 inches Walls: 16 inches

1. psf = pounds per square foot

2. pcf = pounds per cubic foot

The allowable foundation bearing pressures apply to dead loads plus design live load conditions. For short-term loads, such as wind and seismic, a 1/3 increase in this allowable capacity may be used. At perimeter locations, RGI recommends not including the upper 12 inches of soil in the computation of passive pressures because they can be affected by weather or disturbed by future grading activity. The passive pressure value assumes the foundation will be constructed neat against competent soil or backfilled with structural fill

as described in Section 5.2.4. The recommended base friction and passive resistance value includes a safety factor of about 1.5.

With spread footing foundations designed in accordance with the recommendations in this section, maximum total and differential post-construction settlements of 1 inch and 1/2 inch, respectively, should be expected.

5.4 RETAINING WALLS

If retaining walls are needed in the building area, RGI recommends cast-in-place concrete walls be used. The magnitude of earth pressure development on retaining walls will partly depend on the quality of the wall backfill. RGI recommends placing and compacting wall backfill as structural fill. Wall drainage will be needed behind the wall face. A typical retaining wall drainage detail is shown in Figure 3.

With wall backfill placed and compacted as recommended, and drainage properly installed, RGI recommends using the values in the following table for design.

Table 5 Retaining Wall Design

Design Parameter	Value
Allowable Bearing Capacity	2,000 psf
Active Earth Pressure (unrestrained walls)	35 pcf
At-rest Earth Pressure (restrained walls)	50 pcf

For seismic design, an additional uniform load of 7 times the wall height (H) for unrestrained walls and 14H in psf for restrained walls should be applied to the wall surface. Friction at the base of foundations and passive earth pressure will provide resistance to these lateral loads. Values for these parameters are provided in Section 5.3.

5.5 SLAB-ON-GRADE CONSTRUCTION

Once site preparation has been completed as described in Section 5.2, suitable support for slab-on-grade construction should be provided. RGI recommends that the concrete slab be placed on top of medium dense native soil or structural fill. Immediately below the floor slab, RGI recommends placing a four-inch thick capillary break layer of clean, free-draining sand or gravel that has less than five percent passing the U.S. No. 200 sieve. This material will reduce the potential for upward capillary movement of water through the underlying soil and subsequent wetting of the floor slab. Where moisture by vapor transmission is undesirable, an 8- to 10-millimeter thick plastic membrane should be placed on a 4-inch thick layer of clean gravel.

For the anticipated floor slab loading, we estimate post-construction floor settlements of 1/4- to 1/2-inch.

5.6 DRAINAGE

5.6.1 SURFACE

Final exterior grades should promote free and positive drainage away from the building area. Water must not be allowed to pond or collect adjacent to foundations or within the immediate building area. For non-pavement locations, RGI recommends providing a minimum drainage gradient of 3 percent for a minimum distance of 10 feet from the building perimeter. In paved locations, a minimum gradient of 1 percent should be provided unless provisions are included for collection and disposal of surface water adjacent to the structure.

5.6.2 SUBSURFACE

RGI recommends installing perimeter foundation drains. A typical footing drain detail is shown on Figure 4. The foundation drains and roof downspouts should be tightlined separately to an approved discharge facility. Subsurface drains must be laid with a gradient sufficient to promote positive flow to a controlled point of approved discharge.

5.6.3 INFILTRATION

Infiltration feasibility was evaluated under City of Kirkland Policy D-8 “Soil Information for Stormwater Development to Meet Flow Control BMP Requirements” and King County Surface Water Design Manual Appendix C. Site soil types were logged in the field per ASTM D-2487 soil description protocol and evaluated under USDA soil classification guidelines from grain size analysis.

The silty sand with gravel soils encountered are a sandy loam under the USDA classification. This soil classification meets the City of Kirkland soil textural requirement of Sand, Loam, Sandy Loam or Loamy Sand for stormwater Best Management Practices.

The site soil and groundwater conditions would meet the King County Manual Appendix C criteria for limited infiltration with a soil class of sandy loam.

5.7 UTILITIES

Utility pipes should be bedded and backfilled in accordance with American Public Works Association (APWA) specifications. For site utilities located within the right-of-ways, bedding and backfill should be completed in accordance with City of Kirkland specifications. At a minimum, trench backfill should be placed and compacted as structural fill, as described in Section 5.2.4. Where utilities occur below unimproved areas, the degree of compaction can be reduced to a minimum of 90 percent of the soil’s maximum density as

determined by the referenced ASTM D1557. As noted, soils excavated on site should be suitable for use as backfill material. If on-site soils are or become unusable, imported structural fill meeting the gradation provided in Table 2 should be used for trench backfill.

6.0 Additional Services

RGI is available to provide further geotechnical consultation throughout the design phase of the project. RGI should review the final design and specifications in order to verify that earthwork and foundation recommendations have been properly interpreted and incorporated into project design and construction.

RGI is also available to provide geotechnical engineering and construction monitoring services during construction. The integrity of the earthwork and construction depends on proper site preparation and procedures. In addition, engineering decisions may arise in the field in the event that variations in subsurface conditions become apparent. Construction monitoring services are not part of this scope of work. If these services are desired, please let us know and we will prepare a cost proposal.

