Date stamp

CITY OF MUKILTEO

11930 Cyrus Way Mukilteo, WA 98275

RECEIVED
JAN 24 2019
CITY OF MUKILTEO

Land Use Permit Application

PPR - 2019 - 001

PPR #
SEPA #
Misc #

Applicant:	Saratoga 44 LLC	Owner:	_____Same as owner_____
Address:	805 Kirkland Ave, Suite 200 Kirkland Wa 98033	Address:	_____ _____
Phone:	425 750 8400	Phone:	_____

Project Address: ~~892~~ 8002 53rd Ave

Legal Description of Property:
Section 09 Township 28 Range 04 Quarter SW - WEST & WHEELERS SEAVIEW FIVE AC TRS BLK 000 D-01 ELY 235FT OF TR 54 & 55 SD PLAT AKA PAR 1 CITY OF MUK LLA-2015-002 REC AFN 201510080314 & AS DELINEATED ON ROS REC AFN 201508205002 BEING A PTN OF TR 54 & 55 SD PLAT –

Key Contact Person: _Greg Krabbe__Phone: _425 750 8400__Fax: n/a_____

Project Type:

☐ Commercial	☐ Preliminary Subdivision*	☐ Special Use Permit*
X Multi-Family	☐ Final Subdivision*	☐ Reasonable Use
☐ Industrial	☐ Preliminary Short Plat*	☐ Lot Line Adjustment*
☐ Shoreline* (JARPA)	☐ Final Short Plat*	☐ Grading*
☐ Conditional Use*	☐ Sector Plan Amendment	☐ Binding Site Plan
☐ Variance*	☐ Waterfront Development	☐ Project Rezone
	☐ Single Family Residence	☐ Other, Specify_____

* Need to fill out supplemental application form with project.

Project Resume:

Existing Use:_multi family residential_____
Total Site Area:_____4.96 acres_____
Building Foot Print Area:__1.8 acres_____
Lot Coverage:_____39%_____
Parking Provided: ___122_____
Building Height: 25' cottages,
45' towhomes / flats (8% cross slope)
density
Gross Floor Area by Uses:
85,000 sf for residential

Proposed Use: __multi family residential_
Landscaping Area: _____1.15 Acres_____
Water District: Mukilteo water and sewer
Sewer District: Mukilteo water and sewer
# of Proposed Units: _41_

Comp Plan Designation: MRD- low

Zoning: ___MRD_____

Pre-application Meeting Held: (Y/N; date)_____Yes, 12/6/18_____

The information given is said to be true under the penalty of perjury by the laws of the State of Washington.

_____ 1.24.19
Owners Signature **Date**

ENG-2019-003

RECEIVED
JAN 22 2019
CITY OF MUKILTEO

CITY OF MUKILTEO

Engineering Permit Application

11930 Cyrus Way, Mukilteo, WA 98275
Phone: (425) 263-8000
http://mukilteowa.gov
permittech@mukilteowa.gov

Application Type – Mark all those that apply

☑ Clearing & Grading (Land Surface Modification) Per MMC 15.16.010

☐ Right-of-Way Per MMC 12.01.010

☐ Stormwater Per MMC13.12

General Permit Information

PROJECT NAME: Saratoga Height Phase 3

PROJECT ADDRESS: ~~802~~ 802 53rd Ave W

1. CONTRACTOR ☐ Applicant

Name TBD
Address
City/State/Zip
24 Hour Phone
State License #
Mukilteo License #
E-mail

2. PROPERTY OWNER ☑ Applicant

Name Saratoga 44 LLC
Address 805 Kirkland Ave, Suite 200
City/State/Zip Kirkland Wa 98033
Phone (425) 750-8400
E-mail gkrabbe@comcast.net

3. PRIMARY CONTACT ☐ Applicant

Name Greg Krabbe / Windward R.E. Services Inc
Address same as property owner
City/State/Zip
24 HR Phone
E-mail

4. PARCEL NUMBER(S)

00611600005401 and 5402

5. PROJECT DESCRIPTION

Construction of 15 flats in phase 3 of development

6. TOTAL PROJECT AREA (INCLUDE ROW, IF ANY) (SF)

128,502 sf

7. TOTAL SITE AREA (SF)

216,057 sf

8. TOTAL GRADING QUANTITIES (CY)

(Use Total from pg. 2 , #4)

0

9. IS A RETAINING WALL PROPOSED? (YES) or NO

10. EXISTING SITE IMPERVIOUS SURFACE COVER (%)

(Report Item 2 from Page 4)

0

11. TOTAL NEW PLUS REPLACED HARD SURFACES (SF) (Report Item 6 from Page 5)

87555

12. TOTAL PROPOSED LOT HARD SURFACE COVERAGE (SF) - (Report Item 7 from page 5)

87555

Clearing & Grading (Land Surface Modifications)

1. **Total Area of Land Surface Disturbance** (SF): 128,502 sf

2. **Vegetation to be Removed:**

   ☐ Evergreen Trees: _____(canopy area)
   ☐ Deciduous Trees: _____(canopy area)
   ☐ Shrubs / Lawn: _____(area)
   ☐ Invasive(s): _____(area)
   ☑ Other: Already cleared (area)
   Invasive types_____

3. **Method of Land Disturbance:** ☐ Hand Clearing ☐ Machine

4. **Land Disturbance Outside the Building Footprint:**

   ☐ Exported: _____(CY)
   ☐ Imported to Site: _____(CY)
   ☐ Re-Graded on Site: _____(CY)
   ☐ Other: _____(CY)

   Total 0 Already cleared (Add all Land Disturbance, Report on Page 1, #8)

5. **Provide Address for Materials Disposal Site** n/a

6. **Maximum Height of Fill:** 1 **Maximum Depth of Cut:** 12

7. **Identify any stream, surface water, drainage course, wetlands, or critical areas on or within 200 feet of the property:**

   n/a

Retaining Walls:

If a retaining wall is proposed, please check which applies (*Height is measured from bottom of footing)*

☐ No retaining wall proposed ☑ ≥ 4 feet ☐ ≤ 4 feet and not load bearing ☐ Any height and load bearing

Right-of-Way:

Type of work being performed in City right-of-way:

☐ Stormwater ☑ Frontage Improvements ☐ Driveway
☐ Natural Gas ☐ Sewer ☐ Water
☐ Telephone ☐ Power ☐ Cable
☑ Other: grind and overlay

Is this project adjacent to a State Route? ☐ Yes ☑ No

If Yes, WSDOT approval shall be required, and a copy provided with this application, including the WSDOT approved Traffic Control Plan.

Stormwater

WHAT ARE HARD SURFACES and IMPERVIOUS SURFACES?

Hard surfaces include permeable pavement, decks, vegetated roofs, and all impervious surfaces. **Impervious surfaces** are non-vegetated surface areas that either prevent or impair water entry into the soil. These surfaces cause water to run off the surface in greater quantities or at increased flow rates from natural conditions. Common impervious surfaces include, but are not limited to, roof tops, walkways, patios, gravel, asphalt, concrete and bricked surfaces. (See MMC 17.08 for complete definition.)

Step 1. Determine if a Stormwater Permit is Needed

Does the project propose to:

A.	Add new or replace 2,000 square feet or more of hard surface area?	☑ YES	☐ NO
B.	Disturb 7,000 square feet or greater of land?	☑ YES	☐ NO
C.	Connect to the City's stormwater system?	☐ YES	☑ NO

If the answer to ANY of the above is "YES," then a Stormwater Permit is required. Complete entire Stormwater Permit Application and provide required submittals.

If the answer to ALL of the above is "NO," then a Stormwater Permit is NOT required. Complete Steps #2 through #6 and include a Short SWPPP form with your application.

Step 2. Calculate Existing Impervious Surface Area

Enter the area for all existing impervious surfaces on the property. Only include those items that are impervious. Hard surfaces, such as porous pavement, will be considered in Step 3. If there are none to add, enter "0".

TABLE 1 – EXISTING IMPERVIOUS SURFACES

Types of improvements to consider (not a complete list)	Existing Impervious Surfaces Area (sf)	Describe area(s) included in SF (e.g. house, driveway, etc.)
Roof Structures (all buildings)	0	See attached drainage report
Sidewalks / Walkways	0	
Covered Porch / Deck / Patio	0	
Driveway (include gravel areas)	0	
Parking Lot (incl. gravel areas)	0	
Other		
TOTAL →	Item 1 0	

Step 3. Determine if the Project is New Development or Redevelopment

TABLE 2 – PERCENT EXISTING IMPERVIOUS COVER CALCULATION		
A. Enter the total from Item 1 above →		0
B. Total Site Square Footage →		
Existing Site Impervious Cover %	(A ÷ B) x 100	Item 2 0%

- Report Item 2 on Page 1, #10.
- Use result for Step 7. If <35%, project is new development. If >35%, project is redevelopment

Step 4. Calculate Existing Hard Surface Area

Enter any existing hard surfaces **not included** in the impervious surface calculation in Step 2. If there are none to add, enter "0".

TABLE 3 – EXISTING HARD SURFACES		
Types of improvements to consider (not a complete list)	**Existing Hard Surfaces Area (sf)**	**Describe area(s) included in SF (e.g. house, driveway, etc.)**
Green Roof Structures	0	see attached drainage report
Porous Sidewalks / Walkways		
Porous Porch / Deck / Patio		
Porous Driveway / Parking		
Other		
TOTAL →	Item 3 0	

- Use Item 3 in Step 6.

Step 5. Calculate Proposed New and Replaced Hard Surfaces

Include all types of hard (and impervious) surfaces in the table. No "credit" is taken for replaced hard surfaces. For example, if 1,500 sf of gravel is replaced with a 1,500 sf garage, this is entered as 1,500 sf replaced hard surface. There is no deduction for the replaced gravel.

TABLE 4 – PROPOSED NEW PLUS REPLACED HARD SURFACES (Enter "0" for sections not applicable to your project)			
Proposed new PLUS replaced hard surfaces	**Describe area(s) included in SF? (e.g. house, driveway, etc.)**	**New SF**	**Replaced SF**
Roof Structures (all buildings)	See attached drainage report		
Green Roof (not included above)			
Sidewalks / Walkways			
Covered Porch / Deck / Patio			
Uncovered Porch / Deck / Patio			
Driveway (impervious)			
Parking (impervious)			
Pervious Paving surfaces (all			
All Right-of-Way Improvements			
Others		87,555	
SUBTOTALS	→	Item 4 87,555	Item 5 0
TOTAL NEW PLUS REPLACED HARD SURFACES	Add Items 4 & 5	Item 6 87555	

- Report Item 6 on Page 1, #11.
- Use Item 4 in Step 6 (do not include Item 5).

Step 6. Calculate Total Proposed Hard Surfaces

TABLE 5 – TOTAL PROPOSED HARD SURFACES		
A. Report Item 1 Subtotal (from Step 2)		0
B. Report Item 3 Subtotal (from Step 4)		0
C. Report Item 4 Subtotal (from Step 5)		87,555
TOTAL PROPOSED LOT HARD SURFACE COVER	Add A, B, & C	Item 7 87555

- Report Item 7 on Page 1, #12.

Step 7. Determine the Stormwater Minimum Requirements

Is the result on page 1, #10; 35% or more? ☑ YES ☐ NO If yes, use Figure 2.4.2. If no, use Figure 2.4.1.

Figure 2.4.1
Flow Chart for Determining Requirements for New Development (from Ecology Manual)

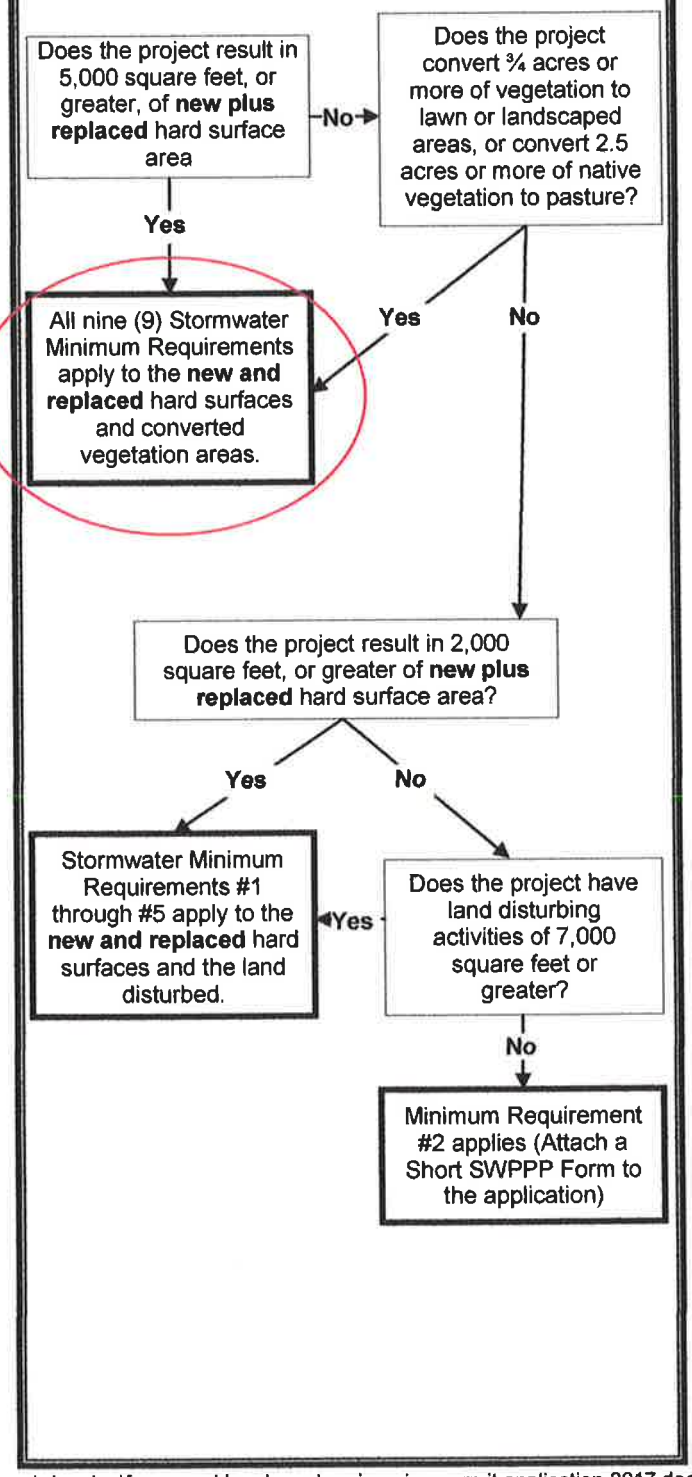
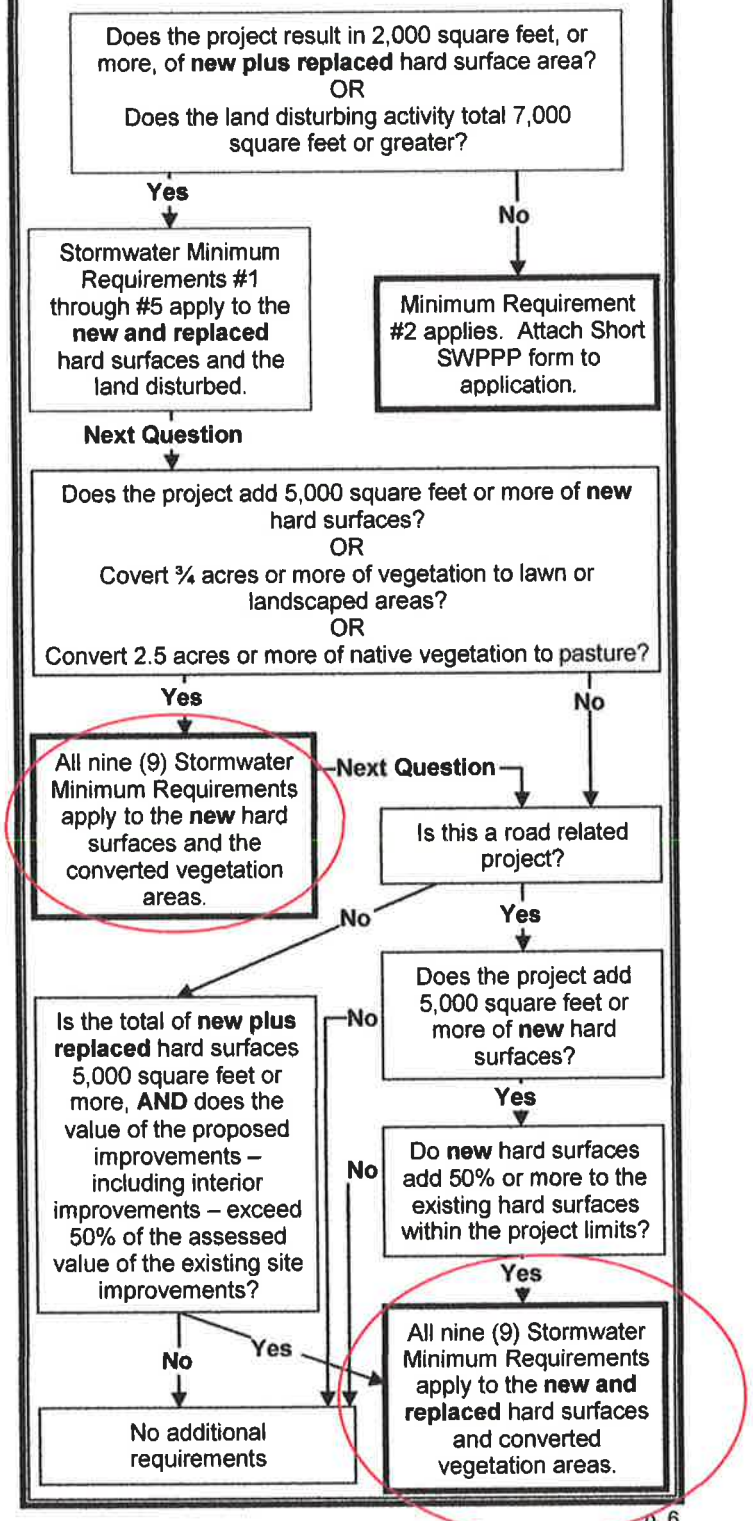


Figure 2.4.2
Flow Chart for Determining Requirements for Redevelopment (from Ecology Manual)



Other

Anticipated Start Date: 07/15/2019 Anticipated Completion Date: 09/18/2020

A Department of Ecology Construction Stormwater Permit is required for projects that disturb ≥1 acre. Will your project disturb ≥1 acre of land through clearing, excavating, or stockpiling of fill? ☑ Yes ☐ No

If yes, complete NOI at http://www.ecy.wa.gov/programs/wq/stormwater/construction/enoi.html

A Forest Practice Permit is required for all projects removing and selling timber from the property site. Will your project remove and sell timber? ☐ Yes ☑ No

A BNSF Permit is required for all projects that will discharge stormwater onto BNSF property (ROW). Does your project discharge to BNSF ROW? ☑ Yes ☐ No

A Hydraulic Permit from the Department of Fish and Wildlife and / or from the Army Corps of Engineers is required for all fill, or work within, over, or under a stream or wetland. Will your project involve stream or wetland? ☐ Yes ☑ No

The list above is meant to provide guidance; it is the project applicant's responsibility to identify and obtain all required permits. All State, Federal, and/ or other applicable Permits shall be obtained and a copy provided to the City of Mukilteo prior to issuance of the City of Mukilteo Engineering Permit.

The permittee shall indemnify, defend and hold harmless the City, its officers, agents and employees, from and against any and all claims, losses or liability, including attorney's fees, arising from injury or death to persons or damage to property occasioned by the construction, installation, operation, location, maintenance, or any other cause related to the improvement for which this permit is granted. With respect to this permit and as to claims against the City, its officers, agents and employees, the permittee expressly waives its immunity under Title 51 of the Revised Code of Washington, the Industrial Insurance Act, for injuries to any employees the permittee may have, and agrees that the obligation to indemnify, defend and hold harmless provided for in this paragraph extend to any claim brought by or on behalf of any employee of the permittee. This waiver has been mutually negotiated by the parties as part of the permitting process and is given, as is the indemnification agreement contained within this paragraph, as consideration for issuance of a right-of-way use permit by the City. This paragraph shall not apply to any damage or injury resulting from the sole negligence of the City, its agents or employees. To the extent any of the damages or injuries referenced by this paragraph were caused by or resulted from the concurrent negligence of the City, its agents or employees, this obligation to indemnify, defend and hold harmless is valid and enforceable only to the extent of the negligence of the permittee, its officers, agents or employees, if any.

The acceptance of the conditions upon which this permit is granted shall be evidenced by the beginning of the installation of said FACILITIES as set forth herein.

SEE ATTACHED INSURANCE REQUIREMENTS AND ACKNOWLEDMENTS. ADDITONAL SIGNATURE REQUIRED.

I HEREBY ACKNOWLEDGE THAT I HAVE READ THIS PERMIT APPLICATION IN ITS ENTIRETY AND KNOW THE SAME TO BE TRUE AND CORRECT. I AGREE TO COMPLY WITH ALL CONDITIONS, CITY ORDINANCES AND STATE / FEDERAL LAWS REGULATING ACTIVITIES COVERED BY THIS PERMIT APPLICATION. I ALSO ACKNOWLEDGE THAT IT IS MY RESPONSIBILITY TO MAINTAIN PUBLIC STREETS FREE OF DIRT AND DEBRIS.

Property Owner Signature	1.21.19 *Date*
Applicant Signature (if different than property owner)	*Date*

ENGINEERING APPLICATION CHECKLIST

Provide the following information as part of your submittal as required in Mukilteo Municipal Code 17.13 and the City of Mukilteo Development Standards.

Submitted

Yes	N/A	Document
☑	☐	Engineering Permit Application – 1
☑	☐	Stormwater Pollution Prevention Plan (SWPPP) – 3 originals
☑	☐	Stormwater Site Plan (Drainage Report) – 2 originals
☑	☑	Geotechnical Report – 2 originals SEE FILE
☑	☐	Civil Plan Set – 3 originals
☐	☑	Wetland and Streams Report – 2 originals SEE FILE
☐	☑	Transportation Impact Study – 1 original SEE FILE
☐	☑	Transportation Concurrency Evaluation and Determination of Transportation Impact Fees Form (if over 10 pm peak trips) – 1 original SEE FILE
☐	☑	Temporary Traffic and Pedestrian Control Plan – 2 originals
☐	☑	Soil Management Plan – 2 originals
☐	☑	Tree Preservation Plan – 2 originals
☐	☑	Maximum Extent Feasible (MEF) Documentation – 1 original
☐	☑	Draft Statutory Warranty Deed (Right-of-Way Dedication), including Title Report, Map, and Real Estate Excise Tax Affidavit Form – 1 of each original
☐	☑	Evidence of Vesting Rights – 1 original
☐	☑	Application for Alternate Material, Design, or Method of Construction – 1 original
☐	☑	Application for Exception from Stormwater Minimum Requirements – 1 original
☐	☑	Draft Declaration of Covenant/Maintenance Plan for Stormwater – 1 original
☐	☑	Draft Access Easement for Stormwater – 1 original
☐	☑	Draft Joint-Use and Maintenance Agreement for Private Roads/Joint-use Driveways – 1 original
☐	☑	WSDOT approval if adjacent to State Route – 1 original
☐	☑	Other agency permits (list) – (1 original each) _____ _____
☐	☑	Wildlife Habitat Report – 2 originals
☐	☑	Archaeology Report – 2 originals

INSURANCE

A. Insurance Term

The Permittee shall procure and maintain for the duration of the Permit, insurance against claims for injuries to persons or damage to property which may arise from or in connection with operations or activities performed by or on the Permittee's behalf with the issuance of this Permit.

B. No Limitation

Permittee's maintenance of insurance as required by the Agreement shall not be construed to limit the liability of the Permittee to the coverage provided by such insurance, or otherwise limit the City's recourse to any remedy available at law or in equity.

C. Minimum Scope of Insurance

Applicant shall obtain insurance of the types and coverage described below:

1. Commercial General Liability insurance shall be at least as broad as ISO occurrence form CG 00 01 and shall cover liability arising from operations, products-completed operations, and stop-gap liability. There shall be no exclusion for liability arising from explosion, collapse or underground property damage. The City shall be named as an additional insured under the Permittee's Commercial General Liability insurance policy using ISO Additional Insured-State or Political Subdivisions-Permits CG 20 12 or a substitute endorsement providing at least as broad coverage.

2. Automobile Liability insurance covering all owned, non-owned, hired and leased vehicles. Coverage shall be at least as broad as Insurance Services Office (ISO) form CA 00 01.

D. Minimum Amounts of Insurance

Permittee shall maintain the following insurance limits:

1. Commercial General Liability insurance shall be written with limits no less than $1,000,000 each occurrence, $2,000,000 general aggregate and a $2,000,000 products-completed operations aggregate limit.

2. Automobile Liability insurance with a minimum combined single limit for bodily injury and property damage of $1,000,000 per accident.

E. Other Insurance Provision

The Permittee's Commercial General Liability insurance policy or policies are to contain, or be endorsed to contain that they shall be primary insurance as respect to the City. Any insurance, self-insurance, or self-insured pool coverage maintained by the City shall be excess of the Applicant's insurance and shall not contribute to it.

F. Acceptability of Insurers

Insurance is to be placed with insurers with a current A.M. Best rating of not less than A:VII.

G. Verification of Coverage

Permittee shall furnish the City with original certificates and a copy of the amendatory endorsements, including the additional insured endorsement, evidencing the insurance requirements of the Permittee before issuance of the Permit.

H. Notice of Cancellation

The Permittee shall provide the City with written notice of any policy cancellation, within two (2) business days of their receipt of such notice.

I. Failure to Maintain Insurance

Failure on the part of the Permittee to maintain the insurance as required shall constitute a material breach of the Permit, upon which the City may, after giving five (5) business days' notice to the Permittee to correct the breach, immediately terminate the Permit, or at its discretion, procure or renew such insurance and pay any and all premiums in connection therewith, with any sums so expended to be repaid to the City on demand.

J. City Full Availability of Consultant Limits

If the Permittee maintains higher insurance limits than the minimums shown above, the City shall be insured for the full available limits of Commercial General and Excess or Umbrella liability maintained by the Permittee, irrespective of whether such limits maintained by the Permittee are greater than those required by this contract or whether any certificate of insurance furnished to the City evidences limits of liability lower than those maintained by the Permittee.

The acceptance of the conditions upon which this permit is granted shall be evidenced by the beginning of the installation of said FACILITIES as set forth herein.

I HEREBY ACKNOWLEDGE THAT I HAVE READ AND AGREE TO COMPLY WITH THE REQUIREMENTS REGARDING INSURANCE.

Applicant Signature

1.21.19

Date

Windward Real Estate Services Inc

Land Development Services

January 21, 2019

City of Mukilteo Planning and Development Services

Att: Garrett Jensen

Re: Development of Saratoga Heights phase 2 major modification – project narrative

Garrett,
Please find the updated site plan review package for the Major Modification to Saratoga Heights project. As you know Saratoga Heights is a proposed single family /multifamily residential development proposed on approximately 4.95 acres in the City of Mukilteo. The site is located at 8002 53rd Ave West. Originally, the project consisted of 32 stacked condominium units, 4 duplex units, and 8 single family detached residential units (total of 44 units). In 2017 the site plan was modified to change the originally proposed stacked flats into 29 duplex, three-plex, and four-plex townhomes for a total of 41. With this submittal we are proposing a major modification to replace the the waterfront townhomes with 15 stacked flats within two multifamily buildings, for a total of 41 units.

The duplexes and cottages were constructed as phase 1 of the original project approval. 14 townhomes within the central loop road are currently under construction and will be recorded in a phase 2 condominium map. This Modification will change the proposed 15 townhomes along the waterfront from townhomes to 15 stacked flats within two multifamily buildings.

The site is located on 53rd Ave West, on the bluff above the BNSF RR tracks. Approximately 30% of the site is steep as topography comes up from the Puget Sound. The remaining 40% is rolling and substantially forested with two existing single family homes and several garage structures. The site is surrounded by multifamily condominiums to the north and south, single family homes to the east, and the RR and Puget Sound to the west.

There are no wetlands or streams onsite. The steep slopes that comprise the west boundary of the project area are considered critical areas and require a 25' setback from the top of bank. Wetland and geotechnical investigations and reports were included in the original application package and should be in your files.

As noted above, there will now be a total of 41 residential units. The 15 flats will have floor areas ranging between 1,800 sf to 2,400 sf for an average area of 2,200 sf and a total of approximately 33,000 sf of floor area. The new total residential square footage will be approximately 85,000 sf. This is down from the originally approved 140,000 sf.

To service these units, a total of 122 parking stalls are provided via typical private garages, exterior driveway parking spaces and 8 shared parking spaces for the phase 1 cottages and duplex units and 6 shared parking spaces for the phase 2 and 3 units.

Building will be constructed from wood with concrete foundations.

Landscaping will utilize native species and will include both conifer and deciduous trees, larger species where space allows. Landscaping will be designed to screen the development from neighbors to the east, north and south. Community open spaces will be landscaped to invite community members to the open spaces along the western boundary of the site. Landscaping in this area will be kept low to support the view corridor.

All utilities will be constructed onsite to serve the new community. A new sewer line was constructed from the lift station at 53rd and 84th along 53rd in phase 1 to provide enough depth to serve the property; however, the western most buildings will require private sewer pump units. Water will also be brought onsite from existing water mains within 53rd and an existing stub at the northern property line.

Road improvements to 53rd will include repairs resulting from the new sewer main installation and frontage improvements to match the surrounding area.

In addition to water and sewer, a comprehensive stormwater collection and treatment system has been installed. This system collects all runoff generated from impermeable area and convey it to a detention vault and through a water quality filter system that will treat runoff consistent with DOE requirements. After detention and treatment, runoff will be conveyed to the base of the slope thru a flexible HPDE welded pipe and discharged thru the RR culverts and into the Puget Sound. This discharge has been designed to accept runoff from the developments to the north and south of the property.

Approximately 10,000 CY of cut and 9,800 CY of fill will be generated by the proposed grading plan.

Erosion control will be per established practices set by the Department of Ecologies stormwater management manual.

Greg Krabbe, PE

RILEYGROUP

January 14, 2019

Mr. Greg Krabbe
KKBL No. 607 Ventures LTD
305 Kirkland Ave, Suite 200
Kirkland, Washington 98033

Subject: **Saratoga Heights Plan Revision 2**
8002 53rd Avenue West
Mukilteo, Washington
RGI Project No. 2015-051

References: Geotechnical Engineering Report for Saratoga Passage Residential Development, prepared by E3RA, Inc. dated September 30, 2013

Saratoga Heights Roadway, Grading and Drainage Improvements – Phase 2, Plan Sheets C0.00 through C3.107 prepared by CPH Consultants November 15, 2018

Saratoga Heights – Phase 2, Landscape Plan Sheets LA-1 and LA 2, prepared by Lane & Associates dated October 29, 2018

Dear Mr. Krabbe

As requested, The Riley Group, Inc. (RGI) has reviewed the above-referenced plans that showing the revisions to the Phase 2 portion of the project. RGI has been providing geotechnical construction monitoring and consultation for the project during the construction of the existing improvements.

We understand the City of Mukilteo is requested additional information for the revisions to the project. RGI is responding to the geotechnical related comments.

RGI has reviewed the referenced plans and the modification is similar to the originally proposed and approved development. The recommendations provided in the referenced geotechnical report are appropriate for the currently proposed project.

If you have any questions regarding this report or require additional information, please call us at (425) 415-0551.

Sincerely yours,

THE RILEY GROUP, INC.

KRISTINA MARIE WELLER
STATE OF WASHINGTON
33182
REGISTERED
PROFESSIONAL ENGINEER

1/14/19

Kristina M. Weller, PE
Principal Geotechnical Engineer

Corporate Office
17522 Bothell Way Northeast
Bothell, Washington 98011
Phone 425.415.0551 • Fax 425.415.0311
www.riley-group.com

CITY OF MUKILTEO

11930 Cyrus Way, Mukilteo, WA 98275
(425) 263-8000
Fax (425) 212-2068

ENVIRONMENTAL CHECKLIST

PURPOSE OF CHECKLIST

The State Environmental Policy Act (SEPA), Chapter 43.21C RCW, requires all governmental agencies to consider the environmental impacts of a proposal before making decisions. An environmental impact statement (EIS) must be prepared for all proposals with probable significant adverse impacts on the quality of the environment. The purpose of this checklist is to provide information to help you and the agency identify impacts from your proposal (and to reduce or avoid impacts from the proposal, if it can be done) and to help the agency decide whether an EIS is required.

INSTRUCTION FOR APPLICANTS

This environmental checklist asks you to describe some basic information about your proposal. Governmental agencies use this checklist to determine whether the environmental impacts of your proposal are significant, requiring preparation of an EIS. Answer the questions briefly, with the most precise information known, or give the best description you can.

You must answer each question accurately and carefully, to the best of your knowledge. In most cases, you should be able to answer the questions from your own observations or project plans without the need to hire experts. If you really do not know the answer, or if a question does not apply to your proposal, write "do not know" or "does not apply". Complete answers to the questions now may avoid unnecessary delays later.

Some questions ask about governmental regulations, such as zoning, shoreline, and landmark designations. Answer these questions if you can. If you have problems, the governmental agencies can assist you.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

USE OF CHECKLIST FOR NONPROJECT PROPOSALS

Complete this checklist for non-project proposals, even though questions may be answered "does not apply." IN ADDITION, complete the SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS (PART D).

For non-project actions, the references in the checklist to the words "project," "applicant," and "property or site" should be read as "proposal," "proposer," and "affected geographic area," respectively.

CITY OF MUKILTEO
ENVIRONMENTAL CHECKLIST

A. BACKGROUND

1. Name of proposed project, if applicable:
   Saratoga Heights, phase 3

2. Name of applicant:
   Windward Real Estate Services Inc.

3. Address and phone number of applicant and contact person:
   Greg Krabbe,
   Windward Real Estate Services inc
   335 Park Place Center, Suite G119
   Kirkland Wa, 98033
   425 347 2898

4. Date checklist prepared: *January 21, 2019*

5. Agency requesting checklist: City of Mukilteo.

6. Proposed timing or schedule (including phasing, if applicable): *Begin Construction in Summer of 2019*

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain*: No.*

8. List any environmental information you know about that has been prepared or will be prepared, directly related to this proposal: *Soils investigation / report, Wetland / Stream investigation report, Driange design and report.*

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain: *None at this time, but others are expected with approval of site plan by City.*

10. List any government approvals or permits that will be needed for your proposal, if known:
    DNR Forest Practices permit, DOE NPDES permit, BNSF RR access permit.

Part Eleven WAC 197-11-960 Environmental Checklist

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description):

The project proposes development of approximately 3 acres of a 5 acre assemblage into 41 multifamily homes; 15 flats, 14 townhomes(duplex and three-plex), 2 duplex units (four homes), and 8 cottage homes. Site development will include access drives, parking areas, and utilities including sewer, water, power and communications services. The overall development will include approximately 25,000 of shared open / recreation space.

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist:

The subject site is located at 8002 53rd Ave West in the City of Mukilteo. The parcel no. is 00611600005400 and 5500, Sec 9. TWP 28N, R4E, WM.

TO BE COMPLETED BY APPLICANT:	EVALUATION FOR AGENCY USE ONLY
B. ENVIRONMENTAL ELEMENTS:	
1. EARTH	
a. General description of this site (circle one): Flat, rolling, hilly, steep slopes, mountainous, other: *Rolling with western 1/3rd very steep.*	❑
b. What is the steepest slope on the site (approximately percent slope)? *50% +.*	❑
c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any prime farmland: *Glacial Till, dens to very dense.*	❑
d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe: *Evidence of erosion on the western steep slopes.*	❑
e. Describe the purpose, type and approximate quantities of any filling or grading proposed. Indicate source of fill: *There will be approximately 6,870 CY of cut and 6,440 CY of fill. Excavation will be for road beds and basement parking. All material besides special road and utility bedding gravels will originate onsite.*	❑

TO BE COMPLETED BY APPLICANT:

EVALUATION FOR AGENCY USE ONLY

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe: *Yes, but only if erosion control practices were not followed during construction activities.* ❑

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)? 40% ❑

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any: *Use of accepted erosion control measures during construction. Collection of approximately 90% of stormwater runoff into a storm drainage system. Installation of a piped conveyance of stormwater down to the base of the hill, discharging into the Puget Sound.* ❑

2. AIR

a. What types of emissions to the air would result from the proposal (i.e., dust, automobile, odors, industrial wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities if known: *Dust and diesel exhaust from equipment during construction. Typical exhaust from automobiles and appliances associated with 41 multifamily homes.* ❑

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe: *No.* ❑

c. Proposed measures to reduce or control emissions or other impacts to air, if any: *Compliance with all emissions laws for vehicles and appliances.* ❑

3. WATER

a. Surface:

(1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into: *The Puget Sound is within 200' of the west boundary of the site.* ❑

(2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans: *No.* ❑

TO BE COMPLETED BY APPLICANT:

EVALUATION FOR AGENCY USE ONLY

(3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material: *None.* ❑

(4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known: *No.* ❑

(5) Does the proposal lie within a 100-year flood plain? If so, note location on the site plan: *No.* ❑

(6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge: *No.* ❑

b. Ground:

(1) Will ground water be withdrawn, or will water be discharged to ground water? Give general description, purpose, and approximate quantities if known: *No.* ❑

(2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: domestic sewage; industrial, containing the following chemicals...; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve. *No sewage or waste material will be discharged into the groundwater- the existing septic system will be removed and replaced by a new sanitary sewer system to discharge into the Mukilteo water and wastewater treatment facility.* ❑

c. Water Runoff (including storm water):

(1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe: *Stormwater runoff will be generated from rooftops and paved automotive and pedestrian surfaces. These will be collected in a comprehensive storm drainage system throughout the site. After collection, runoff will be directed to a water quality treatment facility that meets DOE standards, then, after treatment runoff will be conveyed via a piped system to the base of the steep slope to be discharged into the Puget Sound. Please see the drainage report for details.* ❑

TO BE COMPLETED BY APPLICANT:

EVALUATION FOR AGENCY USE ONLY

(2) Could waste materials enter ground or surface waters? If so, generally describe: *No.*

d. Proposed measures to reduce or control surface, ground and runoff water impact, if any: *An engineered storm drainage system will be installed throughout the project site to collect, treat and convey runoff to a safe discharge location. Please see the drainage report for details.*

4. PLANTS

a. Check or circle types of vegetation found on the site:
_X_ Deciduous tree: alder, maple, aspen, other
_X_ Evergreen tree: fir, cedar, pine, other
_X_ Shrubs
_X_ Grass
___ Pasture
___ Crop or grain
___ Wet soil plants: cattail, buttercup, bullrush, skunk, cabbage, other
___ Water plants: water lily, eelgrass, milfoil, other
___ Other types of vegetation

b. What kind and amount of vegetation will be removed or altered?
Approximately 60% of the site will be cleared for construction. All types of native growth will be removed; Trees, shrubs grasses etc.

c. List threatened or endangered species known to be on or near the site. *None.*

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any: *A comprehensive landscaping and irrigation plan will be included in the project scope. Planting will consist of native plants including deciduous and coniferous trees.*

5. ANIMALS

a. Circle any birds and animals which have been observed on or near the site or are known to be on or near the site:

Birds: hawk, **heron**, **eagle**, **songbirds**, other:
Mammals: deer, bear, elk, beaver, other:
Fish: bass, salmon, trout, herring, shellfish, other:

TO BE COMPLETED BY APPLICANT:

EVALUATION FOR AGENCY USE ONLY

b. List any threatened or endangered species known to be on or near the site: *None.* ❑

c. Is the site part of a migration route? If so, explain: *No.* ❑

d. Proposed measures to preserve or enhance wildlife, if any: *None.* ❑

6. ENERGY AND NATURAL RESOURCES

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc. *Both electric and natural gas sources will be available to meet energy needs onsite. Wood burning fire places may also be an amenity offered. Solar energy would be an option for some homeowners.* ❑

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe: *No.* ❑

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any: *All construction, heating and appliances would be selected to meet energy conservation requirements. No special conservation measures are proposed.* ❑

7. ENVIRONMENTAL HEALTH

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe: *No.* ❑

(1) Describe special emergency services that might be required: *N/A* ❑

(2) Proposed measures to reduce or control environmental health hazards, if any: *Water quality treatment of stormwater runoff. Removal of an existing septic sewer system onsite and the installation of a public / Private sanitary sewer system discharging into the Mukilteo water and wastewater treatment system.* ❑

b. Noise:

TO BE COMPLETED BY APPLICANT:

EVALUATION FOR AGENCY USE ONLY

(1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)? *None.* ❑

(2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site. *Short term- noise from earthwork and construction equipment an activities. Long term – noise generated by 41 multifamily residences.* ❑

(3) Proposed measures to reduce or control noise impacts, if any: *Limited times for construction activities.* ❑

8. LAND AND SHORELINE USE

a. What is the current use of the site and adjacent properties? *Residential, single to mid density.* ❑

b. Has the site been used for agriculture? If so, describe: *N/A* ❑

c. Describe any structures on the site: *There are two homes, one habitable and one abandoned, and two garage structures.* ❑

d. Will any structures be demolished? If so, what? *Yes, all existing structures will be removed.* ❑

e. What is the current zoning classification of the site? *MRD.* ❑

f. What is the current comprehensive plan designation of the site? *MFR-L.* ❑

g. If applicable, what is the current shoreline master program designation of the site? *The development area is outside the shoreline. That area that is within the shoreline area is designated Urban Rail Road.* ❑

h. Has any part of the site been classified as an "environmentally sensitive" area? If so, specify: *No.* ❑

i. Approximately how many people would reside or work in the completed project? *There are 41 residential units proposed, with an average of 3 people per home, 123 people.* ❑

j. Approximately how many people would the completed project displace? *None- as of this writing, the site is vacant.* ❑

k. Proposed measures to avoid or reduce displacement impacts, if any: *None.* ❑

Part Eleven WAC 197-11-960 Environmental Checklist

TO BE COMPLETED BY APPLICANT:

EVALUATION FOR AGENCY USE ONLY

l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any: *The proposed project has been design and will be submitted to the City of Mukilteo for review of its compatibility and constancy with the surrounding land uses and zoning.* ❑

9. HOUSING

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing: *41 units will be provided; these will be for middle to high income residents.* ❑

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing: *One single family home will be eliminated.* ❑

c. Proposed measures to reduce or control housing impacts, if any: *None.* ❑

10. AESTHETICS

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed? *The tallest building is limited to 45' per City of Mukilteo code. Wood will be the primary construction material and exterior siding.* ❑

b. What views in the immediate vicinity would be altered or obstructed? *The site area proposed for development is currently wooded. The proposed structures would replace the forested areas at heights lower than the forested condition. For the most part, views will not be altered.* ❑

c. Proposed measures to reduce or control aesthetic impacts, if any: *Design review of the buildings and landscaping.* ❑

11. LIGHT AND GLARE

a. What type of light or glare will the proposal produce? What time of day would it mainly occur? *None.* ❑

b. Could light or glare from the finished project be a safety hazard or interfere with views? *Not likely.* ❑

TO BE COMPLETED BY APPLICANT: | EVALUATION FOR AGENCY USE ONLY

c. What existing off-site sources of light or glare may affect your proposal? *None.* ❑

d. Proposed measures to reduce or control light and glare impacts, if any: *None.* ❑

12. RECREATION

a. What designated and informal recreational opportunities are in the immediate vicinity? *Open space area are provided throughout the project including a common area along the western limit of the development area that will allow all residents to enjoy the view of the Sound.* ❑

b. Would the proposed project displace any existing recreational uses? If so describe: *No.* ❑

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any: *Open and recreational spaces will be provided onsite.* ❑

13. HISTORIC AND CULTURAL PRESERVATION

a. Are there any places or objects listed on, or proposed for, national, state, or local preservation registers known to be on or next to the site? If so, generally describe: *No.* ❑

b. Generally describe any landmarks or evidence of historic, archaeological, scientific, or cultural importance known to be on or next to the site: *There are none.* ❑

c. Proposed measures to reduce or control impacts, if any: *None.* ❑

14. TRANSPORTATION

a. Identify public streets and highways serving the site, and describe proposed access to the existing street system. Show on site plans, if any: *The site will be served by 53rd Ave. A complete discussion of traffic is made in the traffic report submitted with the application.* ❑

b. Is site currently served by public transit? If not, what is the approximate distance to the nearest transit stop? *There is no transit stop in the immediate* ❑

TO BE COMPLETED BY APPLICANT: | EVALUATION FOR AGENCY USE ONLY

area.

c. How many parking spaces would the completed project have? How many would the project eliminate? *The project will create 122 designated parking stalls. No parking areas will be eliminated.* ❑

d. Will the proposal require any new roads or streets, or improvements to existing roads or streets, not including driveways? If so, generally describe (indicate whether public or private). *A private drive system will need to be constructed onsite to serve the proposed residential units. There will be minor frontage improvements along 53rd Ave. No additional improvements to the surrounding public road system are anticipated.* ❑

e. Describe the existing condition of the proposed access road, including width of easement, width of pavement or roadway, curbs, gutters, and/or sidewalks. *There is an existing gravel driveway that currently serves the site along the north boundary. It is 10-15' wide and extends for approximately ¾ of the site. There are no curbs, gutters or sidewalks. The proposed access road does not follow the existing driveway, but goes through the forested part of the site.* ❑

f. Will the project use (or occur in the immediate vicinity of) water, rail or air transportation? If so, generally describe. *No.* ❑

g. How many vehicular trips per day would be generated by the completed project? If known, indicate when peak volumes would occur. *The project will generate 285 daily trips, 22 AM peak hour trips and 27 PM peak hour trips. See traffic report submitted with project application.* ❑

h. Proposed measures to reduce or control transportation impacts, if any: *None.* ❑

15. PUBLIC SERVICES ❑

a. Would the project result in an increased need for public services (for example: fire protection, police protection, health care, schools, other)? If so, generally describe: *Yes, public services for 41 new residential units will need to be provided.*

b. Proposed measures to reduce or control direct impacts on public services, if any: *None.* ❑

16. UTILITIES ❑

a. Circle utilities currently available at the site: **electricity,** natural gas, **water,**

TO BE COMPLETED BY APPLICANT:

EVALUATION FOR AGENCY USE ONLY

refuse service, **telephone**, sanitary sewer, **septic system**, other.

b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed:

- *Electricity by Snohomish PUD*
- *Gas by Puget Sound Energy*
- *Telephone by Frontier*
- *Cable TV by Comcast*
- *Water and sewer by Mukilteo Water and Wastewater.*

C. SIGNATURE

The information and answers provided in the Environmental Checklist (including Supplement for Non-project Actions, if applicable) are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: _____

Date Submitted: _____

Agency Evaluation completed by: _____ Date: _____

Note: boxes (❑) are checked to indicate agency review of items in checklist.

SEC. 9, TWP 28 N, R4E W.M.

SARATOGA HEIGHTS

CITY OF MUKILTEO SNOHOMISH COUNTY, WA

ROADWAY, GRADING AND STORM DRAINAGE IMPROVEMENTS-PHASE 2/3

JANUARY 9, 2019

PROJECT TEAM

APPLICANT
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CPH CONSULTANTS
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EMAIL: GREG@HACKWORTHGROUP.COM

SURVEYOR
TRI-COUNTY LAND SURVEYING COMPANY
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LYNNWOOD, WA 98036
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EMAIL: BH_TRICOLAND@FRONTIER.COM

GEOTECHNICAL ENGINEER
E3RA
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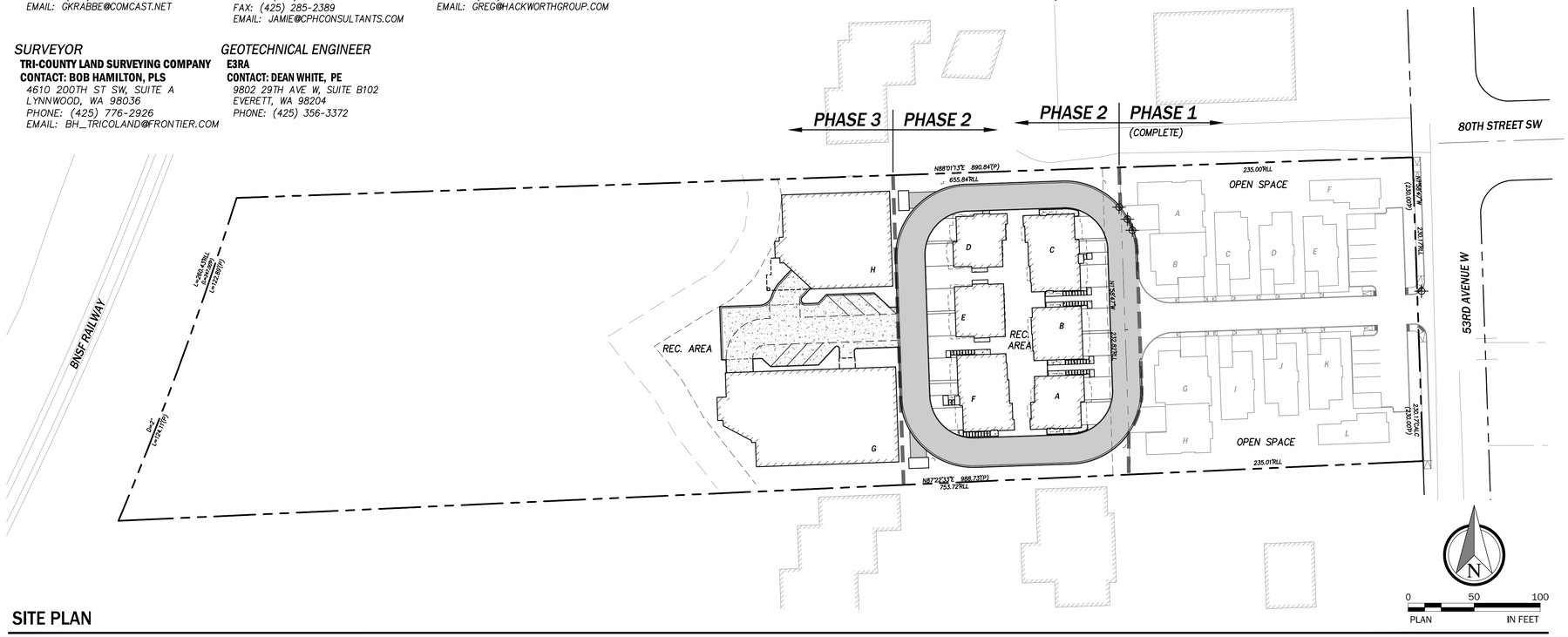
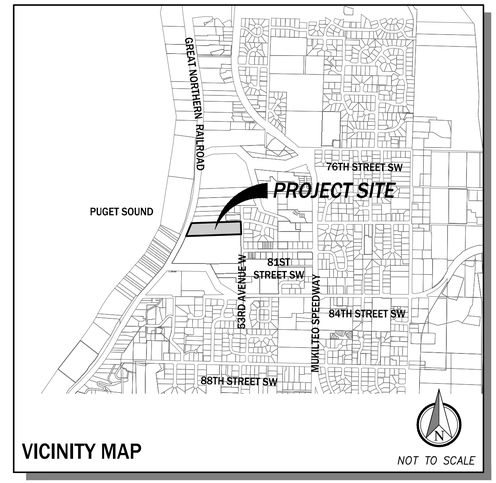
PHONE: (425) 356-3372



SITE PLAN



VICINITY MAP

DRAWING INDEX

PROJECT INFORMATION

GENERAL

PARCEL NO:	*00611600005401, 00611600005402*
SITE ADDRESS:	*8002 53RD AVE W* *MUKILTEO, WA 98275*
JURISDICTION:	*CITY OF MUKILTEO*
ZONING:	*MRD*
COMPREHENSIVE PLAN:	*MFR-L*
PRESENT USE:	*SINGLE FAMILY RESIDENCE*

SITE DEVELOPMENT

TOTAL SITE AREA:	*4.96 ACRES*
OPEN SPACE (NATIVE SLOPE):	*2.01 AC*
DEVELOPABLE AREA:	*2.95 AC*
PROPOSED USE:	*MULTI-FAMILY RESIDENTIAL*
DISTURBED AREA:	*2.95± ACRES*
IMPERVIOUS CALCULATIONS:	
IMPERVIOUS ASPHALT:	*0.76 AC*
SIDEWALK AND CURBS:	*0.27 AC*
ROOFTOPS AND BUILDINGS:	*0.98 AC*
TOTAL IMPERVIOUS AREA:	*2.01 AC*
PROPOSED:	*8 COTTAGE (PHASE 1)* *4 DUPLEX (PHASE 1)* *14 TOWNHOMES (PHASE 2)* *15 CONDO (PHASE 3)* *41 TOTAL*
MAX. DENSITY:	*12 DU/ACRE*
ALLOWABLE DENSITY:	*4.96x12 = 59 DU*
COMMON OPEN SPACE REQ'D:	*127,918 x 0.2 = 25,583 SF*
COMMON OPEN SPACE PROVIDED:	*13,888 SF REC. AREA* *12,100 SF OPEN SPACE* *25,988 SF TOTAL*

REQ'D SETBACKS	
FRONT:	*25'*
INTERIOR:	*5' MIN. (15' TOTAL) - 1 OR 2 STORY* *12' (24' TOTAL) - 3 STORY*
CORNER:	*20'*
REAR:	*20'*
MAX. BUILDING HEIGHT:	*45' (LOT SLOPE EXCEEDS 8%)/25' COTTAGES*
MAX. LOT COVERAGE:	*40% = 4.95 x 0.4 = 1.98 AC*
CALCULATED LOT COVERAGE:	*34,844 BLDG SF/33,262 OS SF = 104.76%*

REQ'D PARKING:		
PHASE 1		
COTTAGE	*2.5/UNITx8=*	*20 STALLS*
DUPLEX	*2.25/UNITx4=*	*9 STALLS*
		29 STALLS
PHASE 2		
TOWNHOME	*2.25/UNITx14=*	*32 STALLS*
PHASE 3		
CONDO	*2.25/UNITx15=*	*34 STALLS*
	TOTAL -	*95 STALLS*
PARKING PROVIDED:		
PHASE 1 (EXISTING)	*-*	*38 STALLS*
PHASE 2 (NEW)	*-*	*48 STALLS*
PHASE 3 (NEW)	*-*	*36 STALLS*
	TOTAL -	*122 STALLS*

APPROXIMATE EARTHWORK QUANTITIES

TOTAL PROJECT AREA:	*4.95 AC*
CLEARED AREA:	*2.63 AC*
CUT:	*7,750 CY*
FILL:	*7,950 CY*
NET (FILL):	*200 CY*

UTILITY PURVEYORS

WATER AND SANITARY SEWER:	*MUKILTEO WATER AND WASTEWATER DISTRICT* *7824 MUKILTEO SPEEDWAY* *MUKILTEO, WA 98275* *(425) 355-3355*
POWER:	*SNOHOMISH COUNTY PUD NO. 1* *2320 CALIFORNIA STREET* *EVERETT, WA* *(425) 783-8272*
NATURAL GAS:	*PUGET SOUND ENERGY* *10885 NE 4TH ST.* *P.O. BOX 97034* *BELLEVUE, WA 98009-9734* *(888) 225-5773*
TV/CABLE:	*COMCAST* *(877) 824-2288*
PHONE:	*FRONTIER COMMUNICATION* *(877) 387-3477*
FIRE:	*MUKILTEO FIRE DEPARTMENT* *10400 47TH PLACE W* *MUKILTEO, WA 98275* *(425) 263-8150*

SURVEY DATA

EXISTING BOUNDARY, TOPOGRAPHIC, AND PLANIMETRIC INFORMATION SHOWN ON THIS PLAN AND OTHERS IN THIS SET WERE USED AS A BASIS FOR DESIGN AND REPRESENT FIELD SURVEY DATA AND MAPPING PREPARED BY TRI-COUNTY LAND SURVEYING COMPANY (JOB NO. 13-019), AS PROVIDED BY THE PROJECT OWNER, AND DOES NOT REPRESENT WORK BY CPH CONSULTANTS. THE FOLLOWING SURVEY DATA WAS PROVIDED WITH THE TOPOGRAPHIC MAP BY TRI-COUNTY LAND SURVEYING:

BENCHMARK - DATUM (NAVD 88)
3" BRASS DISK IN CONCRETE
ELEV.=407.62

LEGAL DESCRIPTION:
TRACTS 54 AND 55, WEST & WHEELER'S SEA VIEW FIVE ACRE TRACTS, SITUATE IN THE COUNTY OF SNOHOMISH, STATE OF WASHINGTON

CPH CONSULTANTS
Site Planning • Civil Engineering
Land Use Consulting • Project Management
11431 Willows Road NE, Suite 120 | Redmond, WA 98052
Phone: (425) 285-2390 | FAX: (425) 285-2389
www.cphconsultants.com