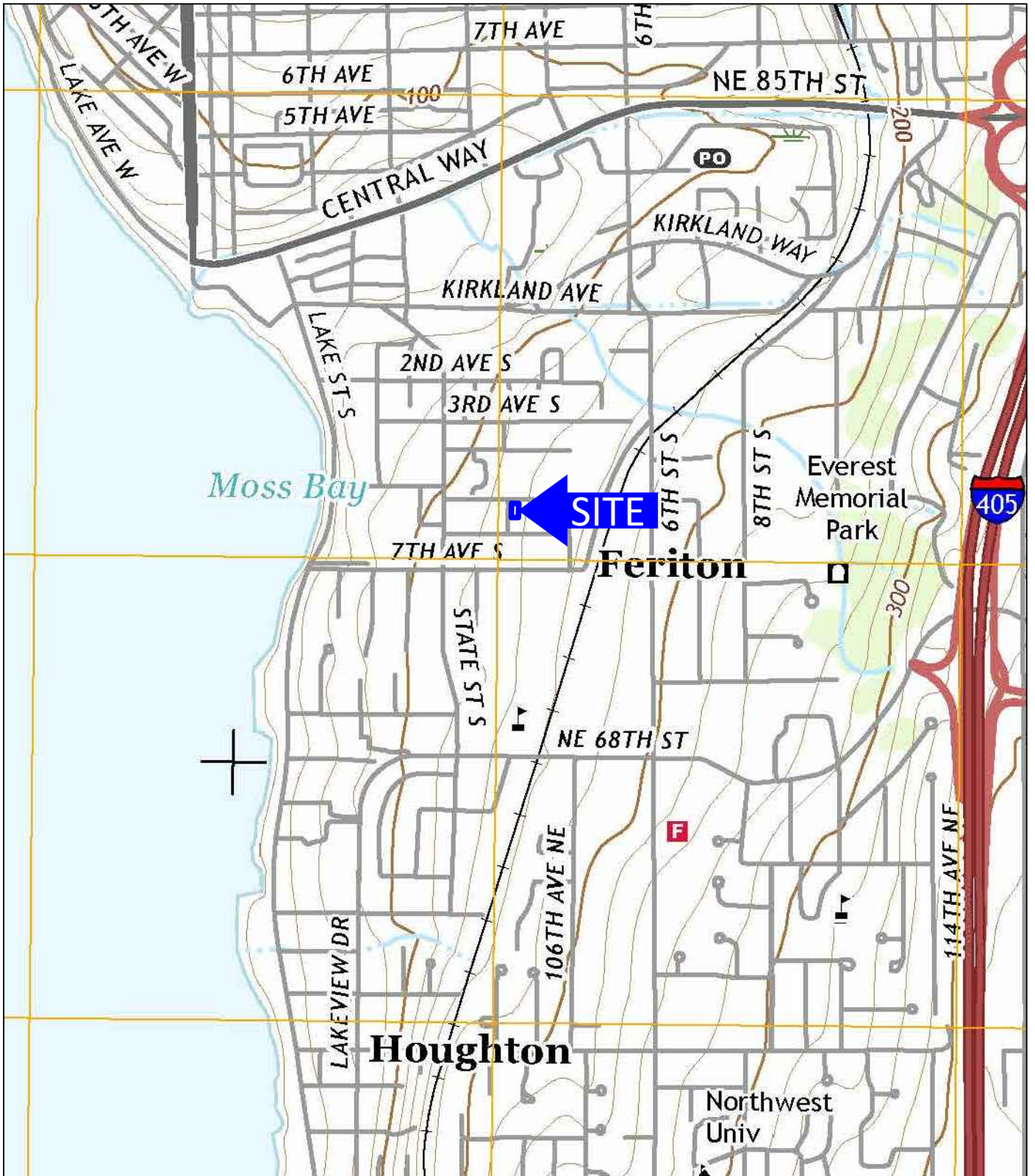
7.0 Limitations

This GER is the property of RGI, Imagine Homes, Inc., and its designated agents. Within the limits of the scope and budget, this GER was prepared in accordance with generally accepted geotechnical engineering practices in the area at the time this GER was issued. This GER is intended for specific application to the Imagine Homes 4th Street project in Kirkland, Washington, and for the exclusive use of Imagine Homes, Inc. and its authorized representatives. No other warranty, expressed or implied, is made. Site safety, excavation support, and dewatering requirements are the responsibility of others.

The scope of services for this project does not include either specifically or by implication any environmental or biological (for example, mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, we can provide a proposal for these services.

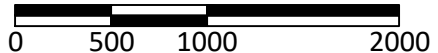
The analyses and recommendations presented in this GER are based upon data obtained from the explorations performed on site. Variations in soil conditions can occur, the nature and extent of which may not become evident until construction. If variations appear evident, RGI should be requested to reevaluate the recommendations in this GER prior to proceeding with construction.

It is the client's responsibility to see that all parties to the project, including the designers, contractors, subcontractors, are made aware of this GER in its entirety. The use of information contained in this GER for bidding purposes should be done at the contractor's option and risk.



USGS, 2017, Kirkland, Washington
7.5-Minute Quadrangle

Approximate Scale: 1"=1000'