LEGEND

	EXISTING	PROPOSED
ROADWAY CENTERLINE		
PROJECT BOUNDARY LINE		
PROPERTY BOUNDARY LINE		
RIGHT-OF-WAY LINE		
EASEMENT LINE		
EDGE OF PAVEMENT LINE		
10' CONTOUR LINE	290	
2' CONTOUR LINE		
SANITARY SEWER MAIN	SS	SS SS
WATER LINE	W	
FIRE SUPPLY	F	F F F F F F F
STORM PIPE	SD	
GAS LINE	GAS	GAS
FENCE LINE	X	
POWER LINE	OP	
BURIED POWER LINE	BP	
UTILITY EASEMENT		
TELEPHONE LINE	T	
BURIED TELEPHONE LINE	BT	
SWALE		
SILT FENCE		X X X X X X X
CONSTRUCTION FENCING		// // // // //
CLEARING LIMIT		
SANITARY SEWER CLEAN OUT		
SANITARY SEWER MANHOLE		
STORM DRAIN CATCH BASIN - TYPE I		
STORM DRAIN CATCH BASIN - TYPE II		
STORM DRAIN INLET (NO CATCH)		
STORM DRAIN CULVERT		
WATER CAP/PLUG		
WATER COUPLING		
GUARD POST		
REDUCER		
THRUST BLOCK		
WATER METER		
2 NOZZLE FIRE HYDRANT		
3 NOZZLE FIRE HYDRANT		
FLANGE/BUND FL JOINT		
MECHANICAL JOINT		
PUSH-ON/HUB JOINT		
THREAD JOINT		
AIR RELIEF VALVE		
BLOW-OFF VALVE		
BUTTERFLY VALVE		
CHECK VALVE		
GATE/GENERAL VALVE		
PLUG VALVE		
GAS METER		
GAS VALVE		
PAD MOUNTED TRANSFORMER		
POWER VAULT	P	P
TRANSMISSION TOWER (SCALEABLE)		
UTILITY POLE		
POWER POLE		
UTILITY POLE ANCHOR		
TELEPHONE RISER		
TELEPHONE VAULT	T	T
BUS STOP	BUS STOP	BUS STOP
MAIL BOX		
RIP RAP		
ROCKERY		
SHRUB		
GENERAL SIGN		
REGULATORY SIGN		
TREE (CONIFER)		
TREE (DECIDUOUS)		
YARD LIGHT		
BRIDGE/TUNNEL		
ASPHALT PAVEMENT		
CONCRETE		

ABBREVIATIONS

AC	ASPHALT CONCRETE PAVEMENT
AP	ANGLE POINT
ATB	ASPHALT TREATED BASE
AVE	AVENUE
BCR	BEGIN CURB RETURN
BOC	BACK OF CURB
BOW	BOTTOM OF WALL
CASP	CRITICAL AREA SITE PLAN
℄	CENTERLINE
CB	CATCH BASIN
CDF	CONTROLLED DENSITY FILL
COM	CITY OF MULKITEO
CMP	CORRUGATED METAL PIPE
CONC.	CONCRETE
CONN.	CONNECTION
CONT.	CONTINUOUS
CPP	CORRUGATED POLYETHYLENE PIPE (W/SMOOTH INTERIOR WALLS)
CSBC	CRUSHED SURFACING BASE COURSE
CSTC	CRUSHED SURFACING TOP COURSE
DIA.	DIAMETER
DI	DUCTILE IRON
DW	DRIVEWAY
E	EAST
ECR	END CURB RETURN
EDDS	ENGINEERING DESIGN AND DEVELOPMENT STANDARDS
EL.	ELEVATION
EOP	EDGE OF PAVEMENT
ESC	EROSION AND SEDIMENT CONTROL
ESD	ENTERING SIGHT DISTANCE
ESMT.	EASEMENT
EVA	EMERGENCY VEHICLE ACCESS
EXIST.	EXISTING
FL	FLOW LINE
FL.	FLANGE
FOC	FACE OF CURB
HORIZ	HORIZONTAL
IE	INVERT ELEVATION
INT	INTERSECTION
LCPE	LINED CORRUGATED POLYETHYLENE PIPE
LF	LINEAL FEET
LT	LEFT
LUI	LAND USE INSPECTOR
MAX.	MAXIMUM
MSE	MECHANICALLY STABILIZED EARTH
MH	MANHOLE
MIN.	MINIMUM
MJ	MECHANICAL JOINT
N	NORTH
NIC	NOT IN CONTRACT
O.C.	ON CENTER
PC	POINT OF CURVATURE
PE	PLAIN END
PI	POINT OF INTERSECTION
PL	PLACE
PT	POINT OF TANGENCY
PVI	POINT OF VERTICAL INTERSECTION
PUE	PUBLIC UTILITY EASEMENT
REQ'D.	REQUIRED
ROW	RIGHT-OF-WAY
RT	RIGHT
S	SOUTH
SD	STORM DRAIN
SP	SPACE
SS	SANITARY SEWER
SSD	STOPPING SIGHT DISTANCE
STA	STATION
TESC	TEMPORARY EROSION AND SEDIMENT CONTROL
TOC	TOP OF CURB
TYP.	TYPICAL
TBW	TOP BACK OF WALK
TOW	TOP OF WALL
UNO	UNLESS NOTED OTHERWISE
VERT.	VERTICAL
WSDOT	WASHINGTON DEPT. OF TRANSPORTATION
W/	WITH
W	WEST
WS	WATER SERVICE

CONSTRUCTION MATERIALS

MATERIAL	WSDOT SPEC (UNLESS OTHERWISE NOTED)
CRUSHED SURFACING TOP COURSE	9-03.9(3)
CRUSHED SURFACING BASE COURSE	9-03.9(3)
ASPHALT TREATED BASE (ATB)	9-03.6
PIPE ZONE BEDDING	9-03.12(3)
WASHED DRAIN ROCK	9-03.12(4)
CLEAN SAND	9-03.13
QUARRY SPALLS	9-13.6
ASPHALT CEMENT CONCRETE	9-02.1 & 9-03.8
NATIVE FILL MATERIAL AND STRUCTURAL BORROW	9-03.14(3)
IMPORTED STRUCTURAL FILL MATERIAL	9-03.14(3)
IMPORTED SELECT FILL MATERIAL	9-03.14(1)
GEOTEXTILE OR GEOTEX FABRIC	9-33.2, TABLE 3 (MIRAFI 600X OR EQUAL)
GEO-FABRIC SILT FENCE	9-33.2, TABLE 6 (MIRAFI 100X OR EQUAL)
NON-WOVEN GEOTEXTILE OR GEOTEX FABRIC	9-33.2, TABLE 1 & 2 (MIRAFI 140N OR EQUAL)
UNSUITABLE EXCAVATION	2-03.3(14)E,F
GRAVEL BORROW	9-03.14(1) REVISED FOR 5% MAX. PASSING A US NO. 200 SIEVE
RIP RAP (HEAVY)	9-13.1(1)
RIP RAP (LIGHT)	9-13.1(2)
RIP RAP (HAND PLACED)	9-13.2
LINED CORRUGATED POLYETHYLENE PIPE (LCPE)	9-05.1(7)
PORTLAND CEMENT CONCRETE	6.02.3(2)B
DUCTILE IRON PIPE	9-05.13
CONCRETE PIPE	9-05.7
CORRUGATED METAL PIPE (CMP)	9-05.1(2)
PVC PIPE	9-05.12
BLACK VINYL COATED CHAIN LINK FENCE	9.16.1 WSDOT STANDARD PLAN L-2 TYPE 1 OR TYPE 3 WITH VINYL COATING

CALL BEFORE YOU DIG 1-800-424-5555

NO.	DATE	REVISION	BY	CK.
1	1/9/19	CITY PERMIT RESUBMITTAL FOR MODIFICATION	PCE	JBS

AIMEE B SCHENCK — STATE OF WASHINGTON — 37610 — REGISTERED PROFESSIONAL ENGINEER — 1-9-19

SARATOGA HEIGHTS - PHASE 2/3

ROADWAY, GRADING AND DRAINAGE IMPROVEMENTS

LEGEND, ABBREVIATIONS, AND GENERAL NOTES

SNOHOMISH COUNTY

MUKILTEO

CLIENT

WINDWARD REAL ESTATE SERVICES, INC

GREG KRABBE
335 PARK PLACE CENTER G111
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PROJECT NO.
0079-13-005

DRAWING
C0.01

SHEET 2 OF 26

GENERAL NOTES

1. ALL WORK AND MATERIALS SHALL BE IN ACCORDANCE WITH CURRENT CITY OF MUKILTEO DEVELOPMENT STANDARDS; THE CURRENT EDITION OF THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION; AND THE ADOPTED EDITION OF THE WASHINGTON STATE DEPARTMENT OF ECOLOGY STORMWATER MANAGEMENT MANUAL FOR WESTERN WASHINGTON.
2. ALL WORK WITHIN THE PLAT AND CITY RIGHT-OF-WAY SHALL BE SUBJECT TO THE INSPECTION OF THE CITY.
3. PRIOR TO ANY SITE CONSTRUCTION INCLUDING CLEARING/LOGGING OR GRADING, THE SITE CLEARING LIMITS SHALL BE LOCATED AND FIELD IDENTIFIED BY THE PROJECT SURVEYOR (OR PROJECT ENGINEER) AS REQUIRED BY THESE PLANS. THE PROJECT SURVEYOR'S NAME AND PHONE NUMBER IS
4. THE DEVELOPER, CONTRACTOR AND PROJECT ENGINEER IS RESPONSIBLE FOR WATER QUALITY AS DETERMINED BY THE MONITORING PROGRAM ESTABLISHED BY THE PROJECT ENGINEER. THE PROJECT ENGINEER'S NAME AND PHONE NUMBER IS ,
5. PRIOR TO ANY SITE WORK, THE CONTRACTOR SHALL CONTACT THE CITY OF MUKILTEO PLANNING & COMMUNITY DEVELOPMENT AT 425-263-8000 TO SCHEDULE A PRECONSTRUCTION CONFERENCE.
6. ENGINEERED AS-BUILT DRAWINGS IN ACCORDANCE WITH THE CURRENT ADOPTED INTERNATIONAL BUILDING CODE SHALL BE REQUIRED PRIOR TO FINAL SITE APPROVAL.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS FOR UTILITY, ROAD, AND RIGHT-OF- WAY CONSTRUCTION. THE CONTRACTOR FOR THIS PROJECT IS

   CONTACT PERSON: _____

   PHONE: _____

   MOBILE: _____

   24-HOUR EMERGENCY CONTACT AND PHONE: ____
8. THE CONSTRUCTION STORMWATER POLLUTION PREVENTION (SWPP) FACILITIES SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE APPROVED SWPPP PLANS PRIOR TO ANY GRADING OR LAND CLEARING. THESE FACILITIES MUST BE SATISFACTORILY MAINTAINED UNTIL CONSTRUCTION AND LANDSCAPING IS COMPLETED AND THE POTENTIAL FOR ON-SITE EROSION HAS PASSED. SEDIMENT LADEN WATERS SHALL NOT ENTER THE NATURAL DRAINAGE SYSTEM.
9. A CERTIFIED EROSION AND SEDIMENT CONTROL LEAD (CESCL) OR SWPPP SUPERVISOR SHALL BE RESPONSIBLE FOR MAINTAINING THE CONSTRUCTION SWPP FACILITIES, AS OUTLINED IN THE APPROVED SWPPP, OR AS MODIFIED FROM TIME TO TIME. CONTACT INFORMATION FOR THE CESCL (OR SWPPP SUPERVISOR) FOR THE PROJECT SHALL BE GIVEN TO THE CITY.
10. NONCOMPLIANCE WITH THE REQUIREMENTS FOR EROSION CONTROLS, WATER QUALITY AND CLEARING LIMITS MAY RESULT IN REVOCATION OF PROJECT PERMITS, PLAN APPROVAL, AND BOND FORECLOSURES.
11. TRENCH BACKFILL OF NEW UTILITIES AND STORM DRAINAGE FACILITIES SHALL BE COMPACTED TO 95% MAXIMUM DENSITY (MODIFIED PROCTOR) UNDER ROADWAYS AND 90% MAXIMUM DENSITY (MODIFIED PROCTOR) OFF ROADWAYS. COMPACTION SHALL BE PERFORMED IN ACCORDANCE WITH SECTIONS 7-08.3(3) AND 2-03.3(14)D OF THE WSDOT STANDARD SPECIFICATIONS.
12. THE OWNER AND CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND PROTECTING ALL EXISTING UTILITIES PRIOR TO BEGINNING CONSTRUCTION. LOCATION OF UTILITIES SHOWN ON CONSTRUCTION PLANS ARE BASED ON BEST RECORDS AVAILABLE AND ARE SUBJECT TO VARIATION. FOR ASSISTANCE IN UTILITY LOCATION, CALL 811.
13. PRIOR TO CONSTRUCTION THE OWNER AND/OR CONTRACTOR SHALL NOTIFY THE PROJECT ENGINEER AND THE PUBLIC WORKS DIRECTOR WHEN CONFLICTS EXIST BETWEEN THE PLANS AND FIELD CONDITIONS. CONFLICTS SHALL BE RESOLVED (INCLUDING PLAN AND PROFILE REVISIONS) AND RESUBMITTED FOR APPROVAL PRIOR TO PROCEEDING WITH CONSTRUCTION.
14. THE CONTRACTOR SHALL KEEP TWO SETS OF PLANS ON SITE AT ALL TIMES FOR RECORDING AS-BUILT INFORMATION; ONE SET SHALL BE SUBMITTED TO THE PROJECT ENGINEER, AND ONE SET SHALL BE SUBMITTED TO THE CITY AT COMPLETION OF CONSTRUCTION AND PRIOR TO FINAL ACCEPTANCE OF WORK.
15. A GRADING PERMIT ISSUED PURSUANT TO THE CURRENT ADOPTED INTERNATIONAL BUILDING CODE, AND APPROVAL OF THE TEMPORARY EROSION AND SEDIMENTATION CONTROL PLAN SHALL BE OBTAINED FROM THE PLANNING & COMMUNITY DEVELOPMENT DEPARTMENT PRIOR TO ANY ON-SITE GRADING WORK NOT EXPRESSLY EXEMPT BY THE CURRENT ADOPTED INTERNATIONAL BUILDING CODE.

HYDROSEEDING GENERAL NOTES

TEMPORARY SEEDING GENERAL NOTES

1. USE SEEDING THROUGHOUT THE PROJECT ON DISTURBED AREAS THAT HAVE REACHED FINAL GRADE OR THAT WILL REMAIN UNWORKED FOR MORE THAN 30 DAYS.
2. THE OPTIMUM SEEDING WINDOWS ARE APRIL 1 THROUGH JUNE 30 AND SEPTEMBER 1 THROUGH OCTOBER 1.
3. BETWEEN OCTOBER 1 AND MARCH 30 SEEDING REQUIRES A COVER OF MULCH WITH STRAW OR AN EROSION CONTROL BLANKET UNTIL 75 PERCENT GRASS COVER IS ESTABLISHED.
4. REVIEW ALL DISTURBED AREAS IN LATE AUGUST TO EARLY SEPTEMBER AND COMPLETE ALL SEEDING BY THE END OF SEPTEMBER.

   a. MULCH IS REQUIRED AT ALL TIMES FOR SEEDING. MULCH CAN BE APPLIED ON TOP OF THE SEED OR SIMULTANEOUSLY BY HYDROSEEDING (SEE ECOLOGY BMP C121 MULCHING FOR SPECIFICATIONS).

   b. SEED AND MULCH ALL DISTURBED AREAS NOT OTHERWISE VEGETATED AT FINAL SITE STABILIZATION.

MAINTENANCE OF SILTATION BARRIERS

1. SILTATION BARRIERS SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. CLOSE ATTENTION SHALL BE PAID TO THE REPAIR OF DAMAGED EROSION CONTROL ELEMENTS, ESPECIALLY END-RUNS AND SEDIMENT BUILD-UP. NECESSARY REPAIRS TO BARRIERS SHALL BE ACCOMPLISHED THE SAME DAY.
2. SEDIMENT DEPOSITS SHOULD BE REMOVED AFTER EACH RAINFALL. SEDIMENT DEPOSITS MUST BE REMOVED WHEN THE SEDIMENT LEVEL REACHES APPROXIMATELY ONE-HALF THE SILTATION BARRIER HEIGHT.
3. ANY SEDIMENT DEPOSITS REMAINING IN PLACE AFTER THE CHECK DAM IS NO LONGER REQUIRED SHALL BE DRESSED TO CONFORM TO THE EXISTING GRADE, PREPARED AND SEEDED.

SEDIMENT TRAP GENERAL NOTES

1. SEDIMENT TRAPS ARE ONLY EFFECTIVE IN REMOVING SEDIMENT DOWN TO ABOUT THE MEDIUM SILT SIZE FRACTION. SOILS IN MUKILTEO OFTEN CONTAIN FINE SILT AND MAY NOT BE ADEQUATELY TREATED WITH SEDIMENT PONDS. THEREFORE, EROSION CONTROL PRACTICES SHOULD BE EMPHASIZED AND PRIORITIZED.
2. THE POND SHALL BE CHECKED AFTER EACH RAIN EVENT, OR WEEKLY, WHICHEVER IS SOONER, TO INSURE THAT IT THE WALLS ARE STRUCTURALLY SOUND, THE POND HAS NOT BEEN DAMAGED BY EROSION OR CONSTRUCTION EQUIPMENT, AND TO DETERMINE MAINTENANCE NEEDS.
3. ANY DAMAGE TO THE POND EMBANKMENTS OR SLOPES SHALL BE REPAIRED IMMEDIATELY.
4. THE EMERGENCY SPILLWAY SHOULD BE CHECKED REGULARLY TO INSURE THAT THE LINING IS WELL ESTABLISHED AND EROSION RESISTANT. THE SILTATION BASIN SHOULD BE CHECKED FOR SEDIMENT CLEANOUT AFTER EACH RAINFALL WHICH PRODUCES RUNOFF.
5. WHEN THE SEDIMENT REACHES THE CLEANOUT LEVEL (TYPICALLY 1-FOOT IN DEPTH), IT SHALL BE REMOVED AND PROPERLY DISPOSED OF OFF-SITE.
6. SECONDARY TREATMENT MAY BE NECESSARY IF THE SEDIMENT POND CANNOT EFFECTIVELY REMOVE THE FINE GRAIN SOILS.

STORM DRAINAGE NOTES

1. ALL PIPE SHALL BE PLACED ACCORDING DIVISION 7 OF THE WSDOT STANDARD SPECIFICATIONS.
2. BACKFILL SHALL BE PLACED EQUALLY ON BOTH SIDES OF THE PIPE OR PIPE-ARCH IN 6" AVERAGE DEPTH LOOSE LIFTS. MAXIMUM LIFT DEPTH SHALL NOT EXCEED 9". EACH LIFT SHALL BE THOROUGHLY COMPACTED. COMPACTED LIFTS MUST EXTEND AT LEAST ONE PIPE DIAMETER ON EACH SIDE OF THE PIPE OR TO THE SIDE OF THE TRENCH. BACKFILL OVER THE PIPE SHALL BE PERFORMED IN ACCORDANCE WITH SECTIONS 7- 08.3(3) THE WSDOT STANDARD SPECIFICATIONS.
3. ALL GRATES LOCATED IN THE GUTTER FLOW LINE (INLET AND CATCH BASIN) SHALL BE DEPRESSED 0.1 FEET BELOW PAVEMENT LEVEL.
4. ALL CATCH BASINS ARE TO BE TYPE I UNLESS OTHERWISE APPROVED BY THE CITY OR DESIGNATED REPRESENTATIVE. THE USE AND INSTALLATION OF INLETS IS NOT ALLOWED.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADJUSTING ALL MANHOLE, INLET AND CATCH BASIN FRAMES AND GRATES TO GRADE JUST PRIOR TO CURB INSTALLATION AND/OR PAVING.
6. ALL CATCH BASINS WITH A DEPTH OF 5 FEET OR GREATER TO THE FLOW LINE SHALL BE TYPE II CATCH BASINS.
7. VANED GRATES ARE REQUIRED ON ALL STORM STRUCTURES. ALL CATCH BASINS AND MANHOLES SHALL HAVE LOCKING LIDS. ROLLED GRATES ARE NOT APPROVED FOR USE.
8. POLYPROPYLENE SAFETY STEPS AND LADDER STEPS SHALL BE PROVIDED IN ALL MANHOLES AND SHALL BE POSITIONED CORRECTLY WITH THE BOLT AREAS ON THE RIM.
9. CATCH BASIN FRAMES AND GRATES SHALL BE OLYMPIC FOUNDRY MODEL SM60, SM52, OR SM44, LOCKING TYPE OR EQUIVALENT. MODEL SM52 SHALL BE REFERRED TO AS A "THROUGH CURB INLET" ON THE PLANS.
10. DETENTION PONDS WITH SIDE SLOPES STEEPER THAN 3:1 OR WITH A MAXIMUM WATER DEPTH GREATER THAN 3 FEET SHALL REQUIRE A VINYL COATED CHAIN LINK PERIMETER FENCE. SIDE SLOPE AVERAGING SHALL NOT BE ALLOWED. ALL INLET AND OUTFALL PIPES SHALL HAVE A TRASH RACK INSTALLED AND A MORTARED RIPRAP HEADWALL.
11. PRIOR TO SIDEWALK CONSTRUCTION; LOT DRAINAGE SYSTEMS, STUB-OUTS AND ANY BEHIND SIDEWALK DRAINS MUST BE INSTALLED AS REQUIRED. PIPE SHALL BE PVC 3034, OR SDR-35. STUB-OUTS SHALL BE MARKED WITH A 2" X 4" WITH 3 FEET VISIBLE ABOVE GRADE AND MARKED "STORM". LOCATIONS OF THESE INSTALLATIONS SHALL BE SHOWN ON THE AS-BUILT CONSTRUCTION PLANS SUBMITTED TO THE CITY.
12. STORM WATER RETENTION/DETENTION FACILITIES, STORM DRAINAGE PIPE AND CATCH BASINS SHALL BE FLUSHED AND CLEANED BY THE DEVELOPER PRIOR TO:

    a. CITY OF MUKILTEO FINAL ACCEPTANCE OF THE PROJECT AND;

    b. UPON COMMENCEMENT AND COMPLETION OF THE 2 YEAR WARRANTY PERIOD FOR THE STORM DRAINAGE SYSTEM. AN INVOICE DETAILING THE FLUSHING AND CLEANING SHALL BE PROVIDED TO THE CITY.
13. ALL PIPES SHALL BE INSTALLED WITH RUBBER GASKETS AS PER MANUFACTURER'S RECOMMENDATIONS.
14. COVERAGE REQUIREMENTS FOR 12" DIAMETER PIPE:

    BACKFILL OVER PIPE LESS THAN 12" REQUIRES RCP CLASS IV. BACKFILL OVER PIPE LESS THAN 24" REQUIRES RCP MINIMUM.

    BACKFILL OVER PIPE GREATER THAN 24" REQUIRES 16 GAGE CMP MINIMUM.
15. CORRUGATED POLYETHYLENE PIPE (CPP):

    a. ALL PIPE SHALL BE SMOOTH INTERIOR. CPP SHALL BE DOUBLE-WALLED. ALL PIPE SHALL MEET AASHTO AND ASTM SPECIFICATIONS.

    b. UPON REQUEST BY THE CITY INSPECTOR, ALL PIPE RUNS SHALL PASS THE LOW PRESSURE AIR TEST REQUIREMENTS OF SECTION 7-04.3(1) E & F OF THE WSDOT STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION. PIPE RUNS SHALL BE TESTED WITH PIPE LOADED AND COMPACTED TO FINISH GRADE.

    c. UPON REQUEST BY THE CITY INSPECTOR, PIPE SHALL BE SUBJECT TO MANDREL TESTING (MANDREL SIZE = 90% OF NOMINAL PIPE DIAMETER).

    d. PIPE SHALL BE STORED ON SITE IN SHIPPING BUNKS ON A FLAT LEVEL SURFACE. THIS REQUIREMENT WILL BE STRICTLY ENFORCED; FAILURE TO COMPLY MAY RESULT IN REJECTION OF THE PIPE AND/OR FUTURE RESTRICTION ON USE OF MATERIAL.

    e. MINIMUM DEPTH OF COVER SHALL BE 2 FEET.

    f. COUPLINGS SHALL BE INTEGRAL BELL AND SPIGOT OR DOUBLE BELL SEPARATE COUPLINGS. SPLIT COUPLINGS WILL NOT BE ALLOWED.

    g. BACKFILL SHALL COMPLY WITH SECTION 7-08.3(3) OF THE WSDOT STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION WITH THE EXCEPTION THAT THE SECOND PARAGRAPH OF SECTION 7-08.3(3) IS DELETED AND REPLACED WITH:

    THE MATERIAL USED FOR BACKFILLING AROUND AND TO A POINT 1 FOOT ABOVE THE TOP OF THE PIPE SHALL BE CLEAN EARTH OR SAND, FREE FROM CLAY. ANY GRAVEL OR STONES INCLUDED IN THE BACKFILL SHALL PASS THROUGH A 1 INCH SIEVE.
16. ALL NON-PERFORATED METAL PIPE SHALL HAVE NEOPRENE GASKETS AT THE JOINTS. O-RING GASKETS MAY BE USED FOR TYPE-F COUPLING BAND.
17. CULVERT ENDS SHALL BE BEVELED TO MATCH SIDE SLOPES. FIELD CUTTING OF CULVERT ENDS IS PERMITTED WHEN APPROVED BY THE CITY.
18. ALL FIELD CUT CULVERT PIPE SHALL BE TREATED AS REQUIRED IN THE STANDARD SPECIFICATIONS OR GENERAL SPECIAL PROVISIONS.

SITE GRADING AND SWPPP NOTES

1. PRIOR TO ANY SITE WORK, INCLUDING CLEARING, LOGGING OR GRADING, THE SITE CLEARING LIMITS SHALL BE LOCATED AND FIELD IDENTIFIED BY THE PROJECT SURVEYOR (OR PROJECT ENGINEER) AS REQUIRED BY THESE PLANS. THE PROJECT SURVEYOR'S NAME AND PHONE NUMBER IS___.
2. SOILS IN MUKILTEO OFTEN CONTAIN FINER PARTICLES WHICH WILL PASS THROUGH SEDIMENT TRAPS UNTREATED AND HAVE EXTREMELY LONG SETTLING TIMES. THEREFORE, THE NEED TO CONTROL EROSION FROM THE SITE IS THE FIRST PRIORITY AND SHOULD BE EMPHASIZED.
3. THE CONSTRUCTION STORMWATER POLLUTION PREVENTION FACILITIES SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE APPROVED SWPPP PRIOR TO ANY GRADING OR EXTENSIVE LAND CLEARING. AN INSPECTION BY THE CITY OF THESE FACILITIES SHALL BE ARRANGED FOR BY THE CONTRACTOR PRIOR TO ANY GRADING. THESE FACILITIES MUST BE SATISFACTORILY MAINTAINED UNTIL CONSTRUCTION AND LANDSCAPING IS COMPLETED AND THE POTENTIAL FOR ON-SITE EROSION HAS PASSED.
4. STOCKPILES ARE TO BE LOCATED IN SAFE AREAS AND ADEQUATELY PROTECTED BY TEMPORARY SEEDING AND MULCHING. HYDROSEEDING IS PREFERRED.
5. THE DEVELOPER (OR PROJECT ENGINEER) IS RESPONSIBLE FOR WATER QUALITY AS DETERMINED BY THE MONITORING PROGRAM ESTABLISHED BY THE PROJECT ENGINEER. THE PROJECT ENGINEER'S NAME AND PHONE NUMBER IS___.
6. IF THE PROJECT WILL DISTURB MORE THAN ONE (1) ACRE OF LAND, THEN A CONSTRUCTION NPDES PERMIT IS REQUIRED AND A CERTIFIED EROSION AND SEDIMENT CONTROL LEAD (CESCL) SHALL BE ASSIGNED TO THE SITE. THE CESCL'S NAME, PHONE NUMBER, AND CESCL CERTIFICATE NUMBER IS __ ___.
7. ALL SITE WORK MUST BE PERFORMED IN ACCORDANCE WITH THE CURRENT CITY ADOPTED INTERNATIONAL BUILDING CODE.
8. ALL EARTH WORK SHALL BE PERFORMED IN ACCORDANCE WITH CITY STANDARDS. A PRECONSTRUCTION SOILS INVESTIGATION MAY BE REQUIRED TO EVALUATE SOILS STABILITY.
9. IF CUT AND FILL SLOPES EXCEED A MAXIMUM OF TWO FEET HORIZONTAL TO ONE FOOT VERTICAL, A ROCK OR CONCRETE RETAINING WALL MAY BE REQUIRED. ALL ROCK RETAINING WALLS GREATER THAN FOUR (4) FEET IN HEIGHT ARE TO BE DESIGNED AND CERTIFIED BY A PROFESSIONAL ENGINEER EXPERIENCED IN SOIL MECHANICS.
10. THE SURFACE OF ALL SLOPES SHALL BE COMPACTED. THIS MAY BE ACCOMPLISHED BY OVER-BUILDING THE SLOPES, THEN CUTTING BACK TO FINAL GRADES; OR BY COMPACTING EACH LIFT AS THE SLOPE IS BEING CONSTRUCTED. ALL SLOPES SHALL BE COMPACTED BY THE END OF EACH WORKING DAY.
11. ALL STRUCTURAL FILLS SHALL BE COMPACTED TO A MINIMUM OF 95% MAXIMUM DENSITY IN THE UPPER 4 FEET & 90% MAXIMUM DENSITY BELOW 4 FEET AS DETERMINED BY MODIFIED PROCTOR.
12. NONCOMPLIANCE WITH THE EROSION CONTROL REQUIREMENTS, WATER QUALITY REQUIREMENTS AND CLEARING LIMITS VIOLATIONS MAY RESULT IN REVOCATION OF PROJECT PERMITS AND PLAN APPROVAL AND BOND FORECLOSURES.
13. UPON COMPLETION OF WORK, FINAL REPORTS MUST BE SUBMITTED TO THE CITY IN CONFORMANCE WITH THE CURRENT CITY ADOPTED INTERNATIONAL BUILDING CODE.
14. A WET WEATHER EROSION CONTROL PLAN MUST BE SUBMITTED TO THE CITY FOR REVIEW AND APPROVAL ON OR BEFORE SEPTEMBER 1, IF THE PROJECT IS PROPOSING TO ACTIVELY CLEAR, GRADE, OR OTHERWISE DISTURB 1,000 SQUARE FEET OR MORE OF SOIL DURING THE PERIOD BETWEEN OCTOBER 1 AND APRIL 30. OTHER THRESHOLDS FOR A WET WEATHER EROSION CONTROL PLAN INCLUDE PROJECTS THAT:

    a. HAVE AREA(S) THAT DRAIN, BY PIPE, OPEN DITCH, SHEET FLOW, OR A COMBINATION OF THESE TO A TRIBUTARY WATER, AND THE TRIBUTARY WATER IS ONE-QUARTER MILE OR LESS DOWNSTREAM; OR

    b. HAVE SLOPES STEEPER THAN 15 PERCENT ADJACENT OR ON-SITE; OR

    c. HAVE HIGH POTENTIAL FOR SEDIMENT TRANSPORT, AS DETERMINED BY THE CONSTRUCTION SITE SEDIMENT TRANSPORT POTENTIAL WORKSHEET; OR

    d. HAVE A CRITICAL AREA OR CRITICAL AREA BUFFER ON-SITE, OR WITHIN 50 FEET OF THE SITE; OR

    e. HAVE HIGH GROUNDWATER TABLE OR SPRINGS.

NO.	DATE	REVISION	BY	CK.
1	1/9/19	CITY PERMIT RESUBMITTAL FOR MODIFICATION	PCE	JBS

AMIE B SCHENK — STATE OF WASHINGTON — 37610 — REGISTERED PROFESSIONAL ENGINEER
1-9-19

SARATOGA HEIGHTS - PHASE 2/3

ROADWAY, GRADING AND DRAINAGE IMPROVEMENTS

CITY STANDARD PLAN NOTES

MUKILTEO — SNOHOMISH COUNTY

CLIENT

WINDWARD REAL ESTATE SERVICES, INC
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PROJECT NO.
0079-13-005

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SHEET 3 OF 26

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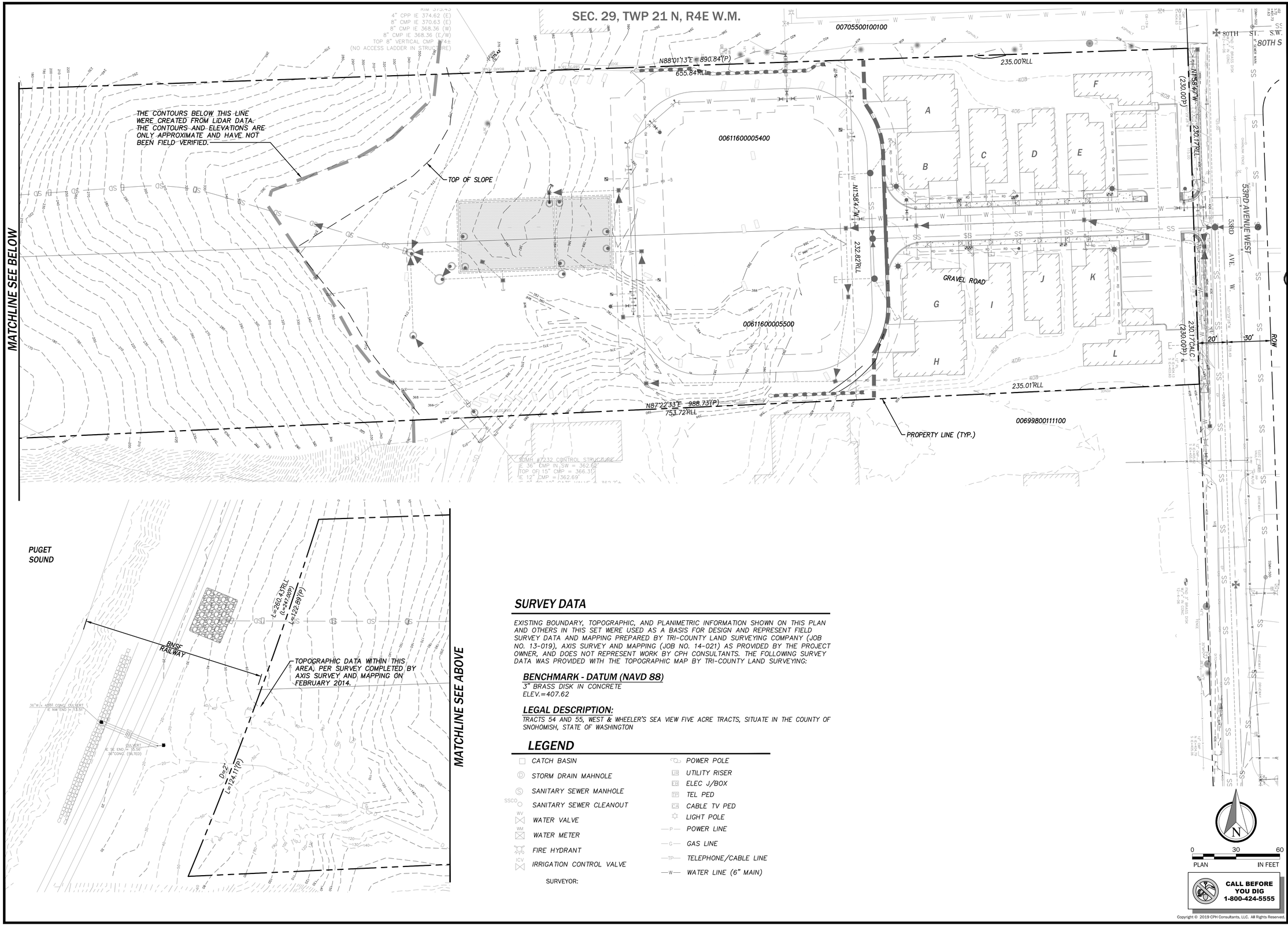

SURVEY DATA

EXISTING BOUNDARY, TOPOGRAPHIC, AND PLANIMETRIC INFORMATION SHOWN ON THIS PLAN AND OTHERS IN THIS SET WERE USED AS A BASIS FOR DESIGN AND REPRESENT FIELD SURVEY DATA AND MAPPING PREPARED BY TRI-COUNTY LAND SURVEYING COMPANY (JOB NO. 13-019), AXIS SURVEY AND MAPPING (JOB NO. 14-021) AS PROVIDED BY THE PROJECT OWNER, AND DOES NOT REPRESENT WORK BY CPH CONSULTANTS. THE FOLLOWING SURVEY DATA WAS PROVIDED WITH THE TOPOGRAPHIC MAP BY TRI-COUNTY LAND SURVEYING:

BENCHMARK - DATUM (NAVD 88)

3" BRASS DISK IN CONCRETE
ELEV.=407.62

LEGAL DESCRIPTION:

TRACTS 54 AND 55, WEST & WHEELER'S SEA VIEW FIVE ACRE TRACTS, SITUATE IN THE COUNTY OF SNOHOMISH, STATE OF WASHINGTON

LEGEND

- CATCH BASIN
- STORM DRAIN MAHNOLE
- SANITARY SEWER MANHOLE
- SANITARY SEWER CLEANOUT
- WATER VALVE
- WATER METER
- FIRE HYDRANT
- IRRIGATION CONTROL VALVE
- POWER POLE
- UTILITY RISER
- ELEC J/BOX
- TEL PED
- CABLE TV PED
- LIGHT POLE
- POWER LINE
- GAS LINE
- TELEPHONE/CABLE LINE
- WATER LINE (6" MAIN)

SURVEYOR:

N

0 30 60
PLAN IN FEET

CALL BEFORE YOU DIG 1-800-424-5555

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1	1/9/19	CITY PERMIT RESUBMITTAL FOR MODIFICATION	PCE	JBS

AMIE B SCHROEDER
STATE OF WASHINGTON
37610
REGISTERED PROFESSIONAL ENGINEER
1-9-19

SARATOGA HEIGHTS - PHASE 2/3

ROADWAY, GRADING AND DRAINAGE IMPROVEMENTS

EXISTING CONDITIONS

SNOHOMISH COUNTY

MUKILTEO

CLIENT

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PROJECT NO.
0079-13-005

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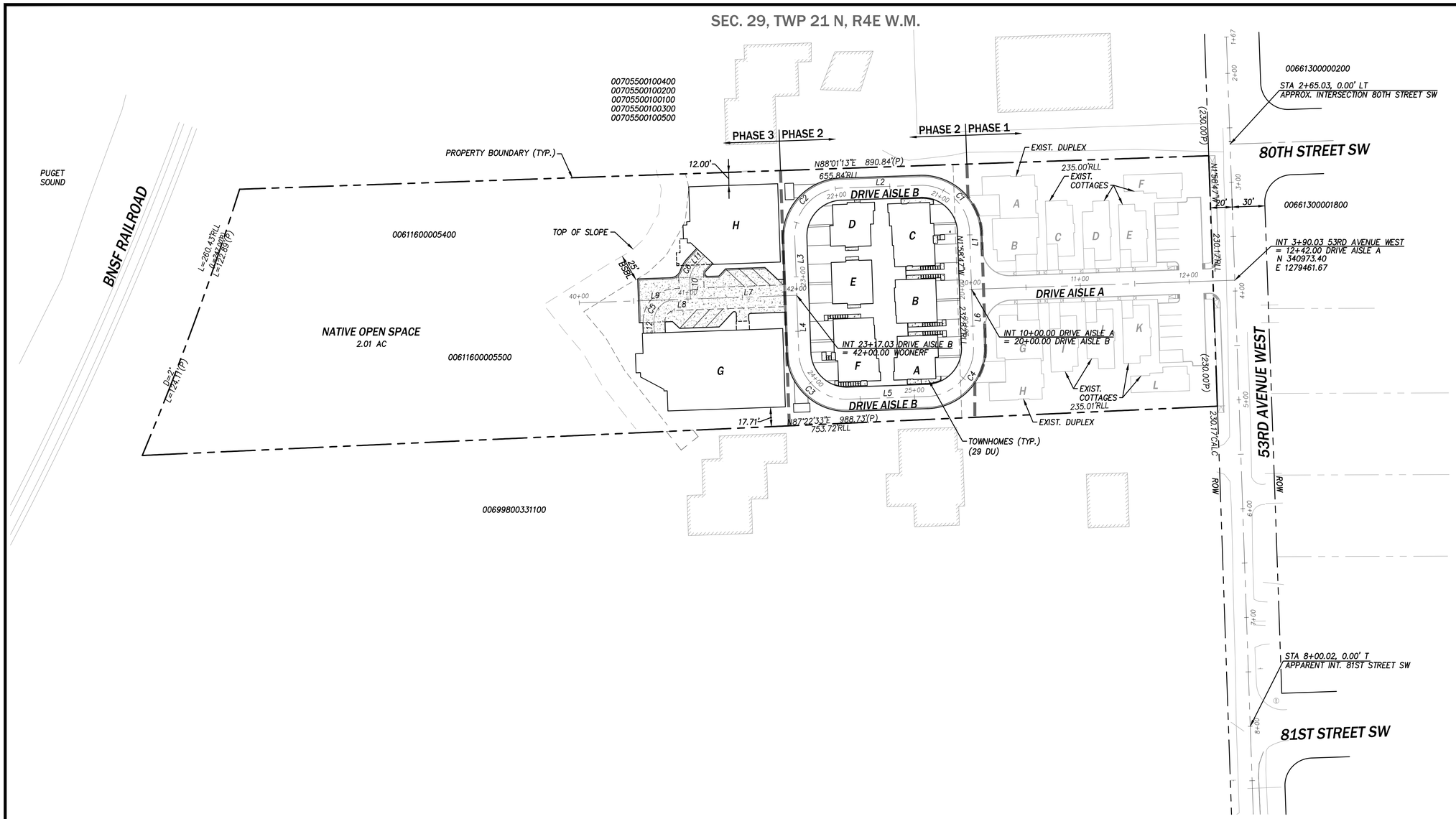
SHEET 4 OF 26



LINE TABLE			CURVE TABLE			
LINE #	DIRECTION	LENGTH	CURVE #	Δ	RADIUS	LENGTH
L1	N1°58'56"W	53.07'	C1	N46°58'56"W	44.00'	69.11'
L2	S88°01'05"W	72.67'	C2	S43°01'03"W	44.00'	69.12'
L3	S1°59'00"E	31.73'	C3	S46°58'56"E	44.00'	69.12'
L4	S1°58'56"E	31.63'	C4	N43°01'04"E	44.00'	69.12'
L5	N88°01'04"E	72.67'	C5	N43°01'04"E	20.00'	31.42'
L6	N1°58'56"W	44.87'	C6	N20°31'04"E	20.00'	15.71'
L7	N88°01'04"E	97.78'				
L8	N88°01'04"E	14.22'				
L9	N88°01'04"E	33.37'				
L10	N1°58'56"W	16.23'				
L11	N43°01'04"E	12.30'				
L12	N1°58'56"W	10.00'				

0 50 100
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STATE OF WASHINGTON
37610
REGISTERED PROFESSIONAL ENGINEER
1-9-19

SARATOGA HEIGHTS - PHASE 2/3

ROADWAY, GRADING AND DRAINAGE IMPROVEMENTS

HORIZONTAL CONTROL PLAN

SNOHOMISH COUNTY

MUKILTEO

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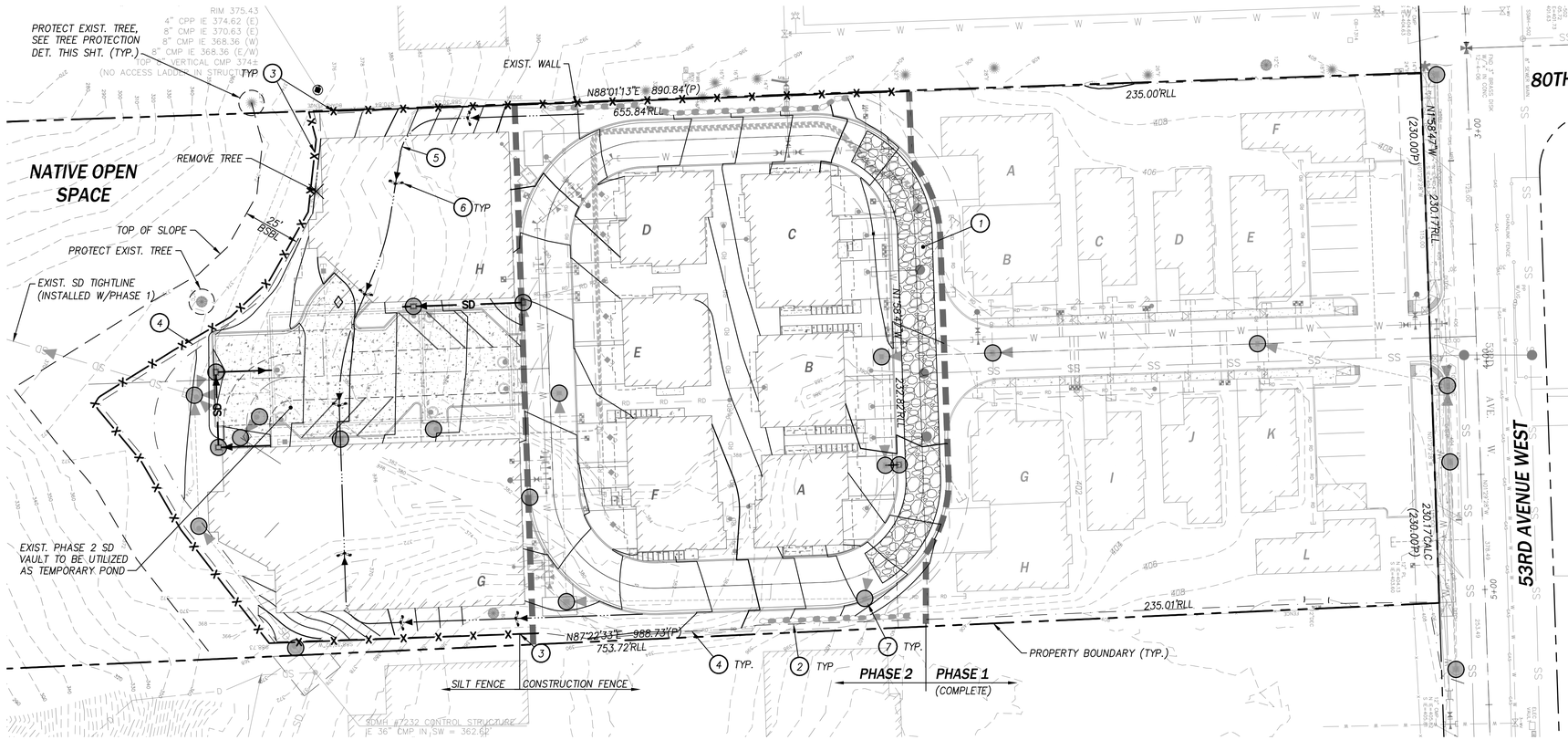
SHEET 5 OF 26

SEC. 29, TWP 21 N, R4E W.M.



CONSTRUCTION NOTES

1. STABILIZED CONSTRUCTION ENTRANCE PER COM STD. PLAN EC-006
2. CONSTRUCTION FENCE PER DETAIL ON SHT. C1.101
3. SILT FENCE PER COM STD. PLAN EC-001
4. APPROX. LIMIT OF GRADING, SEE TYPICAL CLEARING LIMITS DETAIL ON SHT. C1.101
5. TEMP. INTERCEPTOR DITCH PER COM STD. PLAN EC-002
6. ROCK CHECK DAM PER COM STD. PLAN EC-005
7. CATCH BASIN INLET PROTECTION PER COM STD. PLAN EC-007
8. PERMANENT STORM DRAINAGE IMPROVEMENTS UTILIZED WITH TESC MEASURES, SEE SHEET C3.02 FOR DETAILS.

LEGEND

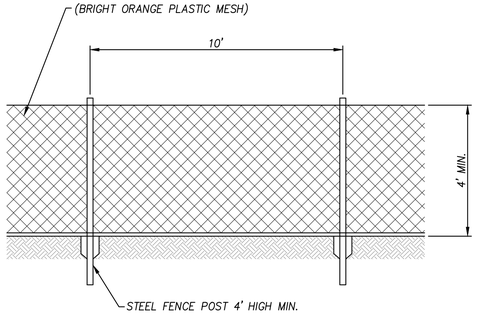
- TYP. SILT FENCE
- CONSTRUCTION FENCE
- EXISTING TOPOGRAPHIC CONTOUR
- PROPOSED GRADING CONTOUR
- TEMPORARY INTERCEPTOR DITCH WITH ROCK CHECK DAM, SEE NOTE 1
- SD — PERMANENT SD PIPE
- CATCH BASIN INLET PROTECTION
- PROTECT EXIST. TREE W/ TREE PROTECTION
- REMOVE EXIST. TREE

GENERAL SEQUENCE OF CONSTRUCTION

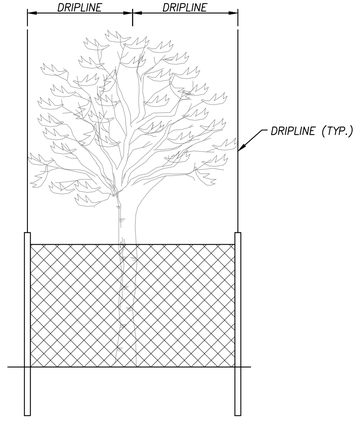
THE FOLLOWING GENERAL SEQUENCE OF CONSTRUCTION IS PROVIDED FOR GUIDANCE AND TO SUGGEST/IDENTIFY A 'PERMIT CONDITIONS OF APPROVAL, AND SEQUENCING OF WORK THAT PROVIDES FOR EFFICIENT CONSTRUCTION EFFORTS/ACTIVITIES WHICH INCLUDE:

1. INSTALL STABILIZED CONSTRUCTION ENTRANCE
2. INSTALL PERIMETER BMP ESC MEASURES
3. INSTALL TREE PROTECTION FENCING PER PLANS
4. INSTALL TIGHTLINE AND ENERGY DISSIPATER (COMPLETED W/PHASE 1)
5. INSTALL PLUGS AND UTILIZE PHASE 2 SD VAULT AS TEMP. SEDIMENT POND.
6. INSTALL REMAINING BMP ESC MEASURES
7. CONSTRUCT PHASE 2

NOTES:
1. ALL EXISTING BUILDINGS AND STRUCTURES TO BE REMOVED BY THE CONTRACTOR.
2. ALL EXISTING WELLS AND SEPTIC SYSTEMS SHALL BE DECOMMISSIONED IN ACCORDANCE TO WDOE REGULATIONS.
3. TEMPORARY CULVERTS, INTERCEPTOR DITCHES, AND CHECK DAMS ARE SHOWN APPROXIMATE. ACTUAL EXTENTS AND LOCATIONS MAY VARY TO FACILITATE SITE CONDITIONS AND CONSTRUCTION ACTIVITIES.
4. ALL PERMANENT STORM DRAIN FACILITIES ACTIVE DURING CONSTRUCTION SHALL BE CLEANED AND/OR REPAIRED TO GOOD WORKING CONDITION PRIOR TO FINAL PROJECT CLOSEOUT.
5. EXISTING UTILITIES SHALL BE PROTECTED DURING CONSTRUCTION. CONTRACTOR SHALL NOTIFY OWNER/ENGINEER OF ANY CONFLICTS WITH PROPOSED IMPROVEMENTS AND/OR CONSTRUCTION.



NOTE:
1. WIRE FENCE TO STEEL FENCE POST
2. PLACE BRIGHT ORANGE PLASTIC MESH FENCE AT THE DRIPLINE AROUND TREE TO BE RETAINED. (TYPICAL)



TREE PROTECTION MEASURES

THE FOLLOWING GUIDELINES ARE RECOMMENDED TO ENSURE THAT THE DESIGNATED SPACE SET ASIDE FOR THE PRESERVED TREES AND/OR NEIGHBORING TREES/SHRUBS ARE PROTECTED AND CONSTRUCTION IMPACTS ARE KEPT TO A MINIMUM.

1. TREE PROTECTION FENCING SHOULD BE ERECTED PER THE TREE PROTECTION FENCE DETAIL PRIOR TO MOVING ANY HEAVY EQUIPMENT ON SITE. DOING THIS WILL SET CLEARING LIMITS AND AVOID COMPACTION OF SOILS WITHIN ROOT ZONES OF RETAINED TREES.
2. EXCAVATION LIMITS SHOULD BE LAID OUT IN PAINT ON THE GROUND TO AVOID OVER EXCAVATING.
3. EXCAVATIONS WITHIN THE DRIP-LINES SHALL BE MONITORED BY A QUALIFIED TREE PROFESSIONAL SO NECESSARY PRECAUTIONS CAN BE TAKEN TO DECREASE IMPACTS TO TREE PARTS. A QUALIFIED TREE PROFESSIONAL SHALL MONITOR EXCAVATIONS WHEN WORK IS REQUIRED AND ALLOWED WITHIN THE "LIMITS OF DISTURBANCE".
4. TO ESTABLISH SUB GRADE FOR FOUNDATIONS, CURBS AND PAVEMENT SECTIONS NEAR THE TREES, SOIL SHOULD BE REMOVED PARALLEL TO THE ROOTS AND NOT AT 90 DEGREE ANGLES TO AVOID BREAKING AND TEARING ROOTS THAT LEAD BACK TO THE TRUNK WITHIN THE DRIP-LINE. ANY ROOTS DAMAGED DURING THESE EXCAVATIONS SHOULD BE EXPOSED TO SOUND TISSUE AND CUT CLEANLY WITH A SAW. CUTTING TOOLS SHOULD BE STERILIZED WITH ALCOHOL.
5. AREAS EXCAVATED WITHIN THE DRIP-LINE OF RETAINED TREES SHOULD BE THOROUGHLY IRRIGATED WEEKLY DURING DRY PERIODS.
6. PREPARATIONS FOR FINAL LANDSCAPING SHALL BE ACCOMPLISHED BY HAND WITHIN THE DRIP-LINES OF RETAINED TREES. LARGE EQUIPMENT SHALL BE KEPT OUTSIDE OF THE TREE PROTECTION ZONES.
7. ON HEAVILY INFESTED TREES WITH IVY VINES THICKER THAN AN INCH, CAREFULLY SAW THROUGH THE VINE AND EASE IT AWAY FROM THE BARK. TO PROTECT THE TREE FROM FUTURE INFESTATION, PULL ALL IVY VINES OUT OF THE GROUND AROUND THE BASE OF THE TREE. ONCE CUT, LEAVE IVY ON THE TREE. PULLING THE IVY OFF COULD HARM THE TREE.

TREE PROTECTION FENCE DETAIL

NOT TO SCALE

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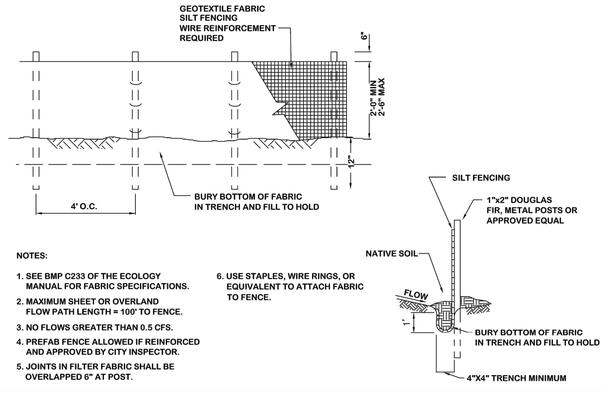
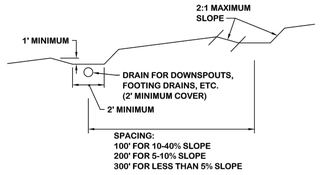


NOTES:

1. SEE BMP C233 OF THE ECOLOGY MANUAL FOR FABRIC SPECIFICATIONS.
2. MAXIMUM SHEET OR OVERLAND FLOW PATH LENGTH = 100' TO FENCE.
3. NO FLOWS GREATER THAN 0.5 CFS.
4. PREFAB FENCE ALLOWED IF REINFORCED AND APPROVED BY CITY INSPECTOR.
5. JOINTS IN FILTER FABRIC SHALL BE OVERLAPPED 6" AT POST.
6. USE STAPLES, WIRE RINGS, OR EQUIVALENT TO ATTACH FABRIC TO FENCE.