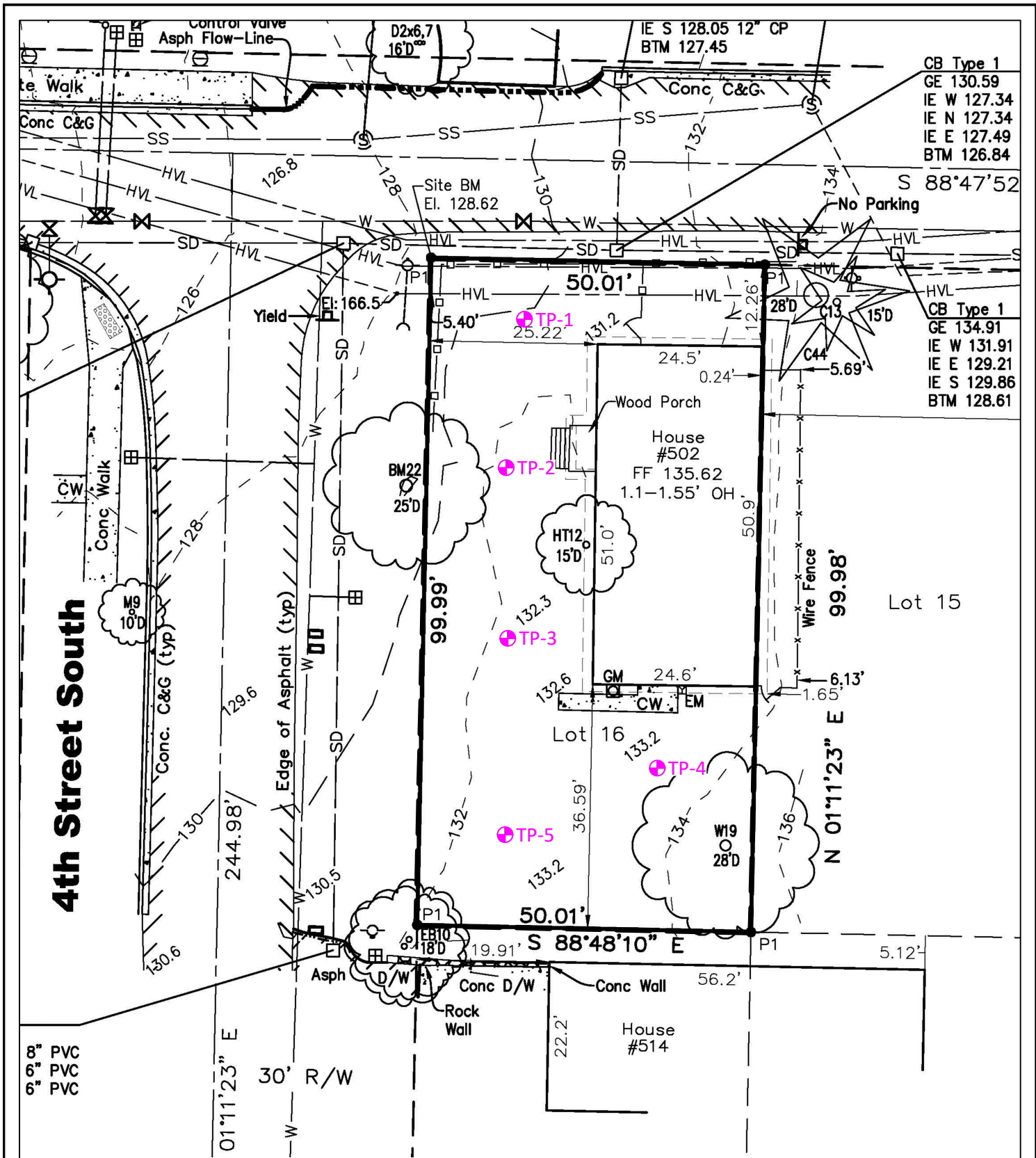
Corporate Office
17522 Bothell Way Northeast
Bothell, Washington 98011
Phone: 425.415.0551
Fax: 425.415.0311

Imagine Homes 4th Street
RGI Project Number:
2020-229-1

Site Vicinity Map

Figure 1
Date Drawn:
05/2020

Address: 502 4th Street South, Kirkland, Washington 98033



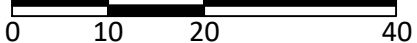
CB Type 1	GE 130.59
IE W 127.34	IE N 127.34
IE E 127.49	BTM 126.84
S 88°47'52"	
CB Type 1	GE 134.91
IE W 131.91	IE E 129.21
IE S 129.86	BTM 128.61