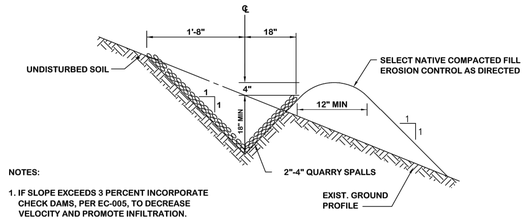
CITY OF MUKILTEO	REVISION DATE	APPROVED FOR PUBLICATION	SILT FENCE DETAIL
	11/18/2016 DATE	11/22/2016 CITY ENGINEER DATE	STANDARD PLAN NO. EC-001



MAINTENANCE STANDARDS:

1. DAMAGE RESULTING FROM RUNOFF OR CONSTRUCTION ACTIVITY SHALL BE REPAIRED IMMEDIATELY
2. IF THE FACILITIES DO NOT REGULARLY RETAIN STORM RUNOFF, THE CAPACITY AND/OR FREQUENCY OF THE DIKES/ SWALES SHALL BE INCREASED
3. MAINTENANCE TO BE PERFORMED BY PROPERTY OWNER
4. INSPECT DIVERSION DIKES AND INTERCEPTOR SWALES ONCE A WEEK AFTER EVERY RAINFALL.

CITY OF MUKILTEO	REVISION DATE	APPROVED FOR PUBLICATION	INTERCEPTOR SWALE DETAIL
	11/18/2016 DATE	11/22/2016 CITY ENGINEER DATE	STANDARD PLAN NO. EC-002

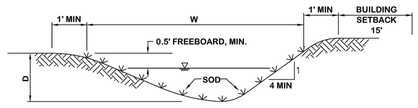


NOTES:

1. IF SLOPE EXCEEDS 3 PERCENT INCORPORATE CHECK DAMS, PER EC-005, TO DECREASE VELOCITY AND PROMOTE INFILTRATION.
2. FOR HIGHER VELOCITIES (3-10 FPS) USE LARGER ROCK.
3. SWALE SHOULD HAVE SUFFICIENT CAPACITY TO CONVEY A 10-YEAR STORM AND RESIST EROSION DURING PEAK FLOW.

CITY OF MUKILTEO	REVISION DATE	APPROVED FOR PUBLICATION	ROCK LINED DRAINAGE SWALE
	11/18/2016 DATE	11/22/2016 CITY ENGINEER DATE	STANDARD PLAN NO. EC-003

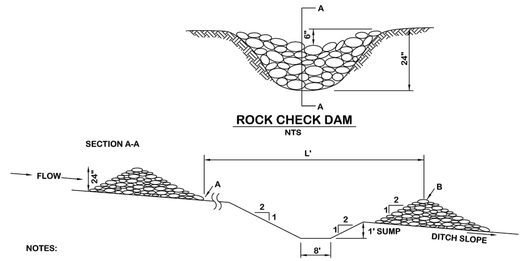
FOR USE WHEN CHANNEL SLOPES LESS THAN 5%



NOTE:

1. SOD SHALL BE STAPLED IN PLACE.
2. ROUND ALL CORNERS FOR EASE OF MOWING
3. IF DESIGN VELOCITY TO BE VEGETATED BY SEEDING EXCEEDS 2 FPS, A A TEMPORARY CHANNEL LINER IS REQUIRED.
4. LOCATE ALL SEDIMENT TRAPS FOR EASE OF MAINTENANCE.
5. DURING CONSTRUCTION AND MAINTENANCE PERIOD REMOVE SEDIMENT WHEN A MAXIMUM OF 6 INCHES IS DEPOSITED AT ANY POINT.
6. MATRIX-TYPE SOIL REINFORCEMENT MAY BE SUBSTITUTED ON PRIOR WRITTEN APPROVAL OF THE CITY ENGINEER.

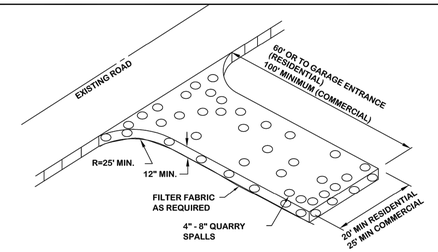
CITY OF MUKILTEO	REVISION DATE	APPROVED FOR PUBLICATION	GRASS LINED SWALE
	11/18/2016 DATE	11/22/2016 CITY ENGINEER DATE	STANDARD PLAN NO. EC-004



NOTES:

1. THE DISTANCE SUCH THAT POINTS 'A' AND 'B' ARE OF EQUAL ELEVATION.
2. CONSTRUCT ROCK DAMS FROM ROCK LARGE ENOUGH TO STAY IN PLACE GIVEN EXPECTED FLOW. PLACE ROCK BY HAND OR MECHANICAL MEANS.

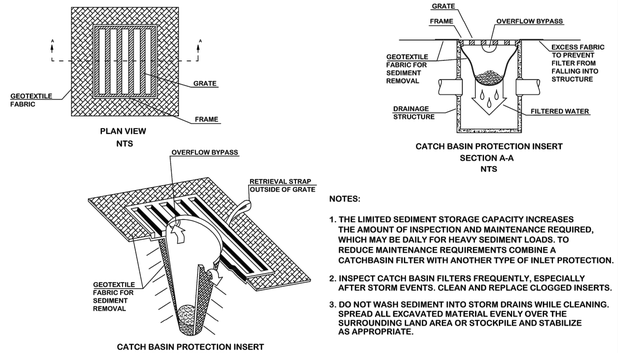
CITY OF MUKILTEO	REVISION DATE	APPROVED FOR PUBLICATION	ROCK CHECK DAMS
	11/18/2016 DATE	11/22/2016 CITY ENGINEER DATE	STANDARD PLAN NO. EC-005



NOTES:

1. THE TEMPORARY CONSTRUCTION ENTRANCE SHALL BE CLEARED OF ALL VEGETATION, ROOTS, AND OTHER OBJECTIONABLE MATERIAL. ANY DRAINAGE FACILITIES REQUIRED BECAUSE OF WASHING SHOULD BE CONSTRUCTED ACCORDING TO SPECIFICATIONS IN THE PLAN. IF WASH RACKS ARE USED, THEY SHOULD BE INSTALLED ACCORDING TO MANUFACTURER'S SPECIFICATIONS.
2. GRAVEL SHALL BE CRUSHED BALLAST ROCK, 4" TO 8" IN DIAMETER; INSTALLED 8" TO 12" IN DEPTH ACROSS THE FULL WIDTH OF THE VEHICULAR INGRESS AND EGRESS AREA. THE LENGTH OF ENTRANCE SHALL BE A MINIMUM OF 100 FEET FOR COMMERCIAL SITES; AND 60 FEET FOR RESIDENTIAL SITES. CRUSHED CONCRETE IS NOT ALLOWED AS BALLAST.
3. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOW OF MUD ONTO PUBLIC RIGHTS-OF-WAY AND ANY STORM DRAINAGE FACILITIES. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH 2" STONE, AS CONDITIONS DEMAND, AND REPAIR AND/OR CLEAN OUT ANY STRUCTURES USED TO TRAP SEDIMENT. ALL MATERIALS SPILLED, DROPPED, WASHED OR TRACKED FROM VEHICLES ONTO ROADWAY OR INTO STORM DRAINS MUST BE REMOVED IMMEDIATELY.
4. ANY SEDIMENT THAT IS TRACKED ONTO PAVEMENT SHALL BE REMOVED BY SHOVELING OR STREET SWEEPING. THE SEDIMENT COLLECTED BY SWEEPING SHALL BE REMOVED OR STABILIZED ON SITE. THE PAVEMENT SHALL NOT BE CLEANED BY WASHING DOWN THE STREET, EXCEPT WHEN HIGH EFFICIENCY SWEEPING IS INEFFECTIVE AND THERE IS A THREAT TO PUBLIC SAFETY. IF IT IS NECESSARY TO WASH THE STREETS, THE CONSTRUCTION OF A SMALL SUMP TO CONTAIN THE WASH WATER SHALL BE CONSIDERED. THE SEDIMENT WOULD THEN BE WASHED INTO THE SUMP WHERE IT CAN BE CONTROLLED.
5. PERFORM STREET SWEEPING BY HAND OR WITH A HIGH EFFICIENCY SWEEPER. DO NOT USE A NON-HIGH EFFICIENCY MECHANICAL SWEEPER BECAUSE THIS CREATES DUST AND THROWS SOILS INTO STORM SYSTEMS OR CONVEYANCE DITCHES.

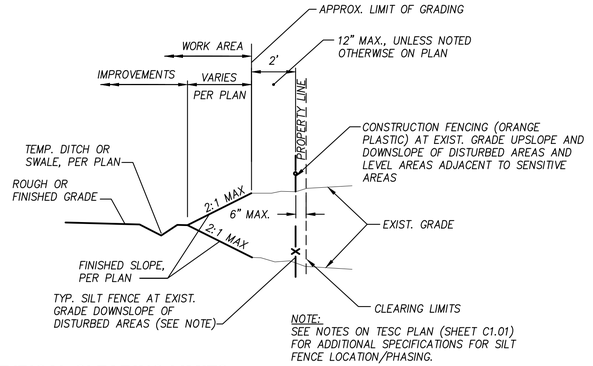
CITY OF MUKILTEO	REVISION DATE	APPROVED FOR PUBLICATION	CONSTRUCTION ENTRANCE
	11/18/2016 DATE	11/22/2016 CITY ENGINEER DATE	STANDARD PLAN NO. EC-006



NOTES:

1. THE LIMITED SEDIMENT STORAGE CAPACITY INCREASES THE AMOUNT OF INSPECTION AND MAINTENANCE REQUIRED, WHICH MAY BE DAILY FOR HEAVY SEDIMENT LOADS. TO REDUCE MAINTENANCE REQUIREMENTS COMBINE A CATCHBASIN FILTER WITH ANOTHER TYPE OF INLET PROTECTION.
2. INSPECT CATCH BASIN FILTERS FREQUENTLY, ESPECIALLY AFTER STORM EVENTS. CLEAN AND REPLACE CLOGGED INSERTS.
3. DO NOT WASH SEDIMENT INTO STORM DRAINS WHILE CLEANING. SPREAD ALL EXCAVATED MATERIAL EVENLY OVER THE SURROUNDING LAND AREA OR STOCKPILE AND STABILIZE AS APPROPRIATE.

CITY OF MUKILTEO	REVISION DATE	APPROVED FOR PUBLICATION	CATCH BASIN PROTECTION INSERT
	11/18/2016 DATE	11/22/2016 CITY ENGINEER DATE	STANDARD PLAN NO. EC-007



TYPICAL CLEARING LIMITS

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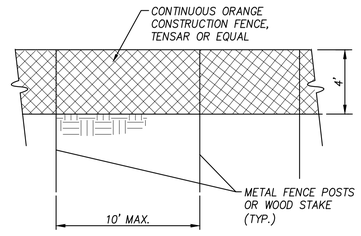

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SARATOGA HEIGHTS - PHASE 2/3

ROADWAY, GRADING AND DRAINAGE IMPROVEMENTS

TEMPORARY EROSION AND SEDIMENT CONTROL DETAILS

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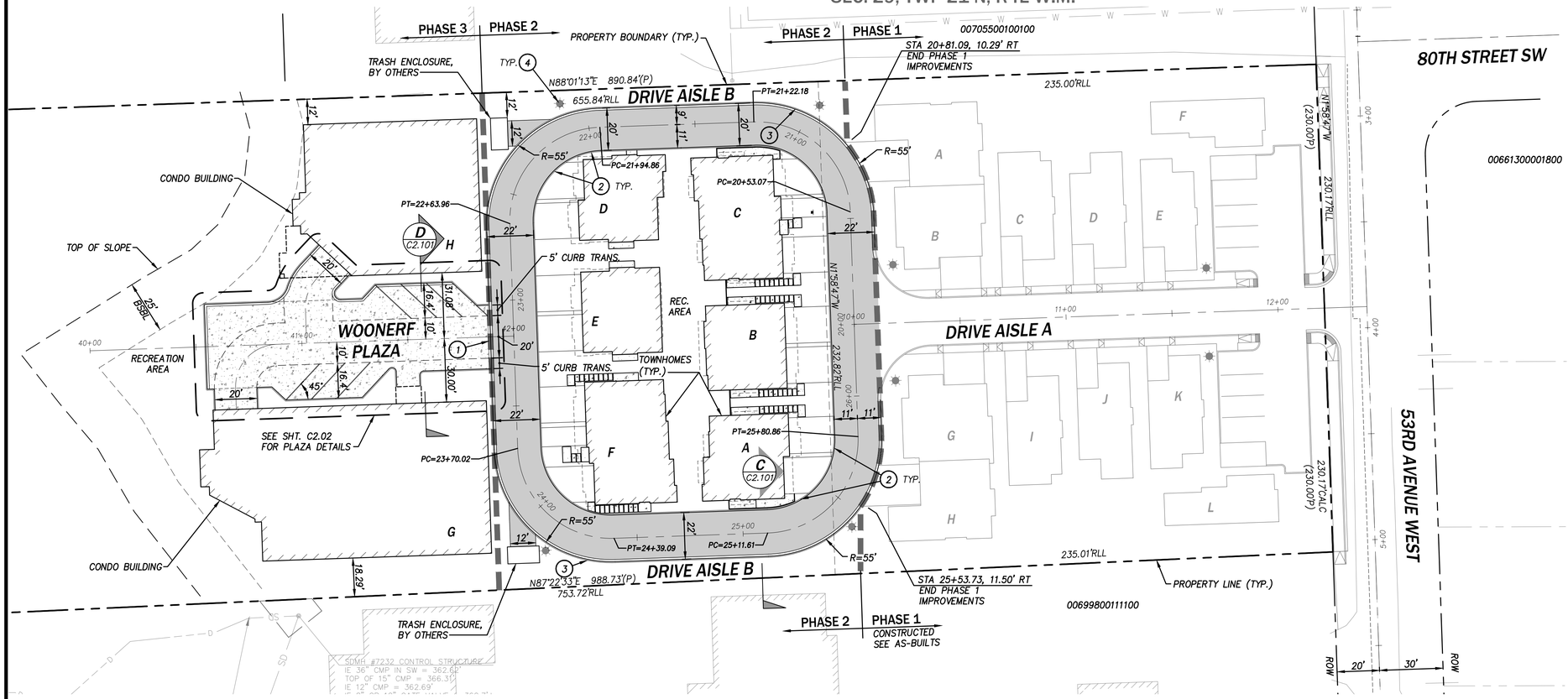

CONSTRUCTION NOTES

1. CEMENT CONCRETE ROLLED CURB AND GUTTER PER DETAIL ON SHEET C2.102; APPROX. LENGTH PER PLAN.
2. CEMENT CONCRETE BARRIER CURB PER DETAIL ON SHEET C2.102; APPROX. LENGTH PER PLAN, SEE NOTE 5 THIS SHT.
3. CEMENT CONCRETE VERTICAL CURB AND GUTTER PER COM STD. PLANS; APPROX. LENGTH PER PLAN
4. LUMINAIRES, SEE DETAILS ON SHEET C2.102 AND NOTE 4 THIS SHT.

LEGEND

- PROPOSED BUILDING
- SIDEWALK
- STANDARD AC PAVEMENT (PER DETAIL ON C2.101)
- LUMINAIRE

NOTES:
1. SEE ARCHITECTURAL PLANS W/BUILDING PERMIT FOR ADDITIONAL SITE LAYOUT INFORMATION.
2. ALL DIMENSIONS ARE TO FRONT FACE OF CURB UNLESS NOTED OTHERWISE.
3. ALL UTILITY TRENCHES CONSTRUCTED IN THE PUBLIC RIGHT OF WAY SHALL BE CONSTRUCTED IN ACCORDANCE WITH STD DWG, UTILITY TRENCH RESTORATION AND BACKFILL AND STD DWG, GENERAL RIGHT-OF-WAY RESTORATION REQUIREMENTS.
4. LUMINAIRES LOCATED ADJACENT TO NEIGHBORING PROPERTIES SHALL PROVIDE SHIELDING TO BLOCK LIGHT SPILLAGE ONTO ADJACENT PROPERTIES.
5. PROVIDE VERTICAL BARRIER DROP CURB AT ALL DRIVEWAY LOCATIONS.

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ROADWAY, GRADING AND DRAINAGE IMPROVEMENTS

SITE LAYOUT

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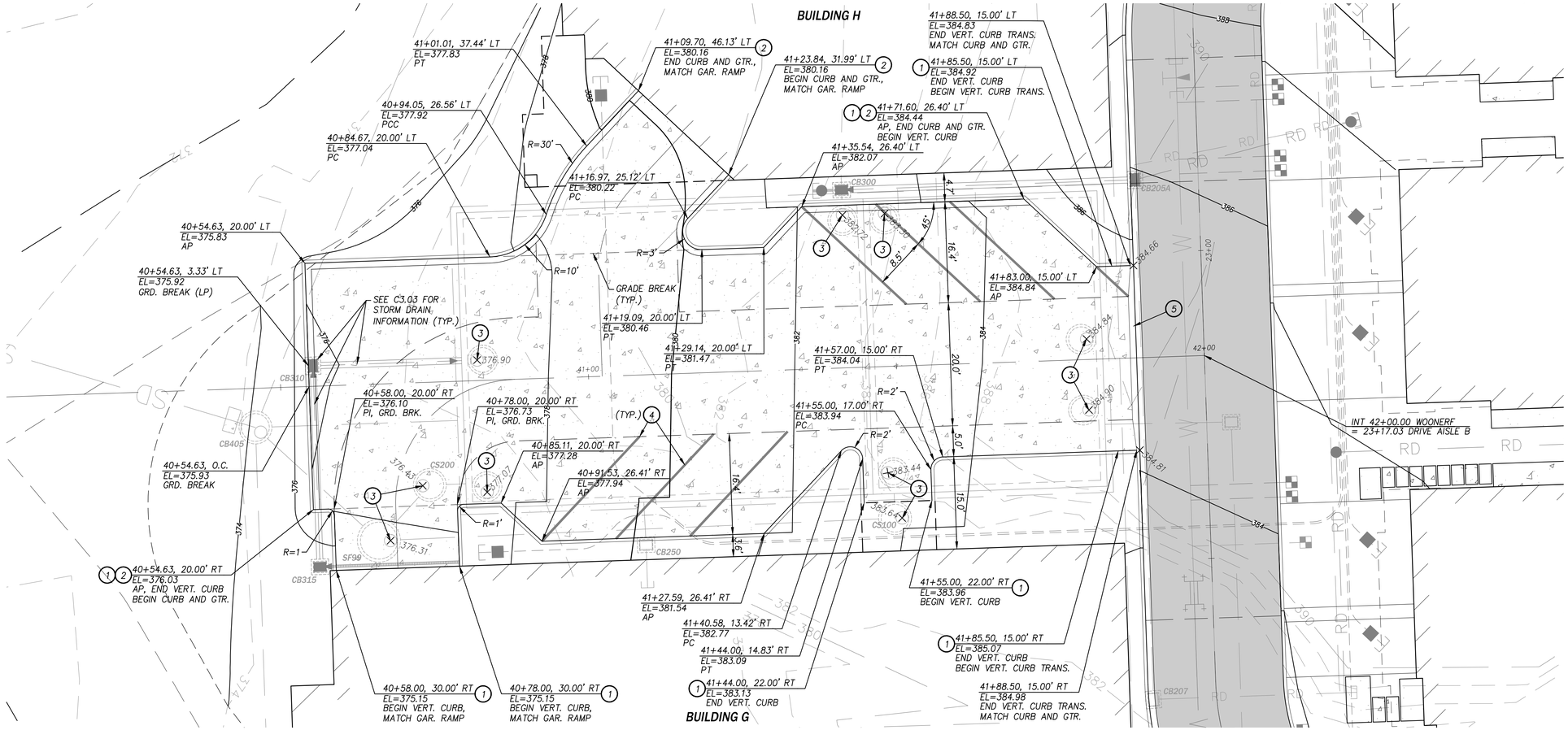

CONSTRUCTION NOTES

1. CEMENT CONCRETE BARRIER CURB PER DETAIL ON SHEET C2.102; APPROX. LENGTH PER PLAN
2. CEMENT CONCRETE VERTICAL CURB AND GUTTER PER COM STD. PLANS; APPROX. LENGTH PER PLAN
3. ADJUST EXIST. SD STRUCTURE TO FINISHED GRADE; APPROX. ELEVATION PER PLAN.
4. 4" WHITE PAINT PARKING STALL MARKING
5. CEMENT CONCRETE ROLLED CURB AND GUTTER PER DETAIL ON SHEET C2.102; SEE SHT. C2.01.

LEGEND

CEMENT CONC. PAVEMENT; JOINTING, COLOR AND TEXTURE BY OTHERS

CEMENT CONC. PAVEMENT; JOINTING, COLOR AND TEXTURE BY OTHERS

NOTES:
1. SEE ARCHITECTURAL PLANS W/BUILDING PERMIT FOR ADDITIONAL SITE LAYOUT INFORMATION.
2. SEE LANDSCAPE PLANS FOR ADDITION PLAZA DETAILS.
3. ALL DIMENSIONS ARE TO FRONT FACE OF CURB UNLESS NOTED OTHERWISE.
4. ALL CURB ELEVATION CALLOUTS ARE TO THE FLOW LINE ELEVATION UNLESS NOTED OTHERWISE.

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0 10 20
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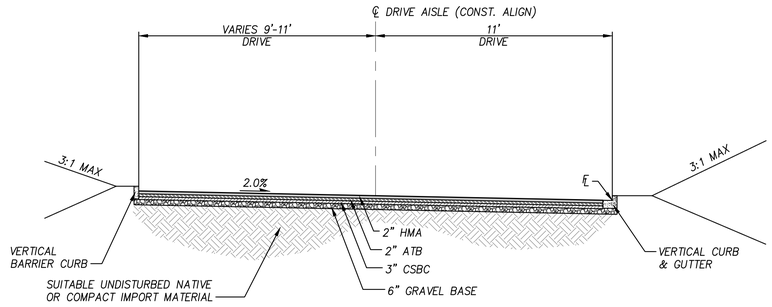
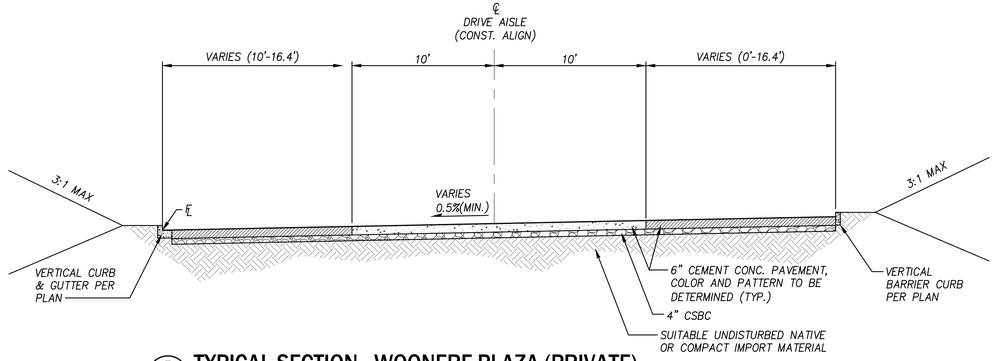


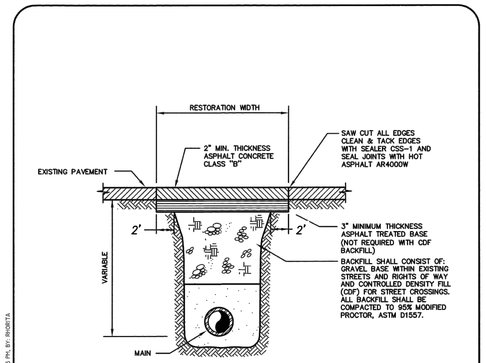
C — **TYPICAL SECTION - DRIVE AISLE B (PRIVATE)**

NOT TO SCALE



D — **TYPICAL SECTION - WOONERF PLAZA (PRIVATE)**

NOT TO SCALE



NOTES:

1. ALL ASPHALT STREETS AND DRIVEWAYS SHALL BE TEMPORARILY REPAIRED WITH COLD MIX, EXCEPT CROSSINGS WITH CDF SHALL BE COVERED WITH STEEL PLATES UNTIL THE CDF HAS CURRED TO ALLOW FOR PLACEMENT OF THE ASPHALT.
2. PATCH SHALL BE MACHINE ROLLED FLUSH WITH EXISTING PAVEMENT AND SHALL BE PLACED PER SEC. 5-04 OF THE WA. STATE D.O.T. SPECIFICATIONS.

ASPHALT PAVEMENT REPAIR

Mukilteo Water and Wastewater District
STANDARD DETAILS

8/09 **W-D23**

H:\PROJECTS\0079\CAD\PLANSET\Mukilteo Standard Details 15-09\W-D23.DWG, Layout1, 8/13/2009 3:51:40 PM, BY: RHORITA

NO.	DATE	REVISION	BY	CK.
1	1/9/19	CITY PERMIT RE-SUBMITTAL FOR MODIFICATION	PCE	JBS

AMIE B SCHROEDER — STATE OF WASHINGTON — 37610 — REGISTERED PROFESSIONAL ENGINEER — 1-9-19

SARATOGA HEIGHTS - PHASE 2/3

ROADWAY, GRADING AND DRAINAGE IMPROVEMENTS

TYPICAL DRIVE AISLE SECTIONS

SNOHOMISH COUNTY

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PROJECT NO.
0079-13-005

DRAWING
C2.101

SHEET 10 OF 26

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NOTE:

1. *LUMINAIRES LOCATED ADJACENT TO NEIGHBORING PROPERTIES SHALL PROVIDE SHIELDING TO BLOCK LIGHT SPILLAGE ONTO ADJACENT PROPERTIES.*

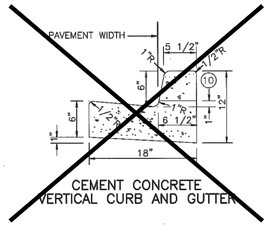
TYPICAL LUMINAIRE

NOT TO SCALE

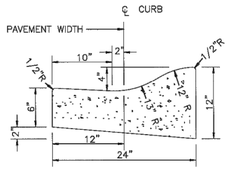
NOTES:

1. VERTICAL CURB WILL BE REQUIRED EXCEPT AS NOTED IN SECTION 4–04.
2. CONSTRUCTION OF CURB DETAILS SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION AS PUBLISHED BY THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION AND THE AMERICAN PUBLIC WORKS ASSOCIATION. (WSDOT/APWA SPECIFICATIONS) UNLESS OTHERWISE MODIFIED BELOW.
3. ALL CONCRETE SHALL BE COMMERCIAL CLASS PER WSDOT/APWA SPECIFICATIONS.
4. FORMS SHALL BE TRUE TO LINE AND GRADE AND SECURELY STAKED. STEEL FORMS ONLY SHALL BE USED ON TANGENT SECTIONS. WOOD FORMS MAY BE USED ON CURVED SECTIONS.
5. FULL DEPTH EXPANSION JOINTS CONSISTING OF 3/8 INCH MINIMUM PREMOLDED JOINT MATERIAL SHALL BE PLACED ADJACENT TO CATCH BASINS, INLETS AND AT POINTS OF TANGENCY ON STREETS AND DRIVEWAY RETURNS. MAXIMUM SPACING SHALL BE 20 FEET.
6. CONTRACTION JOINTS (DUMMY JOINTS) CONSISTING OF 3/8" MIN. X 2" OF PREMOLDED JOINT MATERIAL SHALL BE CONSTRUCTED AT INTERVALS OF 10 FEET.
7. ALL JOINTS SHALL BE CLEAN AND EDGED.
8. FINISH SHALL BE A LIGHT BROOM FINISH.
9. FINISHED CURBS AND GUTTERS SHALL BE SPRAYED WITH A CLEAR CURING COMPOUND.
10. TOP OF CURB AT ACCESS POINT APPROACH.
11. SUBGRADE COMPACTION FOR CURBS AND GUTTERS SHALL MEET A MINIMUM 95% OF MAXIMUM DENSITY IN ACCORDANCE WITH SEC. 2–03.3(14) OF THE WSDOT/APWA SPECIFICATIONS.