4th Street South

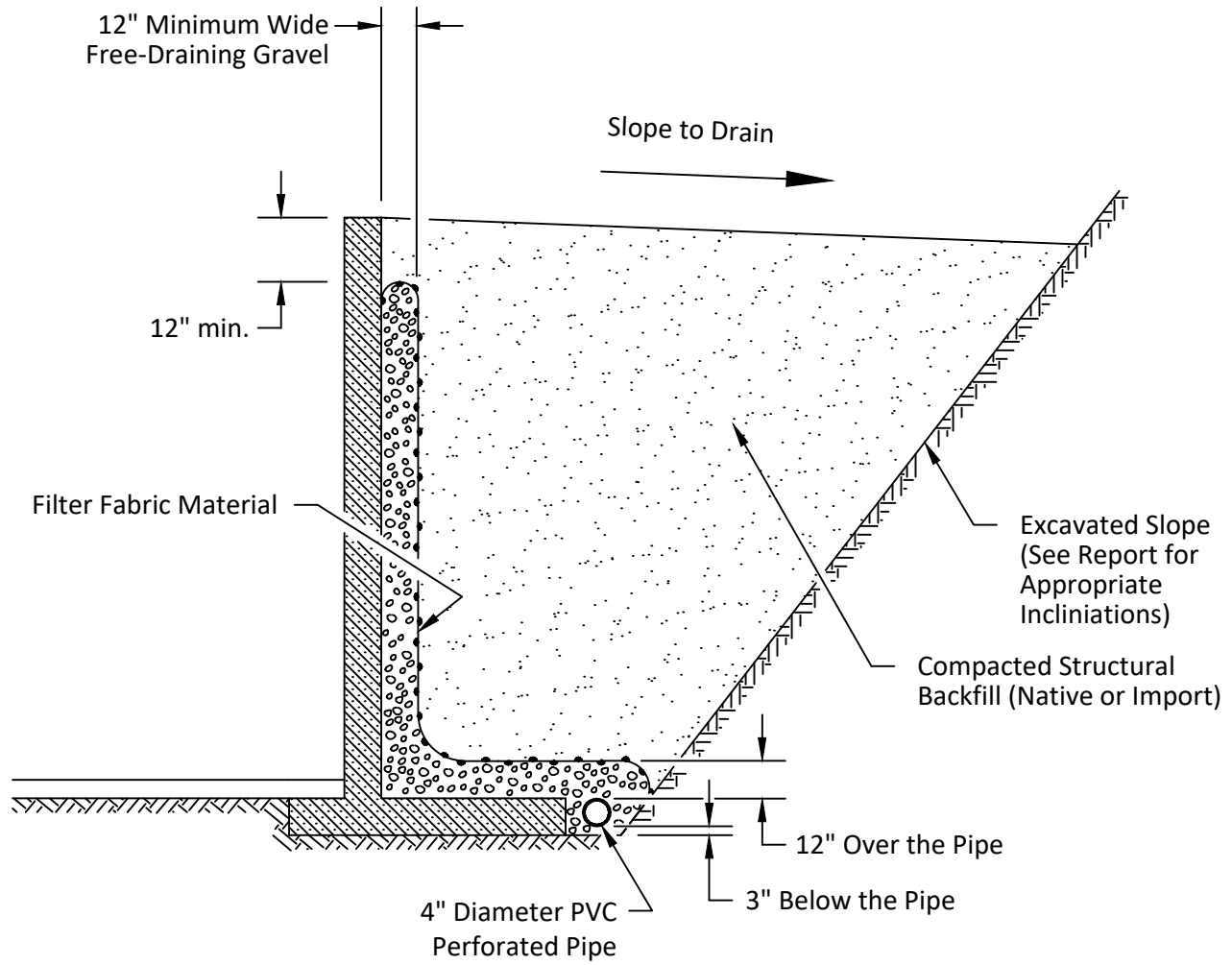
8" PVC
6" PVC
6" PVC

= Test probe by RGI, 05/13/20
 = Site boundary

Approximate Scale: 1"=20'



<p>Corporate Office 17522 Bothell Way Northeast Bothell, Washington 98011 Phone: 425.415.0551 Fax: 425.415.0311</p>	Imagine Homes 4th Street		Figure 2
	RGI Project Number: 2020-229-1	Geotechnical Exploration Plan	
	Address: 502 4th Street South, Kirkland, Washington 98033		



Not to Scale



Corporate Office
 17522 Bothell Way Northeast
 Bothell, Washington 98011
 Phone: 425.415.0551
 Fax: 425.415.0311

Imagine Homes 4th Street

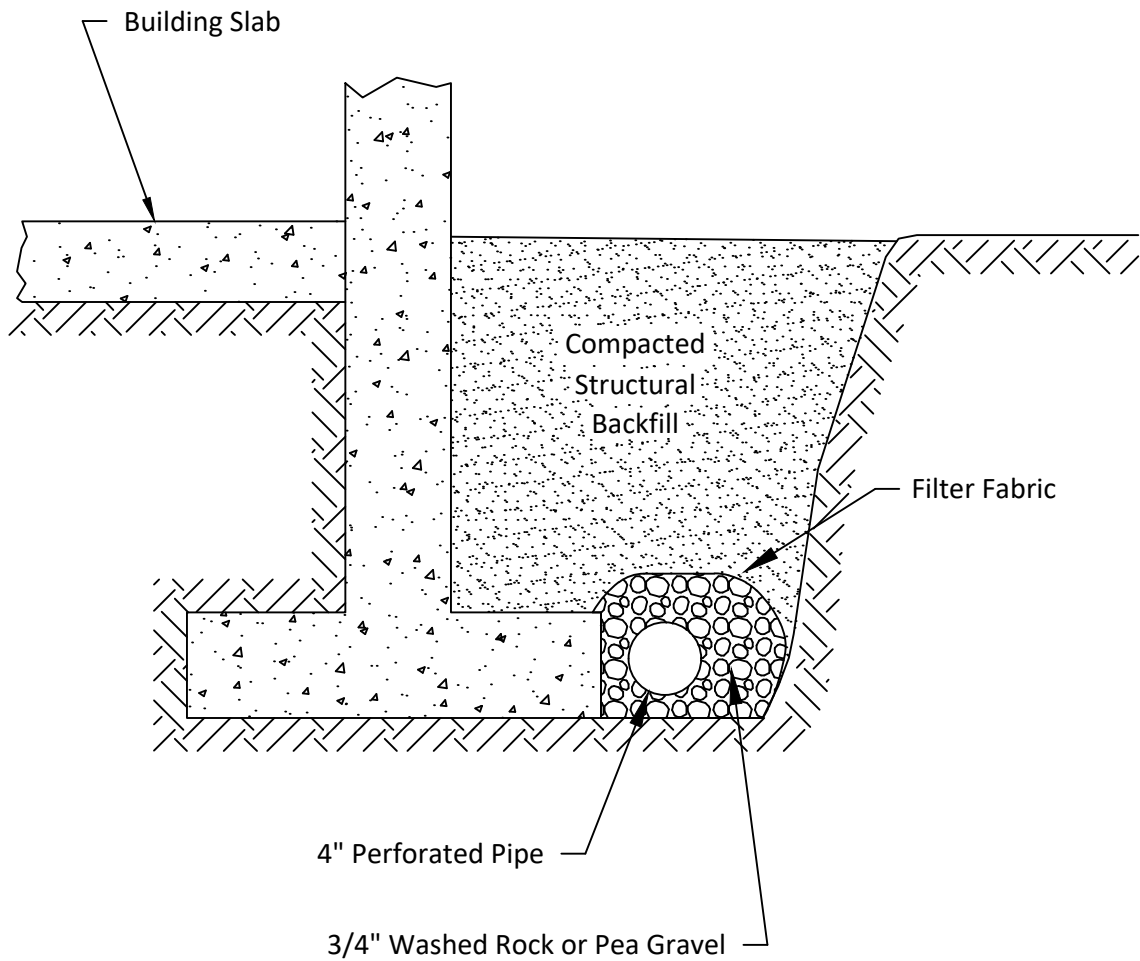
RGI Project Number:
 2020-229-1

Retaining Wall Drainage Detail

Figure 3

Date Drawn:
 05/2020

Address: 502 4th Street South, Kirkland, Washington 98033



Not to Scale



Corporate Office
 17522 Bothell Way Northeast
 Bothell, Washington 98011
 Phone: 425.415.0551
 Fax: 425.415.0311