SEE TEXT SECTION 4–04

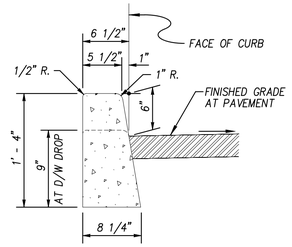


CEMENT CONCRETE
VERTICAL CURB AND GUTTER



CEMENT CONCRETE
ROLLED CURB AND GUTTER

SNOHOMISH COUNTY PUBLIC WORKS		APPROVED BY: Steven E. Thomas 10-1-04
4–140	CURB DETAILS	COUNTY ROAD ENGINEER DATE



CEMENT CONCRETE BARRIER CURB

NOT TO SCALE

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JAMES B. SCHRADER — STATE OF WASHINGTON — 37610 — REGISTERED PROFESSIONAL ENGINEER — 1-9-19

SARATOGA HEIGHTS - PHASE 2/3

ROADWAY, GRADING AND DRAINAGE IMPROVEMENTS

SITE DETAILS

SNOHOMISH COUNTY

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0079-13-005

DRAWING
C2.102

SHEET 11 OF 26

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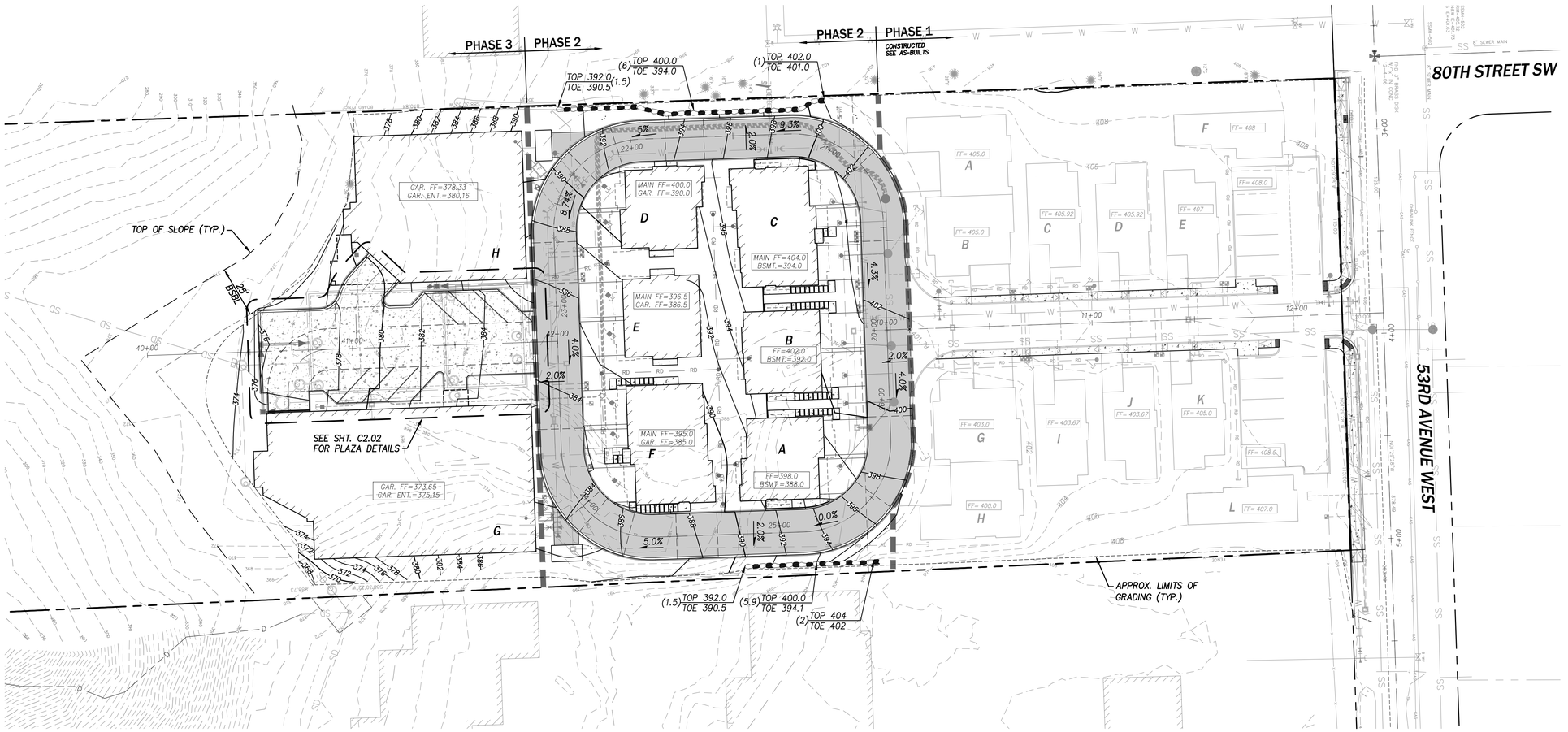

LEGEND

- GRADE BREAK
- APPROX. LIMITS OF CLEARING
- 100.00 — SPOT ELEVATION
- FF= 500.00 — FINISH FLOOR ELEV.
- CRIBLOCK RETAINING WALL SEE DETAIL ON C3.104
- 160 — EXIST. TOPOGRAPHIC CONTOUR
- 160 — PROPOSED GRADE CONTOUR
- TYPE 1 STORM DRAINAGE CATCH BASIN
- TYPE 2 STORM DRAINAGE CATCH BASIN
- SD — STORM DRAINAGE PIPE
- PROPOSED BLDG.
- TOP 246 TOE 242 (4) — FINISHED GRADE AT TOP/TOE OF WALL
- PROTECT EXIST. TREE(S)
- EXIST. TREE TO BE REMOVED
- STANDARD AC PAVEMENT (PER DETAIL ON C2.101)

APPROXIMATE EARTHWORK QUANTITIES

TOTAL PROJECT AREA:	4.95 AC
CLEARED AREA:	2.63 AC
CUT:	7,750 CY
FILL:	7,950 CY
NET (FILL):	200 CY

0 30 60
PLAN IN FEET

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AMIE B SCHNEIDER
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37610
REGISTERED PROFESSIONAL ENGINEER
1-9-19

SARATOGA HEIGHTS - PHASE 2/3

ROADWAY, GRADING AND DRAINAGE IMPROVEMENTS

GRADING PLAN

SNOHOMISH COUNTY

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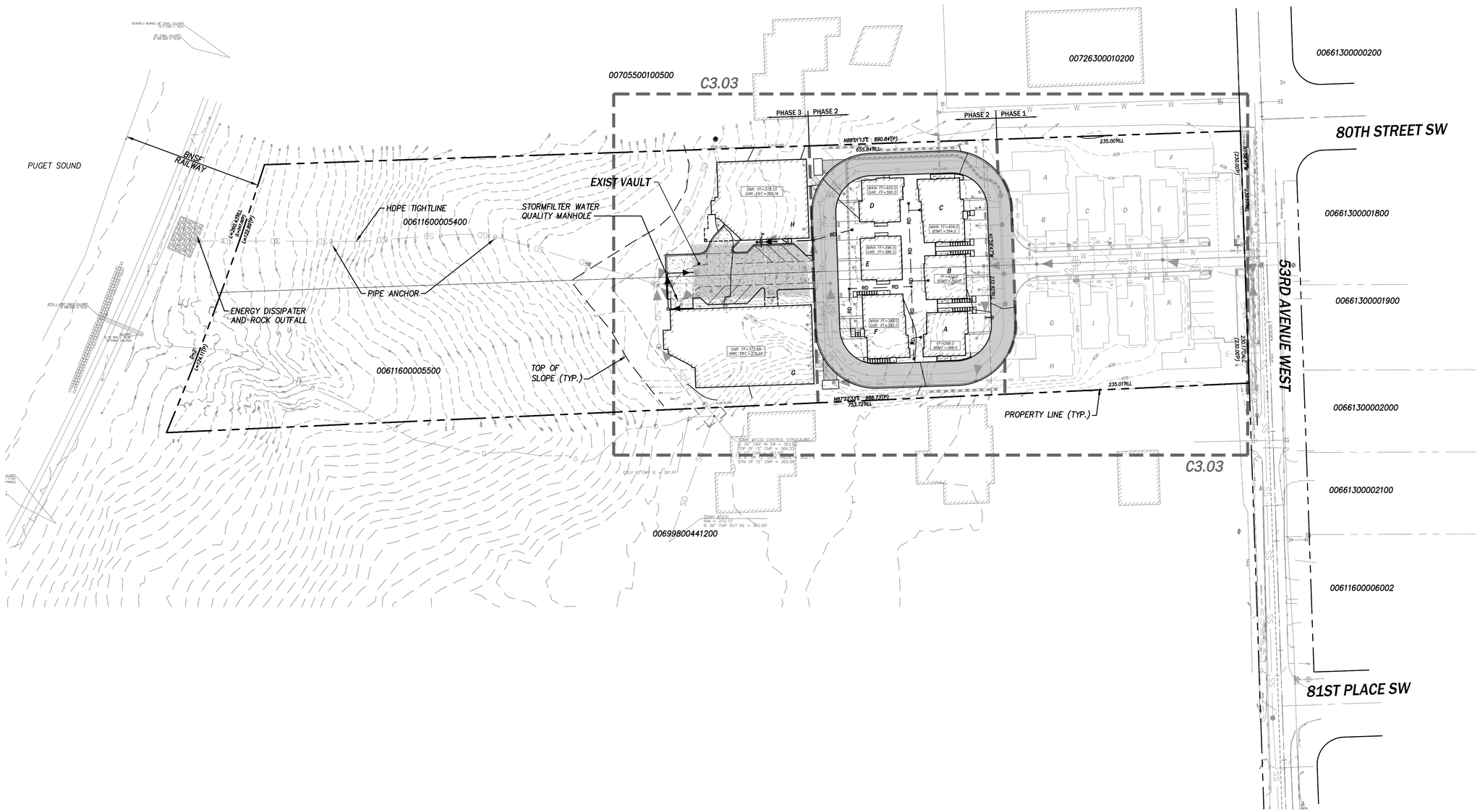
C3.01

SHEET 12 OF 26

SEC. 29, TWP 21 N, R4E W.M.



LEGEND

SD — EXIST. PHASE 1 CONSTRUCTION

PROPOSED PHASE 2/3 IMPROVEMENTS

0 50 100
PLAN IN FEET

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1	1/9/19	CITY PERMIT RE-SUBMITTAL FOR MODIFICATION	PCE	JBS

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STATE OF WASHINGTON
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1-9-19

SARATOGA HEIGHTS - PHASE 2/3

ROADWAY, GRADING AND DRAINAGE IMPROVEMENTS

OVERALL STORM DRAIN PLAN

SNOHOMISH COUNTY
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PROJECT NO.
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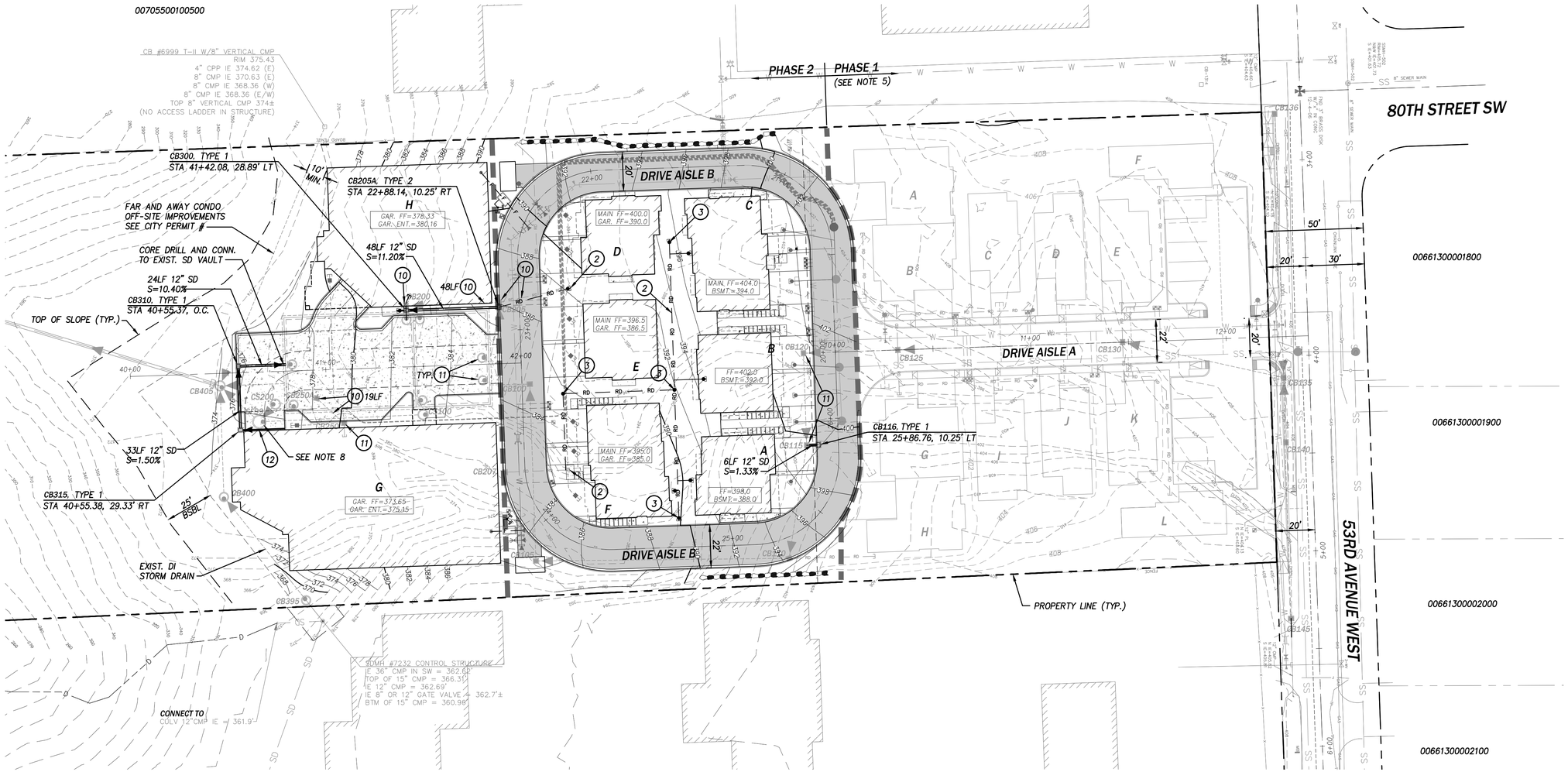
DRAWING
C3.02

SHEET 13 OF 26

SEC. 29, TWP 21 N, R4E W.M.



CONSTRUCTION NOTES

1. CONTECH STORM FILTER TREATMENT VAULT PER DET. ON C3.107
2. 6" PVC (UNO) FOR BLDG. DRAIN CONN., S=1.0% MIN.
3. STORM DRAIN CLEANOUT PER DETAIL ON SHEET C3.104
4. ROUND LOCKING MANHOLE RING AND COVER
5. PHASE 1 FLOW CONTROL VAULT PER WATER VAULT DET. ON SHT. C3.106
6. PHASE 2 FLOW CONTROL VAULT PER WATER VAULT DET. ON SHT. C3.106
7. CONTROL STRUCTURE, SEE DETAILS ON SHT. C3.107
8. ROCKERY DRAIN CONNECTION, SEE NOTE 7
9. 12" NYOPLAST DRAIN INLET W/ STANDARD TRAFFIC RATED GRATE.
10. REMOVE EXIST. SD IMPROVEMENTS INSTALLED W/PHASE 1
11. ADJUST EXIST. PHASE 1 SD STRUCTURE RIM TO PHASE 2 FG (SEE NOTE 9)
12. 20LF DURA SLOPE CHANNEL DRAIN

NOTES:

1. CATCH BASIN LOCATIONS SHOWN ON PLAN REPRESENT CENTER OF STRUCTURE PER STRUCTURE PLACEMENT DETAIL ON SHEET C3.104.
2. ALL STORM DRAINAGE (SD) CONVEYANCE PIPE LOCATED SHALL BE LINED CORRUGATED POLYETHYLENE (LCPE) AND ALL PUBLIC STORM DRAINAGE PIPES SHALL BE PLAIN OR REINFORCED CONCRETE UNLESS OTHERWISE NOTED IN THESE PLANS OR APPROVED BY THE ENGINEER.
3. All CATCH BASIN INLETS SHALL BE INSTALLED WITH STANDARD RECTANGULAR FRAMES WITH VANED GRATES UNLESS NOTED OTHERWISE.
4. STORM DRAINAGE PROFILES PROVIDED ON SHEET C3.04
5. PHASE 1 CONSTRUCTION INCLUDED INSTALLATION OF THE ENTIRE STORM DRAINAGE TRUNK LINE TO THE BOTTOM OF THE SLOPE.
6. ALL MATERIAL SHALL MEET COM DEVELOPMENT STANDARDS.
7. ALL ROCKERY, FOUNDATION AND PERIMETER DRAINS SHALL BE DISCHARGED TO AN APPROVED OUTFALL OR STORM DRAINAGE SYSTEM. THE SANITARY SEWER IS NOT AN APPROVED CONNECTION.
8. IF THE STORM FILTER SYSTEM IS IN PLACE DURING CONSTRUCTION, THE FILTERS SHALL BE REPLACED PRIOR TO FINAL APPROVAL.
9. ADD OR ADJUST LADDER RUNGS OF ALL ADJUSTED VAULT MAINTENANCE ACCESS POINTS (7 LOCATIONS) AND EXISTING CATCH BASINS PER COM STANDARD PLAN NO. SW-010. APPROPRIATE RISER SECTIONS SHALL BE PROVIDED FOR ADJUSTMENT TO FINAL FINISH GRADES.

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AMIE B SCHROEDER
STATE OF WASHINGTON
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PROFESSIONAL ENGINEER
1-9-19

SARATOGA HEIGHTS - PHASE 2/3

ROADWAY, GRADING AND DRAINAGE IMPROVEMENTS

SITE STORM DRAIN PLAN

SNOHOMISH COUNTY

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PROJECT NO.
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DRAWING
C3.03

SHEET 14 OF 26

N

0 30 60
PLAN IN FEET

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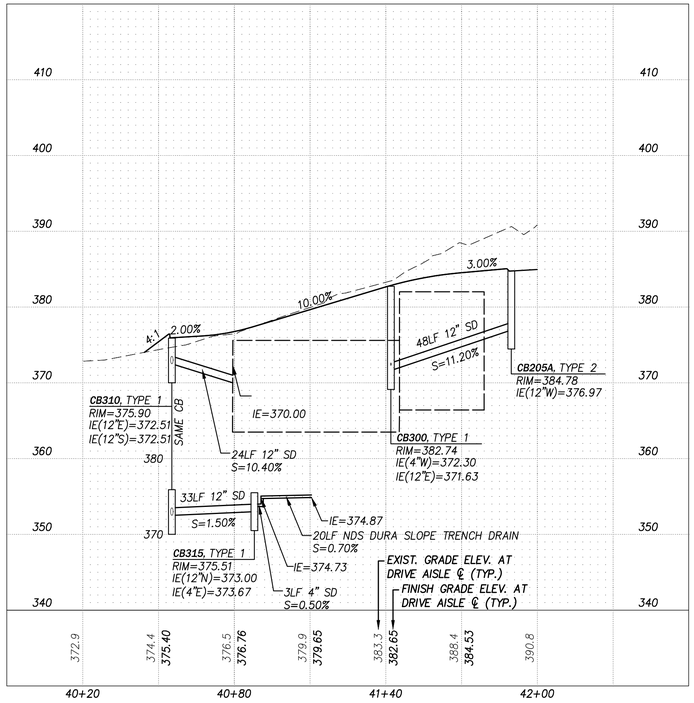
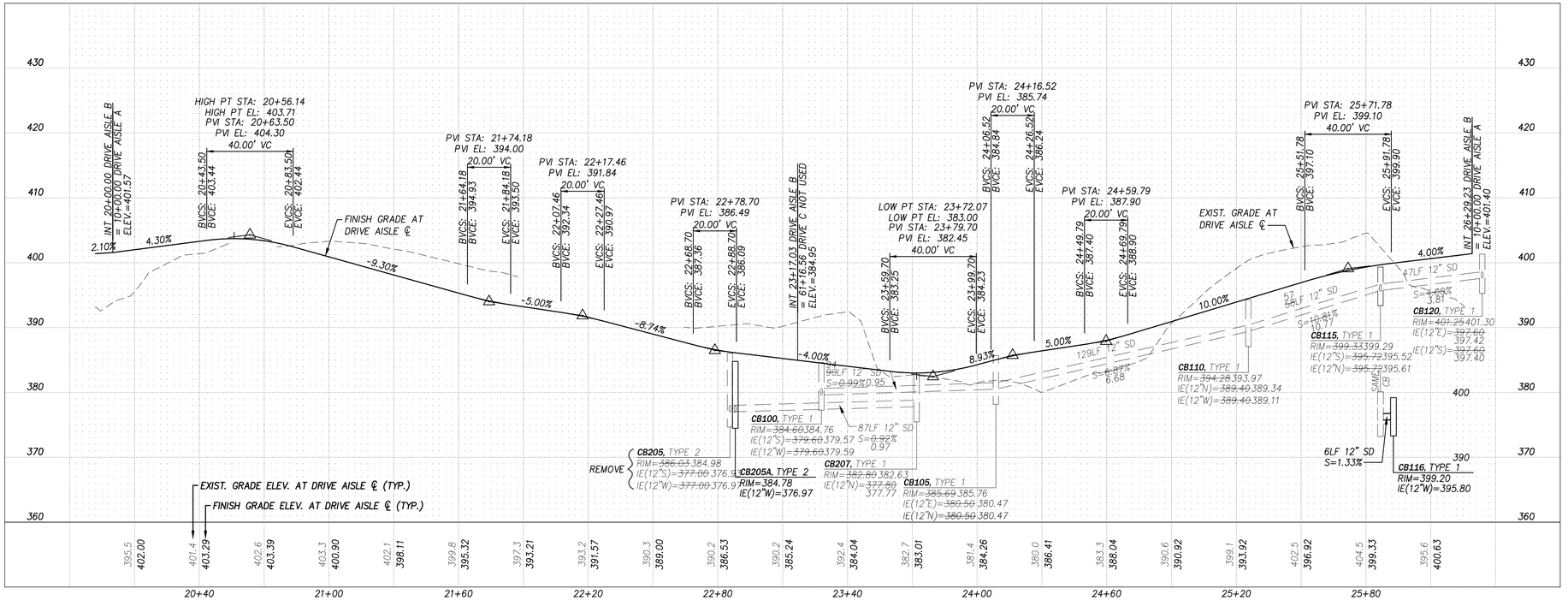


WOONERF PLAZA



DRIVE AISLE B

AS-BUILTS FOR REFERENCE

NO.	DATE	REVISION	BY	CK.
1	1/9/19	CITY PERMIT RE-SUBMITTAL FOR MODIFICATION	PCE	JBS
2				

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1-9-19

SARATOGA HEIGHTS - PHASE 2/3

ROADWAY, GRADING AND DRAINAGE IMPROVEMENTS

SITE STORM DRAIN PROFILES

SNOHOMISH COUNTY

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0 10 20
VERT. IN FEET

0 30 60
HORIZ. IN FEET

PROJECT NO.
0079-13-005

DRAWING
C3.04

SHEET 15 OF 26

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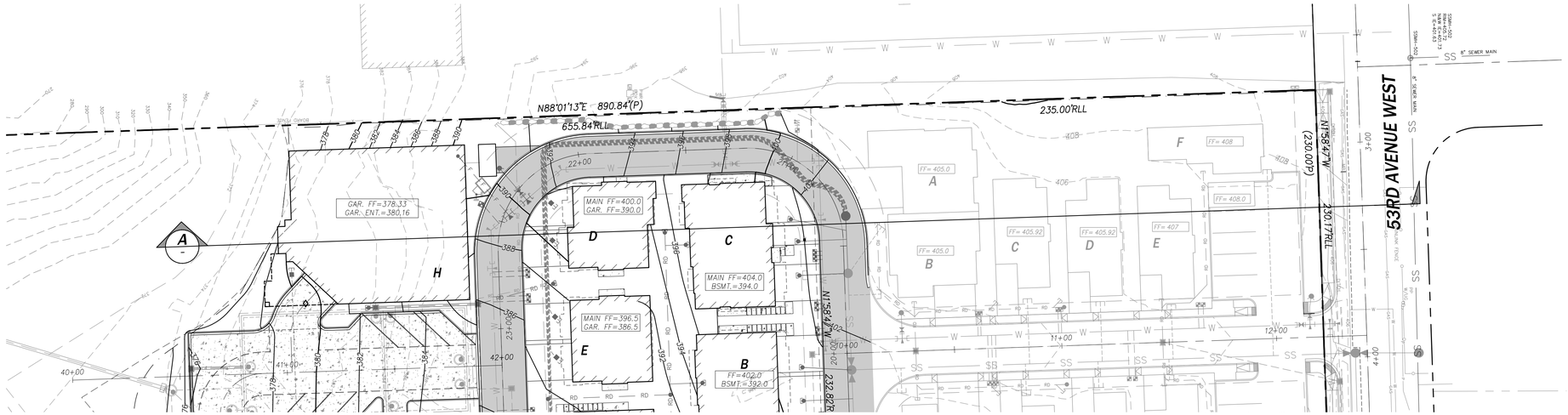

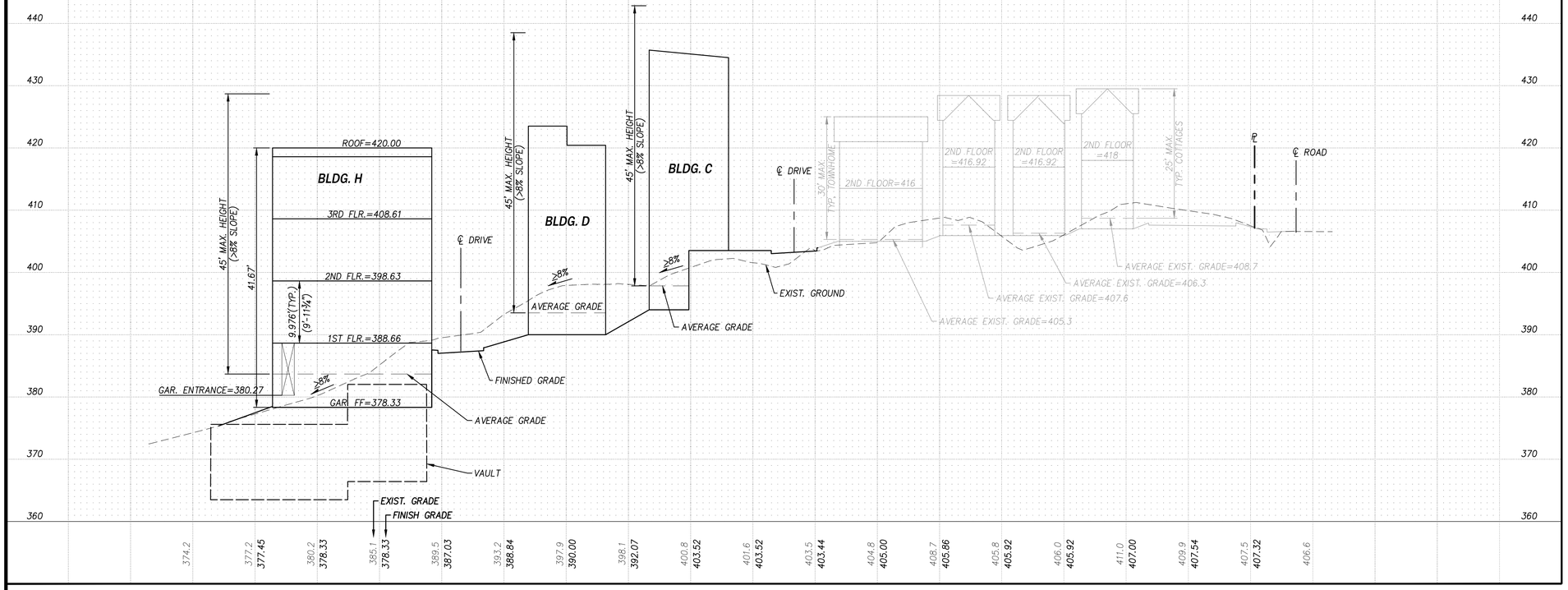

SECTION A-A

NO.	DATE	REVISION	BY	CK.
1	1/9/19	CITY PERMIT RESUBMITTAL FOR MODIFICATION	PCE	JBS

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SARATOGA HEIGHTS - PHASE 2/3