Imagine Homes 4th Street

RGI Project Number:
 2020-229-1

Typical Footing Drain Detail

Figure 4

Date Drawn:
 05/2020

Address: 502 4th Street South, Kirkland, Washington 98033

APPENDIX A

FIELD EXPLORATION AND LABORATORY TESTING

On May 13, 2020, RGI performed field explorations using a Geoprobe drill rig. We explored subsurface soil conditions at the site by observing the drilling of five test probes to a maximum depth of 12 feet below existing grade. The test probe locations are shown on Figure 2. The test probe locations were approximately determined by measurements from existing property lines and paved roads.

A geologist from our office conducted the field exploration and classified the soil conditions encountered, maintained a log of each test exploration, obtained representative soil samples, and observed pertinent site features. All soil samples were visually classified in accordance with the Unified Soil Classification System (USCS).

Representative soil samples obtained from the explorations were placed in closed containers and taken to our laboratory for further examination and testing. As a part of the laboratory testing program, the soil samples were classified in our in house laboratory based on visual observation, texture, plasticity, and the limited laboratory testing described below.

Moisture Content Determinations

Moisture content determinations were performed in accordance with ASTM D2216-10 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass (ASTM D2216) on representative samples obtained from the exploration in order to aid in identification and correlation of soil types. The moisture content of typical sample was measured and is reported on the test probe logs.

Grain Size Analysis

A grain size analysis indicates the range in diameter of soil particles included in a particular sample. Grain size analyses was determined using D6913-04(2009) Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis (ASTM D6913) on three of the samples.

Project Name: **Imagine Homes 4th Street**

Project Number: **2020-229-1**

Client: **Imagine Homes**



Test Probe No.: **TP-1**

Sheet 1 of 1

Date(s) Drilled: 05/13/20	Logged By: TR	Surface Conditions: Sod
Drilling Method(s): Direct Push	Drill Bit Size/Type: n/a	Total Depth of Borehole: 12 feet bgs
Drill Rig Type: Geoprobe	Drilling Contractor: Standard Probe	Approximate Surface Elevation: n/a
Groundwater Level: Not encountered	Sampling Method(s): Continuous	Hammer Data : n/a
Borehole Backfill: Native Soil	Location: 502 4th Street South, Kirkland, Washington 98033	

PID Reading, ppm	Sample ID	Sample Type	Recovery (percent)	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
					0	Sod	
	TP1-2					Black, silty SAND with some gravel, medium dense, moist	
	TP1-5				5		
	TP1-7.5					Gray, silty SAND, dense, moist	
	TP1-10				10	Gray, SAND with SILT	
	TP1-12					Test probe terminated 12 feet bgs No groundwater encountered	
					15		

Project Name: **Imagine Homes 4th Street**

Project Number: **2020-229-1**

Client: **Imagine Homes**



Test Probe No.: **TP-2**

Sheet 1 of 1

Date(s) Drilled: 05/13/20	Logged By: TR	Surface Conditions: Sod
Drilling Method(s): Direct Push	Drill Bit Size/Type: n/a	Total Depth of Borehole: 12 feet bgs
Drill Rig Type: Geoprobe	Drilling Contractor: Standard Probe	Approximate Surface Elevation: n/a
Groundwater Level: Not encountered	Sampling Method(s): Continuous	Hammer Data : n/a
Borehole Backfill: Native Soil	Location: 502 4th Street South, Kirkland, Washington 98033	

PID Reading, ppm	Sample ID	Sample Type	Recovery (percent)	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
					0	Sod	
	TP2-2					Brown, silty SAND with gravel, medium dense, moist	
	TP2-5				5		
	TP2-7.5						
	TP2-10				10		
	TP2-12					Gray, silty SAND, dense, moist	
						Test probe terminated 12 feet bgs	
						No groundwater encountered	
					15		

Project Name: **Imagine Homes 4th Street**

Project Number: **2020-229-1**

Client: **Imagine Homes**



Test Probe No.: **TP-3**

Sheet 1 of 1

Date(s) Drilled: 05/13/20	Logged By: TR	Surface Conditions: Sod
Drilling Method(s): Direct Push	Drill Bit Size/Type: n/a	Total Depth of Borehole: 12 feet bgs
Drill Rig Type: Geoprobe	Drilling Contractor: Standard Probe	Approximate Surface Elevation: n/a
Groundwater Level: Not encountered	Sampling Method(s): Continuous	Hammer Data : n/a
Borehole Backfill: Native Soil	Location: 502 4th Street South, Kirkland, Washington 98033	

PID Reading, ppm	Sample ID	Sample Type	Recovery (percent)	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
					0	Sod	
	TP3-2					Brown, silty SAND with gravel, medium dense, moist	
	TP3-5				5		
	TP3-7.5						
	TP3-10				10	Gray, silty SAND, dense, moist	
	TP3-12					Test probe terminated 12 feet bgs No groundwater encountered	
					15		

Project Name: **Imagine Homes 4th Street**

Project Number: **2020-229-1**

Client: **Imagine Homes**



Test Probe No.: **TP-4**

Sheet 1 of 1

Date(s) Drilled: 05/13/20	Logged By: TR	Surface Conditions: Sod
Drilling Method(s): Direct Push	Drill Bit Size/Type: n/a	Total Depth of Borehole: 12 feet bgs
Drill Rig Type: Geoprobe	Drilling Contractor: Standard Probe	Approximate Surface Elevation: n/a
Groundwater Level: Not encountered	Sampling Method(s): Continuous	Hammer Data : n/a
Borehole Backfill: Native Soil	Location: 502 4th Street South, Kirkland, Washington 98033	

PID Reading, ppm	Sample ID	Sample Type	Recovery (percent)	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
					0	Sod	
	TP4-2				0 - 1	Brown, silty SAND with gravel, medium dense, moist	
	TP4-6				4 - 5		
	TP4-9				8 - 9	Gray, silty SAND, dense, moist	
	TP4-12				11 - 12	Test probe terminated 12 feet bgs	
					12 - 15	No groundwater encountered	

Project Name: **Imagine Homes 4th Street**

Project Number: **2020-229-1**

Client: **Imagine Homes**



Test Probe No.: **TP-5**

Sheet 1 of 1

Date(s) Drilled: 05/13/20	Logged By: TR	Surface Conditions: Sod
Drilling Method(s): Direct Push	Drill Bit Size/Type: n/a	Total Depth of Borehole: 12 feet bgs
Drill Rig Type: Geoprobe	Drilling Contractor: Standard Probe	Approximate Surface Elevation: n/a
Groundwater Level: Not encountered	Sampling Method(s): Continuous	Hammer Data : n/a
Borehole Backfill: Native Soil	Location: 502 4th Street South, Kirkland, Washington 98033	

PID Reading, ppm	Sample ID	Sample Type	Recovery (percent)	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
					0	Sod	
	TP5-2					Brown, silty SAND with gravel, medium dense, moist	
	TP5-5				5	Brown, silty SAND, very dense, moist	
	TP5-7.5						
	TP5-10				10	Gray, silty SAND, very dense, moist	
	TP5-12					Test probe terminated 12 feet bgs No groundwater encountered	
					15		

Project Name: **Imagine Homes 4th Street**

Project Number: **2020-229-1**

Client: **Imagine Homes**



Boring Log Key

Sheet 1 of 1

PID Reading, ppm	Sample ID	Sample Type	Recovery (percent)	GW Depth	Depth (feet)	MATERIAL DESCRIPTION	Graphic Log
1	2	3	4	5	6	7	8

COLUMN DESCRIPTIONS

- 1** PID Reading, ppm: The reading from a photo-ionization detector, in parts per million.
- 2** Sample ID: Sample identification number.
- 3** Sample Type: Type of soil sample collected at the depth interval shown.
- 4** Recovery (percent): Percent Recovery
- 5** GW Depth: Groundwater depth in feet below the ground surface.
- 6** Depth (feet): Depth in feet below the ground surface.
- 7** MATERIAL DESCRIPTION: Description of material encountered. May include consistency, moisture, color, and other descriptive text.
- 8** Graphic Log: Graphic depiction of the subsurface material encountered.

FIELD AND LABORATORY TEST ABBREVIATIONS

- CHEM: Chemical tests to assess corrosivity
- COMP: Compaction test
- CONS: One-dimensional consolidation test
- LL: Liquid Limit, percent
- PI: Plasticity Index, percent
- SA: Sieve analysis (percent passing No. 200 Sieve)
- UC: Unconfined compressive strength test, Qu, in ksf
- WA: Wash sieve (percent passing No. 200 Sieve)

MATERIAL GRAPHIC SYMBOLS

- Silty SAND (SM)
- Poorly graded SAND with Silt (SP-SM)

TYPICAL SAMPLER GRAPHIC SYMBOLS

- Auger sampler
- Bulk Sample
- 3-inch-OD California w/ brass rings
- CME Sampler
- Grab Sample
- 2.5-inch-OD Modified California w/ brass liners
- Pitcher Sample

OTHER GRAPHIC SYMBOLS

- Water level (at time of drilling, ATD)
- Water level (after waiting)
- Minor change in material properties within a stratum
- Inferred/gradational contact between strata
- Queried contact between strata

GENERAL NOTES

1: Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive, and actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
 2: Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

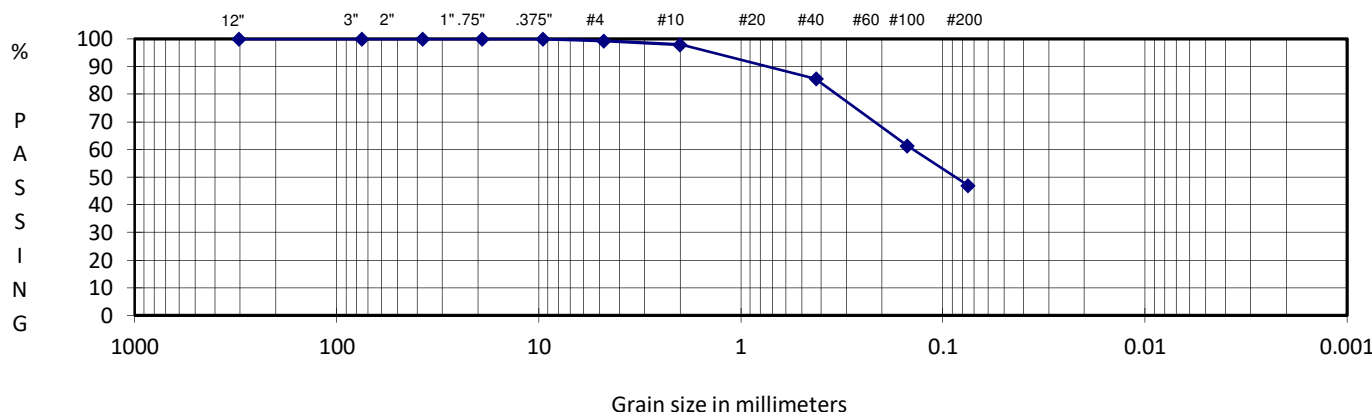
GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2487, D6913