ROADWAY, GRADING AND DRAINAGE IMPROVEMENTS

SITE SECTION A

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SHEET 16 OF 26

N

0 10 20
VERT. IN FEET

0 30 60
HORIZ. IN FEET

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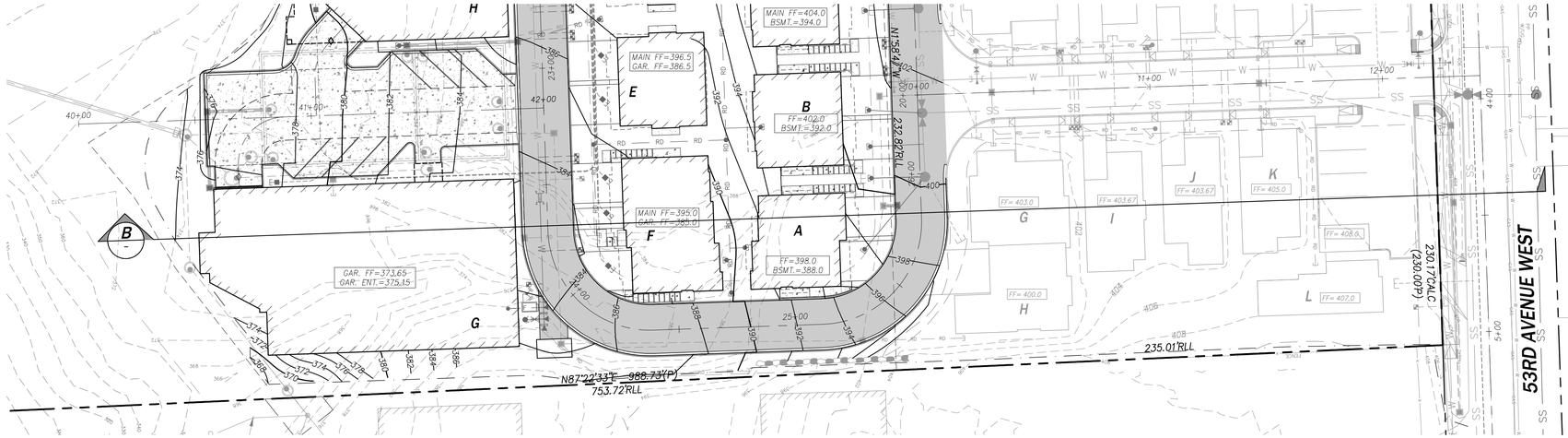

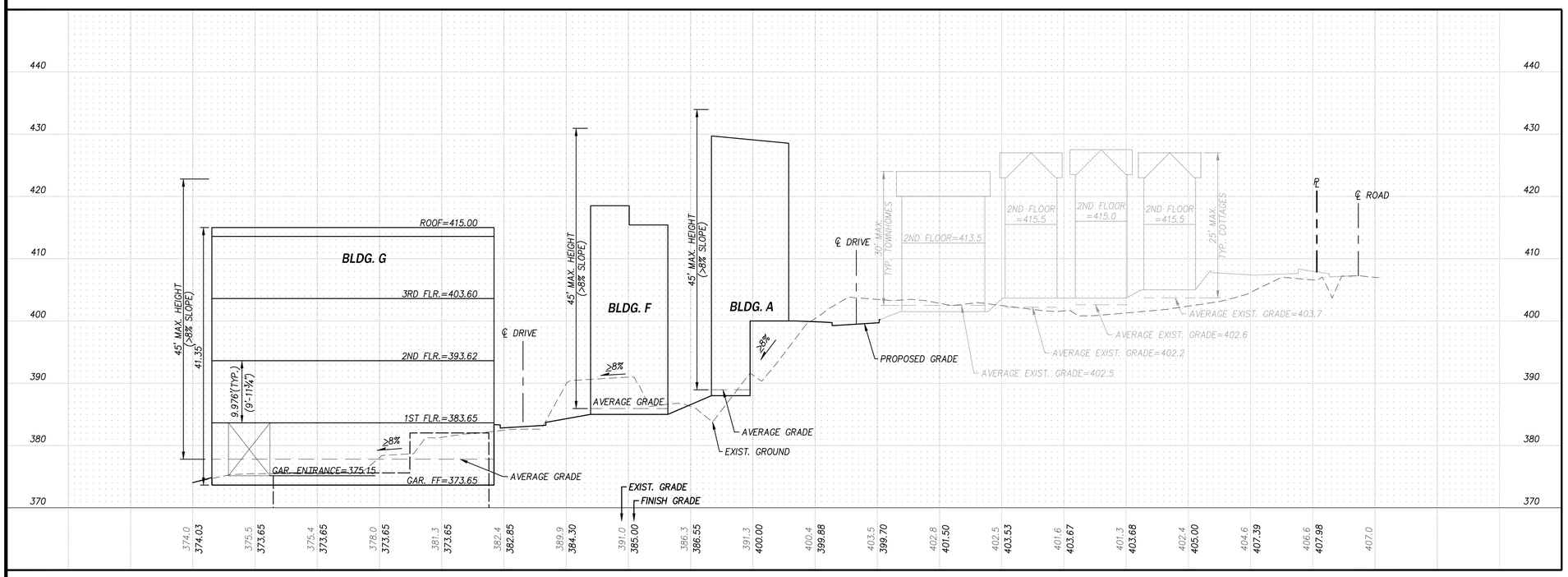

SECTION B-B

NO.	DATE	REVISION	BY	CK.
1	1/9/19	CITY PERMIT RE-SUBMITTAL FOR MODIFICATION	PCE	JBS

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STATE OF WASHINGTON
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1-9-19

SARATOGA HEIGHTS - PHASE 2/3

ROADWAY, GRADING AND DRAINAGE IMPROVEMENTS

SITE SECTION B

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DRAWING
C3.102

SHEET 17 OF 26

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VERT. IN FEET

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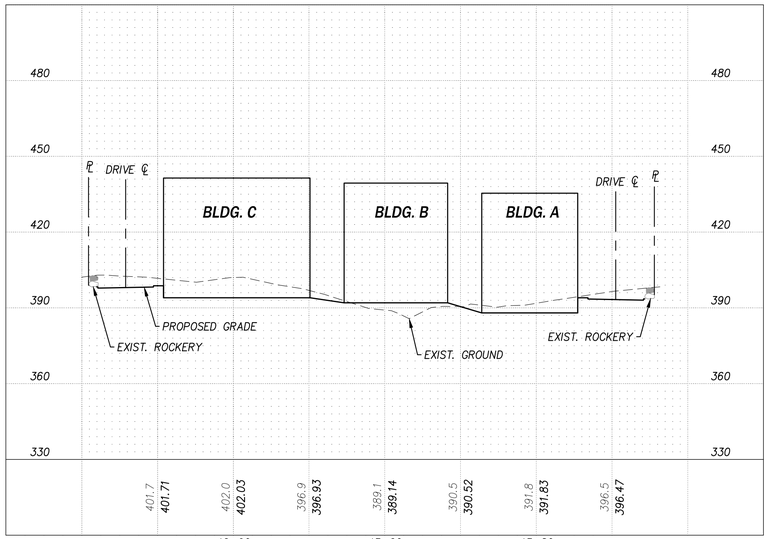

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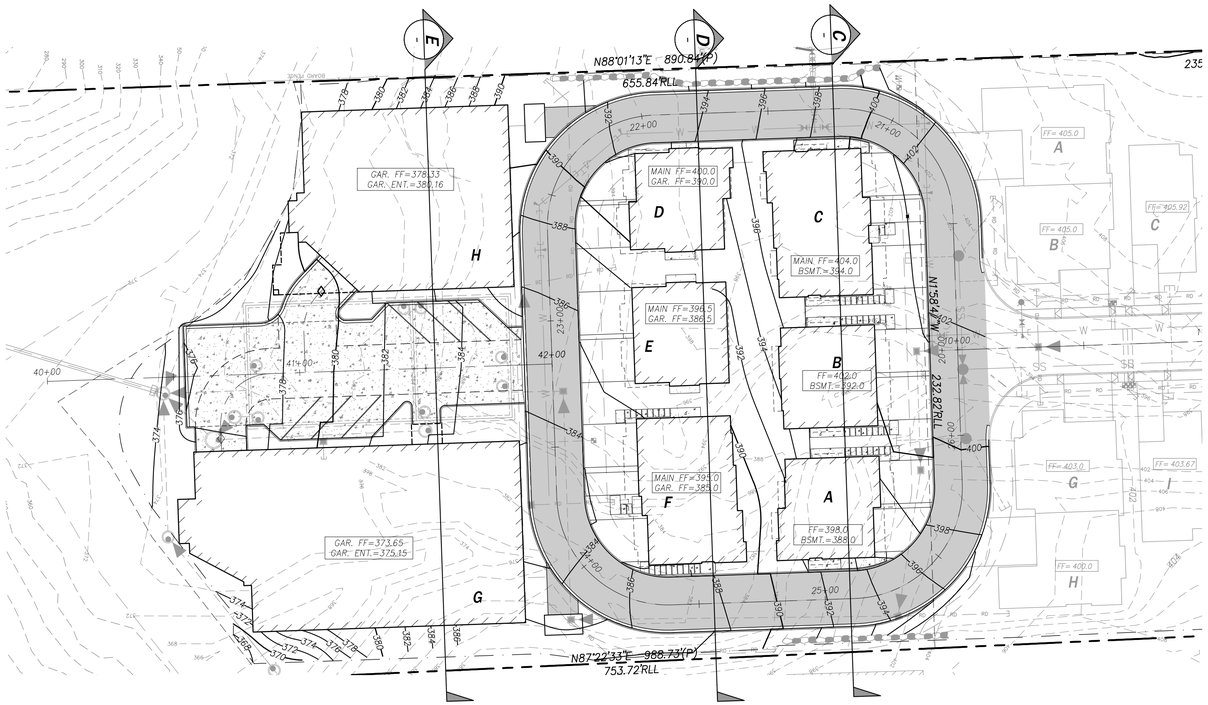

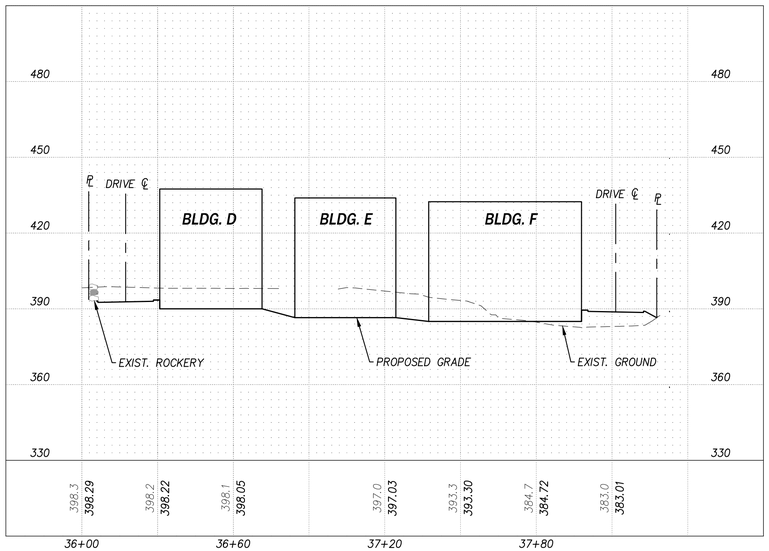

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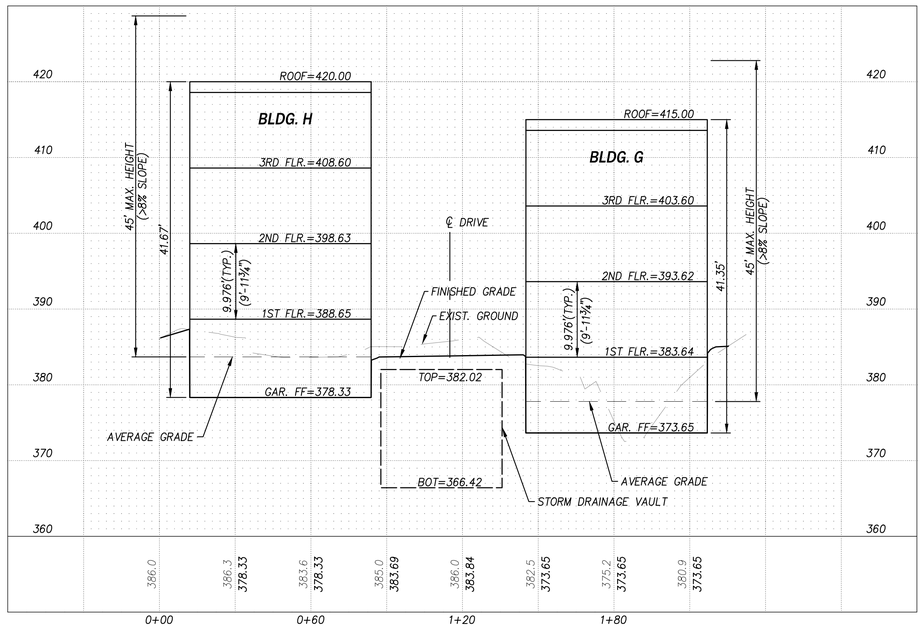

SECTION E

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1-9-19

SARATOGA HEIGHTS - PHASE 2/3

ROADWAY, GRADING AND DRAINAGE IMPROVEMENTS

SITE SECTION C, D, AND E

SNOHOMISH COUNTY

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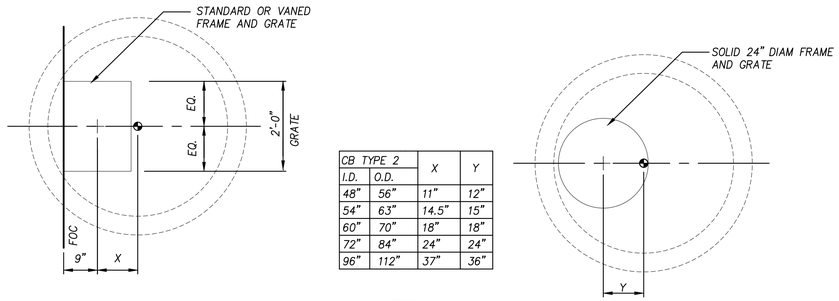
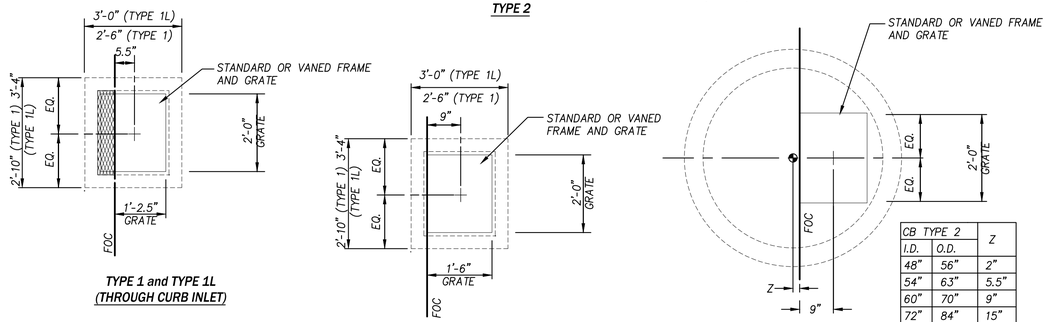
DRAWING
C3.103

SHEET 18 OF 26



CB TYPE 2		X	Y
I.D.	O.D.		
48"	56"	11"	12"
54"	63"	14.5"	15"
60"	70"	18"	18"
72"	84"	24"	24"
96"	112"	37"	36"

TYPE 2



TYPE 1 and TYPE 1L (THROUGH CURB INLET)

TYPE 1 and TYPE 1L

CB TYPE 2		Z
I.D.	O.D.	
48"	56"	2"
54"	63"	5.5"
60"	70"	9"
72"	84"	15"
96"	112"	28"

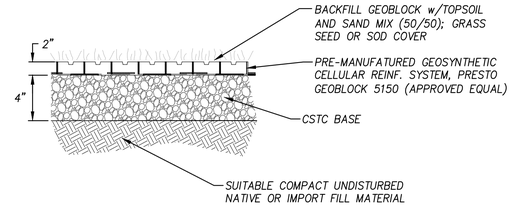
REVERSE TYPE 2
(SEE NOTE 3)

NOTES:
1. *CENTER OF GRATE = CENTER OF STRUCTURE FOR TYPE 1 AND TYPE 1L STRUCTURES ONLY*
2. *NORTHING AND EASTING (OR STATION AND OFFSET FROM CONSTRUCTION CENTERLINE) SHOWN ON PLAN REFERENCES CENTER OF STRUCTURE FOR ALL DRAINAGE FACILITIES UNLESS OTHERWISE NOTED ON PLANS*
3. *REVERSE TYPE 2 CATCH BASIN TO BE INSTALLED ONLY AT LOCATIONS SPECIFIED ON PLANS*

LEGEND
- *+ = CENTER OF GRATE*
- *= CENTER OF STRUCTURE*
- *FOC = FACE OF CURB*

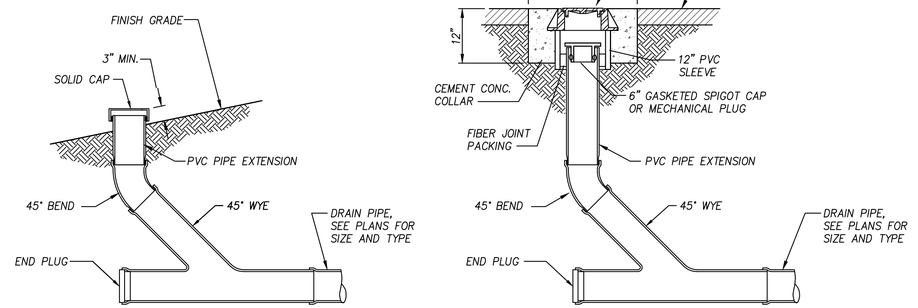
STRUCTURE PLACEMENT DETAIL

NOT TO SCALE



TYPICAL GEOSYNTHETIC REINFORCED GRASS PAVEMENT

NOT TO SCALE



OPEN SPACE/LOT FRONTAGE

PAVED FRONTAGE

TYPICAL CLEANOUT

NOT TO SCALE

NO.	DATE	REVISION	BY	CK.
1	1/9/19	CITY PERMIT RE-SUBMITTAL FOR MODIFICATION	PCE	JBS

AMIE B SCHENCK — STATE OF WASHINGTON — 37610 — REGISTERED PROFESSIONAL ENGINEER — 1-9-19

SARATOGA HEIGHTS - PHASE 2/3

ROADWAY, GRADING AND DRAINAGE IMPROVEMENTS

GRADING AND DRAINAGE DETAILS

SNOHOMISH COUNTY

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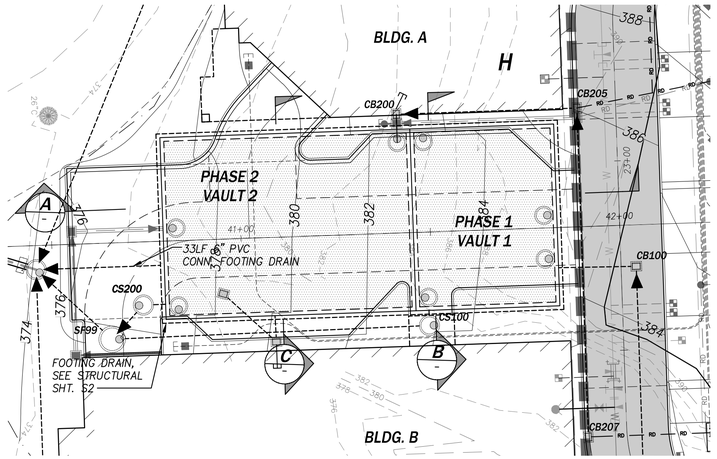
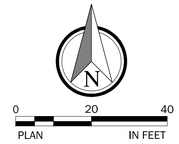


NOTES:
1. REF. STRUCT. PLANS FOR ADDTIONAL DIMENSION AND ELEVATION INFORMATION.
2. ALL DIMENSIONS AND LOCATION CONTROL (NORTHING/EASTING) REFERENCE INSIDE WALL FACE OF VAULT UNLESS NOTED OTHERWISE.



PLAN - DETENTION VAULT

SCALE: AS NOTED

VAULT 1							VAULT 2						
	LIVE STORAGE VOLUME (CF) *			RELEASE RATE (CFS)				LIVE STORAGE VOLUME (CF) *			RELEASE RATE (CFS)		
	REQUIRED	DESIGNED	AS-BUILT	REQUIRED	DESIGNED	AS-BUILT		REQUIRED	DESIGNED	AS-BUILT	REQUIRED	DESIGNED	AS-BUILT
2-YR	13,248	13,248	-	0.008	0.008	-	2-YR	25,583	25,583	-	0.009	0.009	-
100-YR	22,412	22,412	-	0.033	0.033	-	100-YR	29,440	29,440	-	0.103	0.103	-

NOTES:

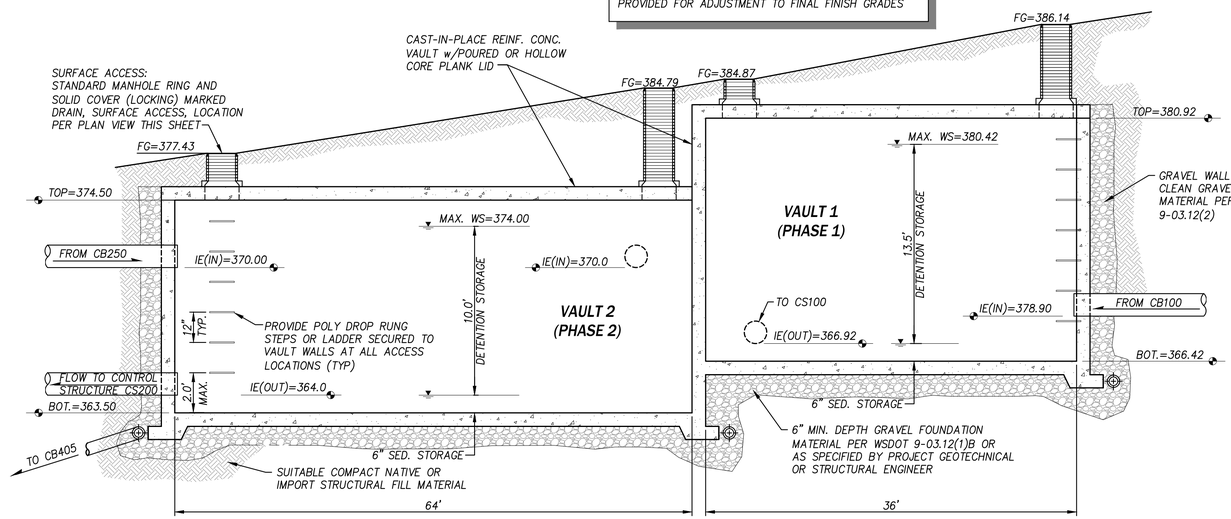
SEE STRUCTURAL PLANS FOR ADDITIONAL VAULT DETAILS AND SPECIFICATIONS

NOTES:

1. VAULTS AND ALL APPURTENANCES SHALL MEET THE STRUCTURAL REQUIREMENTS FOR OVERBURDEN SUPPORT UNDER A MINIMUM HS-25 TRAFFIC LOADING WITH ANY SPECIAL PROVISIONS OF THE STRUCTURAL PLANS AND DETAILS.
2. ALL METAL PARTS SHALL BE CORROSION RESISTANT STEEL PARTS SHALL BE STAINLESS STEEL, OR EQUIVALENT.
3. A CONTINUOUS PVC OR HYDROPHILIC WATER STOP SHALL BE INSTALLED AT ALL CAST-IN-PLACE CONCRETE CONSTRUCTION OR EXPANSION JOINTS. THE CONTRACTOR SHALL PROVIDE THE ENGINEER WITH MANUFACTURER DATA FOR THE SPECIFIC TYPE AND MODEL OF WATER STOP PROPOSED FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.
4. THE 5'x10' VAULT ACCESS OPENING SHALL BE INSTALLED AT THE LOCATION SHOWN ON THIS PLAN IN ACCORDANCE WITH ANY ADDITIONAL PROVISIONS OF THE ACCOMPANYING STRUCTURAL PLANS AND DETAILS. THIS OPENING SHALL HAVE A PRE-MANUFACTURED LID INSTALLED FLUSH WITH ADJACENT FINISHED GRADES. THE TYPE OF COVER MAY BE A REMOVABLE GRATE, SPRING-LOADED HATCH, SOLID, OR EQUIVALENT COMBINATION THAT PROVIDES A CLEAR OPENING OF 5'X10'. THE LID SHALL BE DESIGNED AND INSTALLED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS FOR THE SAME STRUCTURAL LOADING CONDITIONS AS THE ASSOCIATED VAULT AS PROVIDED ON THE STRUCTURAL PLANS. THE CONTRACTOR SHALL PROVIDE THE ENGINEER WITH MANUFACTURER AND SUPPORTING STRUCTURAL DESIGN DATA TO CONFIRM THESE DESIGN PARAMETERS FOR THE ACTUAL TYPE AND MODEL OF THE VAULT ACCESS PROPOSED FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.
5. RIM ELEVATIONS SHALL BE ADJUSTED AS REQUIRED TO ACCOMMODATE ACTUAL ACCESS LOCATIONS AND FINISHED GRADE CONDITIONS.
6. ALL UNSUITABLE SOILS SHALL BE REMOVED FROM FOOTPRINT OF VAULT AND TO A DISTANCE BEYOND THE VAULT EQUAL TO THE DEPTH OF OVER EXCAVATED MATERIAL IN ACCORDANCE WITH THE PROJECT PLANS AND SPECIFICATIONS, AND AS DIRECTED BY THE ENGINEER. ALL UNSUITABLE MATERIAL SHALL BE REPLACED WITH SUITABLE COMPACT STRUCTURAL FILL MATERIAL

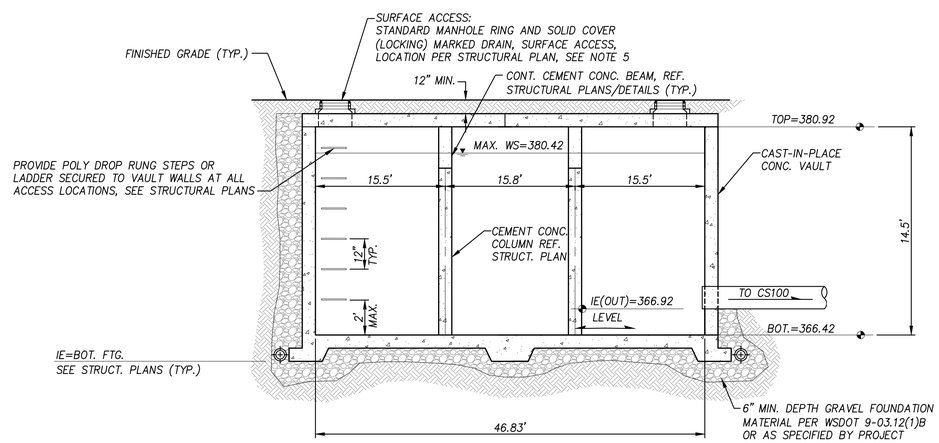
PHASE 2 CONSTRUCTION

NOTE:
ADD OR ADJUST LADDER RUNGS OF ALL ADJUSTED VAULT MAINTENANCE ACCESS POINTS AND EXISTING CATCH BASIN. APPROPRIATE RISER SECTIONS SHALL BE PROVIDED FOR ADJUSTMENT TO FINAL FINISH GRADES



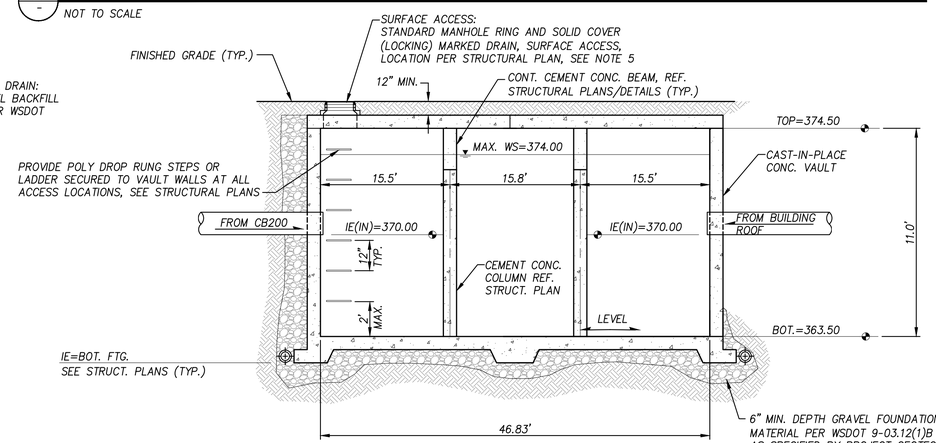
A — SECTION

NOT TO SCALE



B — SECTION

NOT TO SCALE



C — SECTION

NOT TO SCALE

AS-BUILTS FOR REFERENCE (SEE PHASE 2 CONSTRUCTION NOTE)

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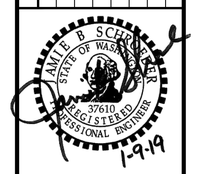
1	1/9/19	CITY PERMIT RESUBMITTAL FOR MODIFICATION	PCE	JBS



SARATOGA HEIGHTS - PHASE 2/3

ROADWAY, GRADING AND DRAINAGE IMPROVEMENTS

STORM WATER VAULT DETAILS

SNOHOMISH COUNTY

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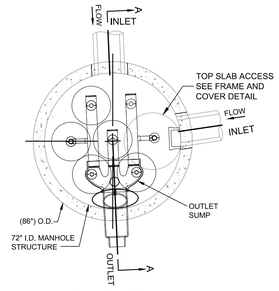
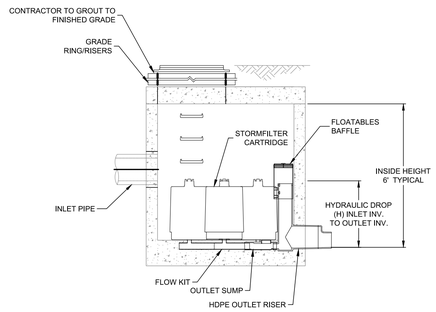


PLAN VIEW
STANDARD OUTLET RISER
FLOWKIT: 42A



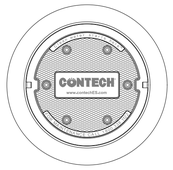
SECTION A-A

STORMFILTER DESIGN NOTES

STORMFILTER TREATMENTCAPACITY IS A FUNCTION OF THE CARTRIDGE SELECTION AND THE NUMBER OF CARTRIDGES. THE STANDARD MANHOLE STYLE IS SHOWN WITH THE MAXIMUM NUMBER OF CARTRIDGES (7). VOLUME SYSTEM IS ALSO AVAILABLE WITH MAXIMUM 7 CARTRIDGES. Ø72" MANHOLE STORMFILTER PEAK HYDRAULIC CAPACITY IS 1.5 CFS. IF THE SITE CONDITIONS EXCEED 1.5 CFS AN UPSTREAM BYPASS STRUCTURE IS REQUIRED.