PROJECT TITLE	Imagine Homes 4th Street	SAMPLE ID/TYPE	TP-1
PROJECT NO.	2020-229-1	SAMPLE DEPTH	7.5'
TECH/TEST DATE	JDH 5/19/2020	DATE RECEIVED	5/13/2020

WATER CONTENT (Delivered Moisture)		Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture	
Wt Wet Soil & Tare (gm)	(w1) 576.3	Weight Of Sample (gm)	496.3
Wt Dry Soil & Tare (gm)	(w2) 496.3	Tare Weight (gm)	133.0
Weight of Tare (gm)	(w3) 133.0	(w6) Total Dry Weight (gm)	363.3

Weight of Water (gm)	(w4=w1-w2) 80.0	SIEVE ANALYSIS	
Weight of Dry Soil (gm)	(w5=w2-w3) 363.3	Cumulative	
Moisture Content (%)	(w4/w5)*100 22	Wt Ret +Tare	(Wt-Tare) (wt ret/w6)*100
		(%Retained)	% PASS (100-%ret)

% COBBLES	0.0	12.0"	133.0	0.00	0.00	100.00	cobbles
% C GRAVEL	0.0	3.0"	133.0	0.00	0.00	100.00	coarse gravel
% F GRAVEL	0.7	2.5"					coarse gravel
% C SAND	1.4	2.0"					coarse gravel
% M SAND	12.3	1.5"	133.0	0.00	0.00	100.00	coarse gravel
% F SAND	38.5	1.0"					coarse gravel
% FINES	47.0	0.75"	133.0	0.00	0.00	100.00	fine gravel
% TOTAL	100.0	0.50"					fine gravel
D10 (mm)		0.375"	133.0	0.00	0.00	100.00	fine gravel
D30 (mm)		#4	135.7	2.70	0.74	99.26	coarse sand
D60 (mm)		#10	140.8	7.80	2.15	97.85	medium sand
Cu		#20					medium sand
Cc		#40	185.6	52.60	14.48	85.52	fine sand
		#60					fine sand
		#100	273.6	140.60	38.70	61.30	fine sand
		#200	325.6	192.60	53.01	46.99	finest
		PAN	496.3	363.30	100.00	0.00	silt/clay



DESCRIPTION: Silty SAND
 USCS: SM

Prepared For:
 Imagine Homes, Inc.

Reviewed By:
 ELW



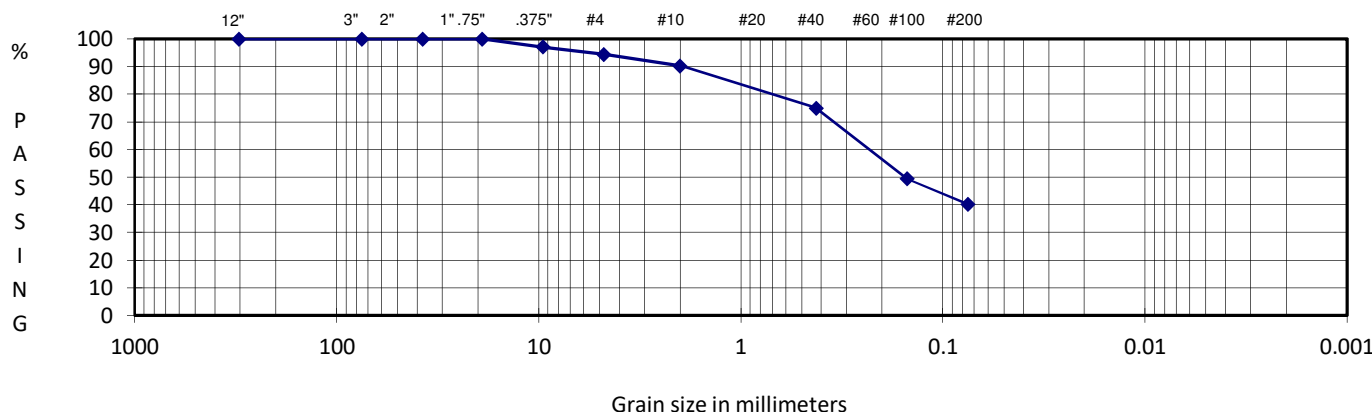
GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2487, D6913

PROJECT TITLE	Imagine Homes 4th Street	SAMPLE ID/TYPE	TP-3
PROJECT NO.	2020-229-1	SAMPLE DEPTH	2'
TECH/TEST DATE	JDH 5/19/2020	DATE RECEIVED	5/13/2020

WATER CONTENT (Delivered Moisture)		Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture	
Wt Wet Soil & Tare (gm)	(w1) 406.3	Weight Of Sample (gm)	354.6
Wt Dry Soil & Tare (gm)	(w2) 354.6	Tare Weight (gm)	132.9
Weight of Tare (gm)	(w3) 132.9	(w6) Total Dry Weight (gm)	221.7

Weight of Water (gm)	(w4=w1-w2) 51.7	SIEVE ANALYSIS	
Weight of Dry Soil (gm)	(w5=w2-w3) 221.7	Cumulative	
Moisture Content (%)	(w4/w5)*100 23	Wt Ret +Tare	(Wt-Tare) (wt ret/w6)*100
			% PASS (100-%ret)

% COBBLES	0.0	12.0"	132.9	0.00	0.00	100.00	cobbles
% C GRAVEL	0.0	3.0"	132.9	0.00	0.00	100.00	coarse gravel
% F GRAVEL	5.6	2.5"					coarse gravel
% C SAND	4.1	2.0"					coarse gravel
% M SAND	15.3	1.5"	132.9	0.00	0.00	100.00	coarse gravel
% F SAND	34.7	1.0"					coarse gravel
% FINES	40.2	0.75"	132.9	0.00	0.00	100.00	fine gravel
% TOTAL	100.0	0.50"					fine gravel
D10 (mm)		0.375"	139.4	6.50	2.93	97.07	fine gravel
D30 (mm)		#4	145.4	12.50	5.64	94.36	coarse sand
D60 (mm)		#10	154.5	21.60	9.74	90.26	medium sand
Cu		#20					medium sand
Cc		#40	188.5	55.60	25.08	74.92	fine sand
		#60					fine sand
		#100	245.2	112.30	50.65	49.35	fine sand
		#200	265.5	132.60	59.81	40.19	finer
		PAN	354.6	221.70	100.00	0.00	silt/clay



DESCRIPTION: Silty SAND with trace gravel
 USCS: SM

Prepared For:
 Imagine Homes, Inc.

Reviewed By:
 ELW



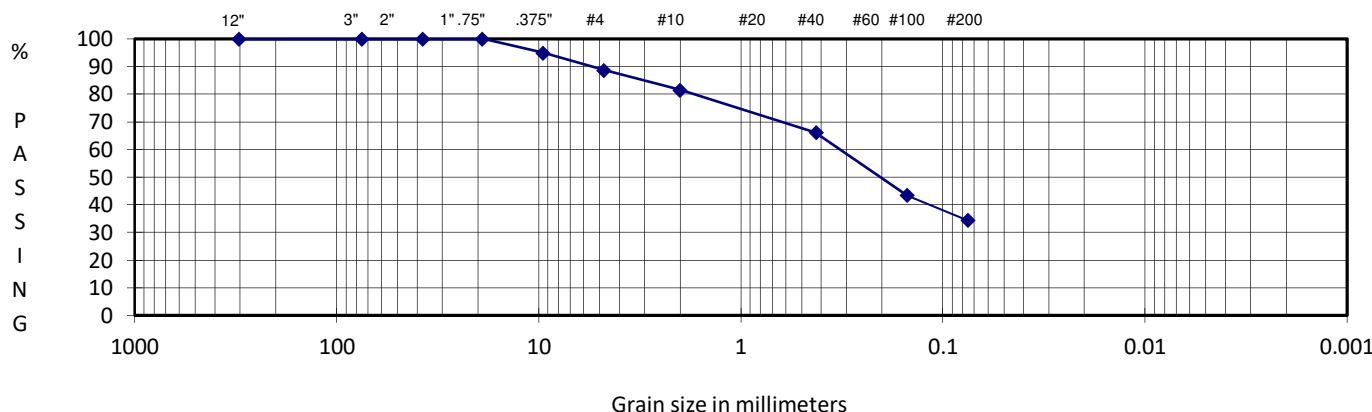
GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2487, D6913

PROJECT TITLE	Imagine Homes 4th Street	SAMPLE ID/TYPE	TP-5
PROJECT NO.	2020-229-1	SAMPLE DEPTH	2'
TECH/TEST DATE	JDH 5/19/2020	DATE RECEIVED	5/13/2020

WATER CONTENT (Delivered Moisture)		Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture	
Wt Wet Soil & Tare (gm)	(w1) 504.5	Weight Of Sample (gm)	452.9
Wt Dry Soil & Tare (gm)	(w2) 452.9	Tare Weight (gm)	133.3
Weight of Tare (gm)	(w3) 133.3	(w6) Total Dry Weight (gm)	319.6

Weight of Water (gm)	(w4=w1-w2) 51.6	SIEVE ANALYSIS	
Weight of Dry Soil (gm)	(w5=w2-w3) 319.6	Cumulative	
Moisture Content (%)	(w4/w5)*100 16	Wt Ret	(Wt-Tare)
		+Tare	{(wt ret/w6)*100}
			% PASS
			(100-%ret)

% COBBLES	0.0	12.0"	133.3	0.00	0.00	100.00	cobbles
% C GRAVEL	0.0	3.0"	133.3	0.00	0.00	100.00	coarse gravel
% F GRAVEL	11.4	2.5"					coarse gravel
% C SAND	7.2	2.0"					coarse gravel
% M SAND	15.4	1.5"	133.3	0.00	0.00	100.00	coarse gravel
% F SAND	31.8	1.0"					coarse gravel
% FINES	34.3	0.75"	133.3	0.00	0.00	100.00	fine gravel
% TOTAL	100.0	0.50"					fine gravel
D10 (mm)		0.375"	149.8	16.50	5.16	94.84	fine gravel
D30 (mm)		#4	169.7	36.40	11.39	88.61	coarse sand
D60 (mm)		#10	192.6	59.30	18.55	81.45	medium sand
Cu		#20					medium sand
Cc		#40	241.7	108.40	33.92	66.08	fine sand
		#60					fine sand
		#100	314.3	181.00	56.63	43.37	fine sand
		#200	343.4	210.10	65.74	34.26	finer
		PAN	452.9	319.60	100.00	0.00	silt/clay



DESCRIPTION: Silty SAND with trace gravel
 USCS: SM

Prepared For:
 Imagine Homes, Inc.

Reviewed By:
 ELW