CARTRIDGE SELECTION

CARTRIDGE HEIGHT	27"		18"		LOW DROP	
RECOMMENDED HYDRAULIC DROP (H)	3.05'		2.3'		1.8'	
SPECIFIC FLOW RATE (gpm/sf)	2 gpm/ft²	1 gpm/ft²	2 gpm/ft²	1 gpm/ft²	2 gpm/ft²	1 gpm/ft²
CARTRIDGE FLOW RATE (gpm)	22.5	11.25	15	7.5	10	5



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	SF99
WATER QUALITY FLOW RATE (cfs)	0.02
PEAK FLOW RATE (cfs)	0.04
RETURN PERIOD OF PEAK FLOW (yrs)	100
# OF CARTRIDGES REQUIRED	5
CARTRIDGE FLOW RATE	1.00 gpm
MEDIA TYPE (CSF, PERLITE, ZPG, GAC, PHS)	ZPG

PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE #1	363.92	SD	12"
INLET PIPE #2	363.92	SD	12"
OUTLET PIPE	360.87	SD	*
UPSTREAM RIM ELEVATION			376.42
DOWNSTREAM RIM ELEVATION			
ANTI-FLOTATION BALLAST		WIDTH	HEIGHT

NOTES/SPECIAL REQUIREMENTS:

* PER ENGINEER OF RECORD

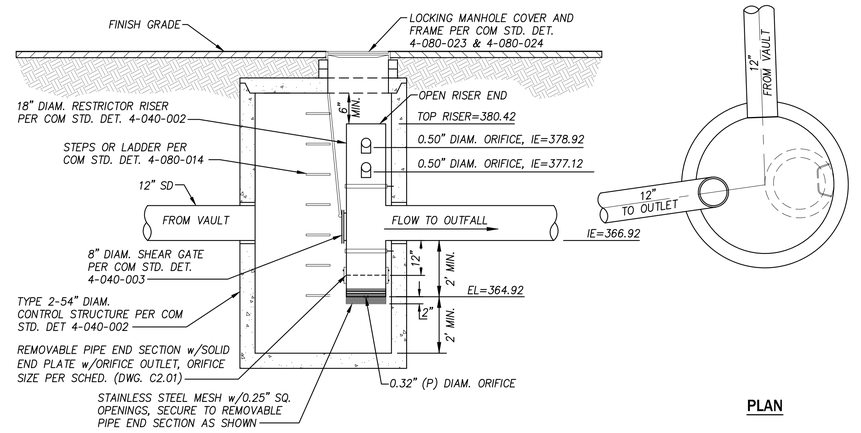
GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR SITE SPECIFIC DRAWINGS WITH DETAILED VAULT DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE, www.ContechES.com
4. STORMFILTER WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO HS20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 5' AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.
6. FILTER CARTRIDGES SHALL BE MEDIA-FILLED, PASSIVE, SIPHON ACTUATED, RADIAL FLOW, AND SELF CLEANING. RADIAL MEDIA DEPTH SHALL BE 7-INCHES. FILTER MEDIA CONTACT TIME SHALL BE AT LEAST 39 SECONDS.
7. SPECIFIC FLOW RATE IS EQUAL TO THE FILTER TREATMENT CAPACITY (gpm) DIVIDED BY THE FILTER CONTACT SURFACE AREA (sq ft).

INSTALLATION NOTES
1. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
2. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STORMFILTER STRUCTURE (LIFTING CLUTCHES PROVIDED).
3. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS AND ASSEMBLE STRUCTURE.
4. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT INLET PIPE(S).
5. CONTRACTOR TO PROVIDE AND INSTALL CONNECTOR TO THE OUTLET RISER STUB. STORMFILTER EQUIPPED WITH A DUAL DIAMETER HDPE OUTLET STUB AND SAND COLLAR. IF OUTLET PIPE IS LARGER THAN 8 INCHES, CONTRACTOR TO REMOVE THE 8 INCH OUTLET STUB AT MOLDED IN CUT LINE. COUPLING BY FERNCO OR EQUAL AND PROVIDED BY CONTRACTOR.
6. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.

CONTECH ENGINEERED SOLUTIONS LLC
www.contechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

SF99
STORMFILTER
STANDARD DETAIL

STORM FILTER VAULT DETAILS



PLAN

FLOW CONTROL STRUCTURE – CS100

NOT TO SCALE

PLAN

FLOW CONTROL STRUCTURE – CS200

NOT TO SCALE

NO.	DATE	REVISION	BY	CK.
1	1/9/19	CITY PERMIT RESUBMITTAL FOR MODIFICATION	PCE	JBS
2	1/09/19	REVISED CS200 ORIFICE DIAMETER	TJ	JBS

AMIE B SCHERER
STATE OF WASHINGTON
37610
REGISTERED
PROFESSIONAL ENGINEER
1-9-19

AS-BUILTS FOR REFERENCE (SEE PHASE 2 CONSTRUCTION NOTE)

SARATOGA HEIGHTS - PHASE 2/3

ROADWAY, GRADING AND DRAINAGE IMPROVEMENTS

STORM DRAINAGE DETAILS

SNOHOMISH COUNTY
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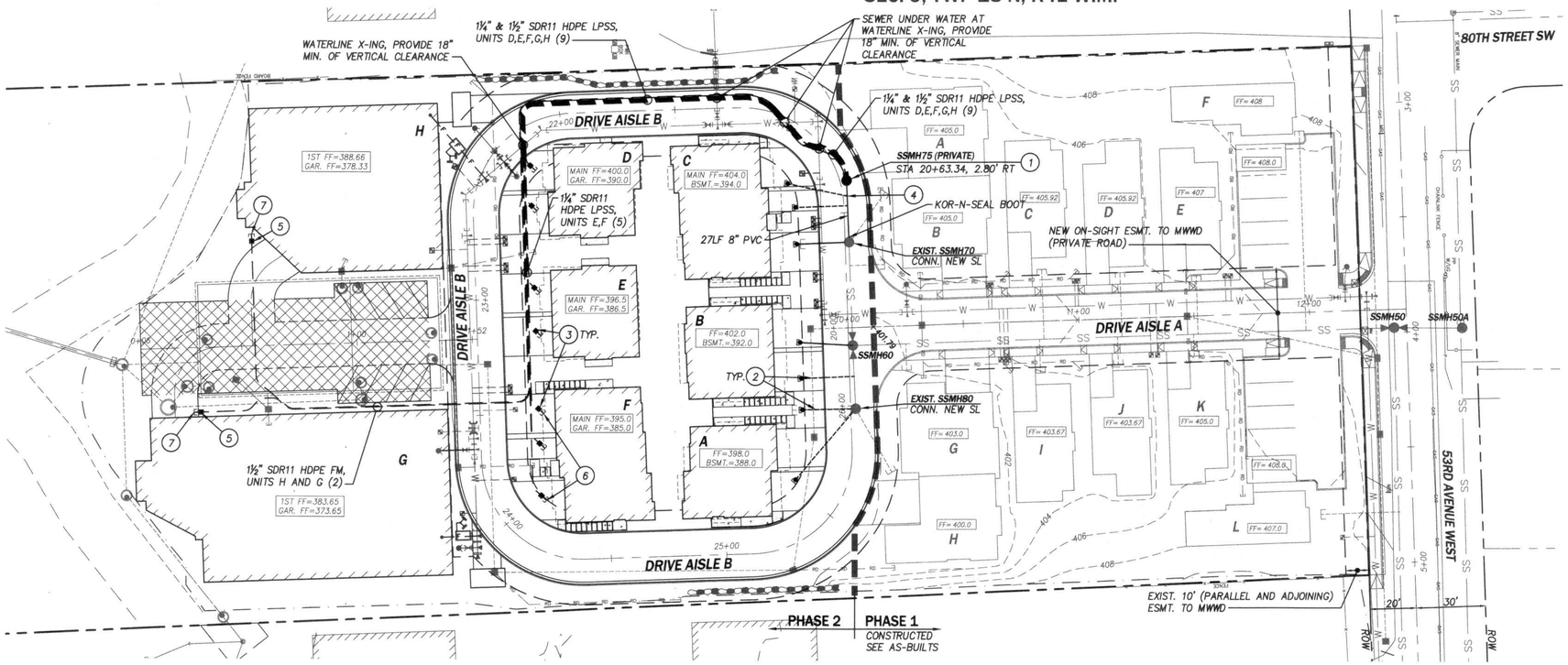
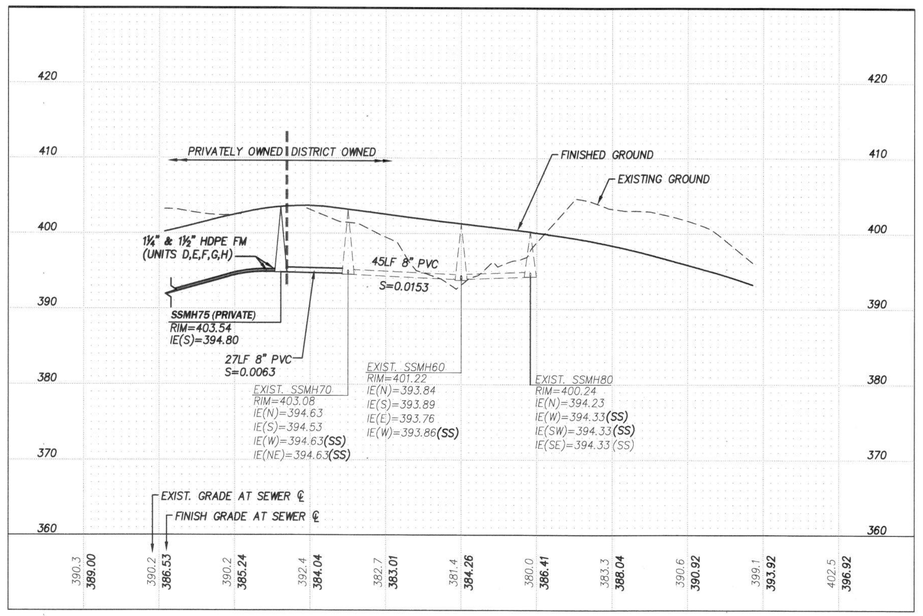
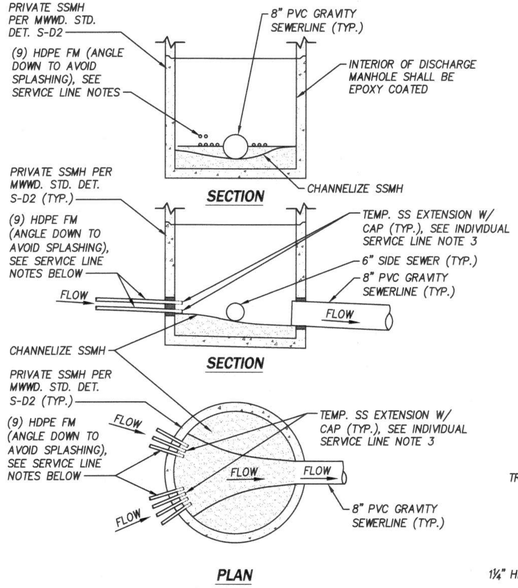




SEWER CENTERLINE

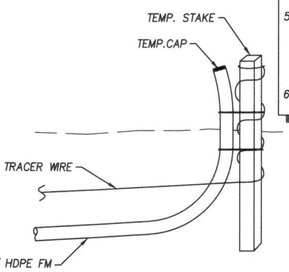


INDIVIDUAL SERVICE LINE NOTES:

1. GROUP INDIVIDUAL SERVICE LINE PENETRATIONS FROM EACH BUILDING TOGETHER. IDENTIFY AND LABEL THE UNIT FOR EACH LINE.
2. THE INDIVIDUAL SEWER FORCE MAIN SERVICES SHALL BE LABELED W/ THE INDIVIDUAL ADDRESS AT THE DISCHARGE MANHOLE
3. LEAVE 1¼" AND 1½" HDPE FM PROTRUDING INTO MH, INSTALL CAP/PLUG FOR PRESSURE TEST. ONCE TEST IS ACCEPTED, CUT HDPE FLUSH W/ INTERIOR OF MH

FM DISCHARGE SSMH (PRIVATE)

NOT TO SCALE



NOTES:

1. THE INDIVIDUAL SERVICE FARCE MAIN SERVICES SHALL BE PRESSURE TESTED USING AIR OR WATER PER MWWD STANDARDS.
2. CONNECT INDIVIDUAL SERVICE LINE TO THE PUMP UPON ACCEPTANCE OF THE PRESSURE TEST BY MWWD.

TEMP. CONN. AT PUMP FOR TESTING

NOT TO SCALE

CONSTRUCTION NOTES

1. PRIVATE FORCEMAIN DISCHARGE SEWER MANHOLE PER MWWD STD. DET. S-D2 AND DET. BELOW
2. STANDARD SIDE SEWER PER MWWD. STD. DET. S-D8 (ONE TEE AT END ONLY)
3. 1¼" HDPE SDR-11 TYPICAL SEWER SERVICE LATERAL PER E/ONE STD. DET. ON SHT. C4.11, TEMP. CONN. AT PUMP DETAIL BELOW, AND NOTE 3 BELOW
4. 8"x 6" WYE (PVC)
5. 1½" HDPE SDR-11 TYPICAL SEWER SERVICE LATERAL PER E/ONE STD. DET. ON SHT. C4.11, TEMP. CONN. AT PUMP DETAIL BELOW, AND NOTE 3 BELOW
6. E/ONE MODEL DH079 GRINDER PUMP SYSTEM; SEE NOTE 4 BELOW
7. E/ONE DUPLEX SYSTEM; SEE NOTE 4 BELOW

LEGEND

- SD — STORM DRAIN
- SD CATCH BASIN
- SS — SANITARY SEWER MAIN
- STANDARD PRECAST MANHOLE
- SIDE SEWER SERVICE
- SIDE SEWER CLEANOUT
- W — WATER MAIN
- WATER SERVICE
- PUBLIC UTILITY ESMT.
- WATER METER (SIZE PER PLAN)
- FIRE HYDRANT (FH)
- GATE VALVE (GV)
- LOW PRESSURE INDIVIDUAL SANITARY SEWER FORCE MAIN
- LPSS SERVICE LATERAL W/ FUTURE INDIVIDUAL E/ONE GRINDER PUMPS (SEE NOTES BELOW)

NOTES:

1. EACH RESIDENTIAL UNIT NOT ABLE TO BE SERVICED BY A GRAVITY SIDE SEWER SHALL BE TIED INDIVIDUALLY TO THE PRIVATE FM DISCHARGE MANHOLE AS SHOWN ON THE PLAN. THE THE LOW PRESSURE SANITARY SEWER FM LINES SHALL BE HDPE SDR-11 OR APPROVED EQUAL INSTALLED IN GENERAL ACCORDANCE WITH MUKILTEO WATER AND WASTEWATER DISTRICT STANDARDS.
2. INDIVIDUAL LOW PRESSURE SIDE SEWER LINES MAY BE INSTALLED IN A COMMON TRENCH AND SHALL INCLUDE TRACER WIRE FOR FUTURE LOCATING OF LINES.
3. THE LOW PRESSURE SANITARY SEWER (LPSS) PRIVATE SEWER SERVICE LATERAL DESIGN PROPOSED WITH THIS PROJECT IS BASED ON MANUFACTURER RECOMMENDATIONS FOR A REPRESENTATIVE E/ONE MODEL DH071 AND E/ONE DUPLEX GRINDER PUMP SYSTEM (OAE). THIS PROJECT PROPOSES TO INSTALL AN INDIVIDUAL LOW PRESSURE PRIVATE SEWER LATERAL FOR EACH UNIT AS SHOWN IN THESE PLANS. EXTENSION OF THE SERVICE LATERALS, INCLUDING A SWING CHECK VALVE AND OTHER NECESSARY APPURTENANCES, SHALL BE INSTALLED BY INDIVIDUAL HOME BUILDERS AT THE TIME OF PUMP INSTALLATION AND IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDED MEANS AND METHODS.
4. FUTURE INDIVIDUAL GRINDER PUMPS SHALL BE INSTALLED INSIDE THE UNIT OR WITHIN 30 INCHES OF THE BUILDING FOUNDATION WALL.
5. UNITS IN BUILDINGS A, B, AND C SHALL CONNECT SEWER EFFLUENT FROM MAIN AND UPPER FLOORS TO THE GRAVITY STUBS ON THE EAST SIDE OF BUILDINGS. BASEMENT SEWER FLOWS WILL BE CONNECTED TO SEWER FORCE MAIN W/ INDIVIDUAL GRINDER PUMPS AND CONNECTED TO GRAVITY PIPING W/IN THE UNIT.
6. THE INDIVIDUAL SEWER FORCE MAIN SERVICES SHALL BE PRESSURE TESTED USING AIR OR WATER PER MWWD STANDARDS.

0 10 20 VERT. IN FEET

0 30 60 HORIZ. IN FEET

MULKILTEO WATER AND WASTEWATER DISTRICT

Approved by: _____ 10/30/18
Mukilteo Water and Wastewater — Date

Mukilteo Water and Wastewater District Ext. No. 528

Gray & Osborne No. 17566

Project must be completed and ownership transferred to the Mukilteo Water and Wastewater District within 1 year from the date of approval. In the event that the project developer fails to do so, the project will be subject to reapplication, additional plan review and revision, due to any changes in District standards or requirements occurring prior to completion and transfer of ownership. Water/sewer service is available only after payment of all current fees, recording of easements and transfer of ownership to the District.

CALL BEFORE YOU DIG 1-800-424-5555

NO.	DATE	REVISION	BY	CK.
1	10/9/18	WATER AND SEWER IMPROVEMENTS PACKAGE	PCE	JBS

JAMIE B SCHNEIDER — STATE OF WASHINGTON — 37610 — REGISTERED PROFESSIONAL ENGINEER — 10-9-18

SARATOGA HEIGHTS - PHASE 2

SANITARY SEWER PLAN AND PROFILE

MULKILTEO — SNOHOMISH COUNTY, WASHINGTON

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335 PARK PLACE CENTER G111
KIRKLAND, WA 98033
PHONE: (425)347-2898

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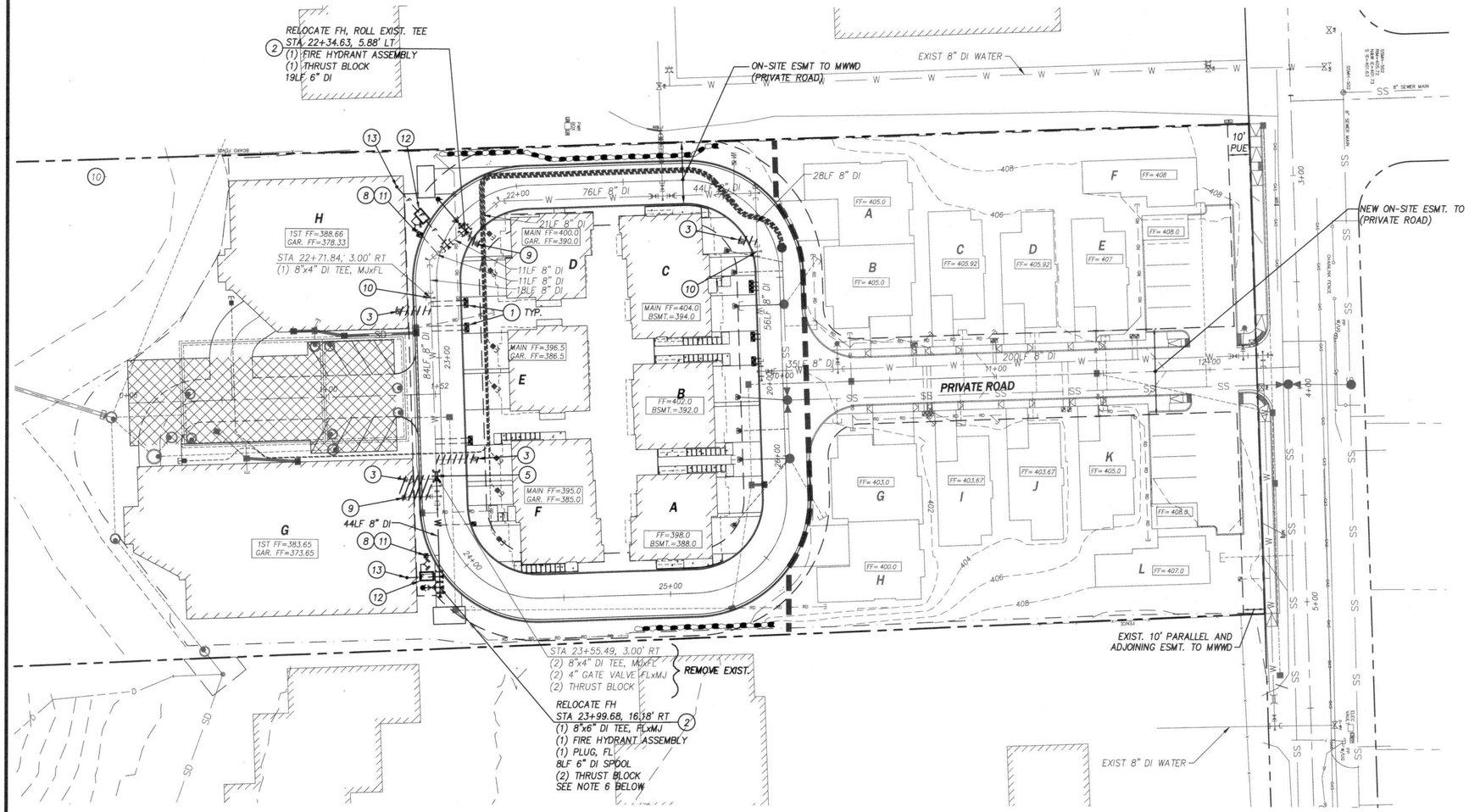


CONSTRUCTION NOTES

1. 1" SINGLE WATER SERVICE INSTALLATION PER MWWD STD. DET. W-D10
2. FIRE HYDRANT ASSEMBLY PER MWWD STD. DET. W-D3
3. REMOVE 2" DOMESTIC WATER SERVICE CONN., 2" GATE VALVE, AND 2" POLY IN METER BOX. INSTALL 2" IP PLUG (BRASS) IN EXIST. SADDLE.
4. WET TAP CONN. PER MWWD STD. DET. W-D8
5. 8" SOLID SLEEVE W/ MEGA LUGS
6. VERTICAL ANCHOR BLOCK PER MWWD STD. DET. W-D14
7. 1" IRRIGATION SERVICE PER MWWD STD. DET. W-D10
8. DCVA PER MWWD STD. DET. W-D17
9. REMOVE EXIST. FIRE HYDRANT
10. REMOVE 4" GATE VALVE (2), INSTALL 4" BLIND FLANGE (2)
11. 2" DOMESTIC WATER SERVICE CONN. PER MWWD. STD. DET. W-D12 W/DCVA PER MWWD. STD. DET. W-D17 (SEE NOTE 5 BELOW)
12. 4" FIRE LINE CONN. PER MWWD. STD. DET. W-D19 AND W-D20 (SEE NOTE 2 BELOW)
13. FIRE LINE RISER PER MWWD. STD. DET. W-D21
14. 4" 22° BEND W/MEGA LOCKS AND THRUST BLOCKS

LEGEND

- SD — STORM DRAIN
- SD CATCH BASIN
- SS — SANITARY SEWER MAIN
- STANDARD PRECAST MANHOLE
- E — SIDE SEWER SERVICE
- SIDE SEWER CLEANOUT
- W — WATER MAIN (PHASE 1)
- W — WATER MAIN (PHASE 2)
- WATER SERVICE
- PUBLIC UTILITY ESMT.
- 1" DOMESTIC WATER METER
- 2" DOMESTIC WATER METER
- FIRE HYDRANT (FH)
- GATE VALVE (GV)

NOTES:
1. CONNECTION LOCATIONS TO EXISTING MAINS SHALL BE FIELD VERIFIED BY CONTRACTOR.
2. FIRE SERVICE SIZES SHOWN ARE APPROXIMATE. ACTUAL LINE SIZE SHALL BE VERIFIED BY THE FIRE PROTECTION ENGINEER/DESIGNER PRIOR TO INSTALLATION AND WATER MAIN CONNECTIONS.
3. ALL PIPING IN EASEMENTS SHALL BE RESTRAINED JOINT, MEGALUG OR EQUAL.
4. EXIST. WATER MAINS WERE INSTALLED WITH PHASE 1 IMPROVEMENTS FOR SARATOGA HEIGHTS. THE CONTRACTOR SHALL REFERENCE RECORD DRAWINGS AVAILABLE FROM MUKILTEO WATER DISTRICT.
5. DOMESTIC WATER METER SIZES SHOWN SHALL BE VERIFIED BY A MECHANICAL ENGINEER PRIOR TO CONSTRUCTION.
6. EXIST. HYDRANT MAY BE UTILIZED ONLY IF BURY MATCHES EXISTING COVER (NO RISERS WILL BE ALLOWED).

0 10 20 VERT. IN FEET
0 30 60 HORIZ. IN FEET

CALL BEFORE YOU DIG 1-800-424-5555

MULKITEO WATER AND WASTEWATER DISTRICT

Approved by: Eric Dahl 10/9/18
Mukilteo Water and Wastewater / Date

Mukilteo Water and Wastewater District Ext. No. 828

Gray & Osborne No. 175666

Project must be completed and ownership transferred to the Mukilteo Water and Wastewater District within 1 year from the date of approval. In the event that the project developer fails to do so, the project will be subject to reapplication, additional plan review and revision, due to any changes in District standards or requirements occurring prior to completion and transfer of ownership. Water/sewer service is available only after payment of all current fees, recording of easements and transfer of ownership to the District.

NO.	DATE	REVISION	BY	CK.
1	10/9/18	WATER AND SEWER IMPROVEMENTS PACKAGE	PCE	JRS

JAMIE B SCHROEDER
STATE OF WASHINGTON
37610
REGISTERED
PROFESSIONAL ENGINEER

SARATOGA HEIGHTS - PHASE 2

WATER PLAN

MULKITEO

SNOHOMISH COUNTY, WASHINGTON

CLIENT
WINDWARD REAL ESTATE SERVICES, INC.
335 PARK PLACE CENTER G111
KIRKLAND, WA 98033
PHONE: (425)347-2898

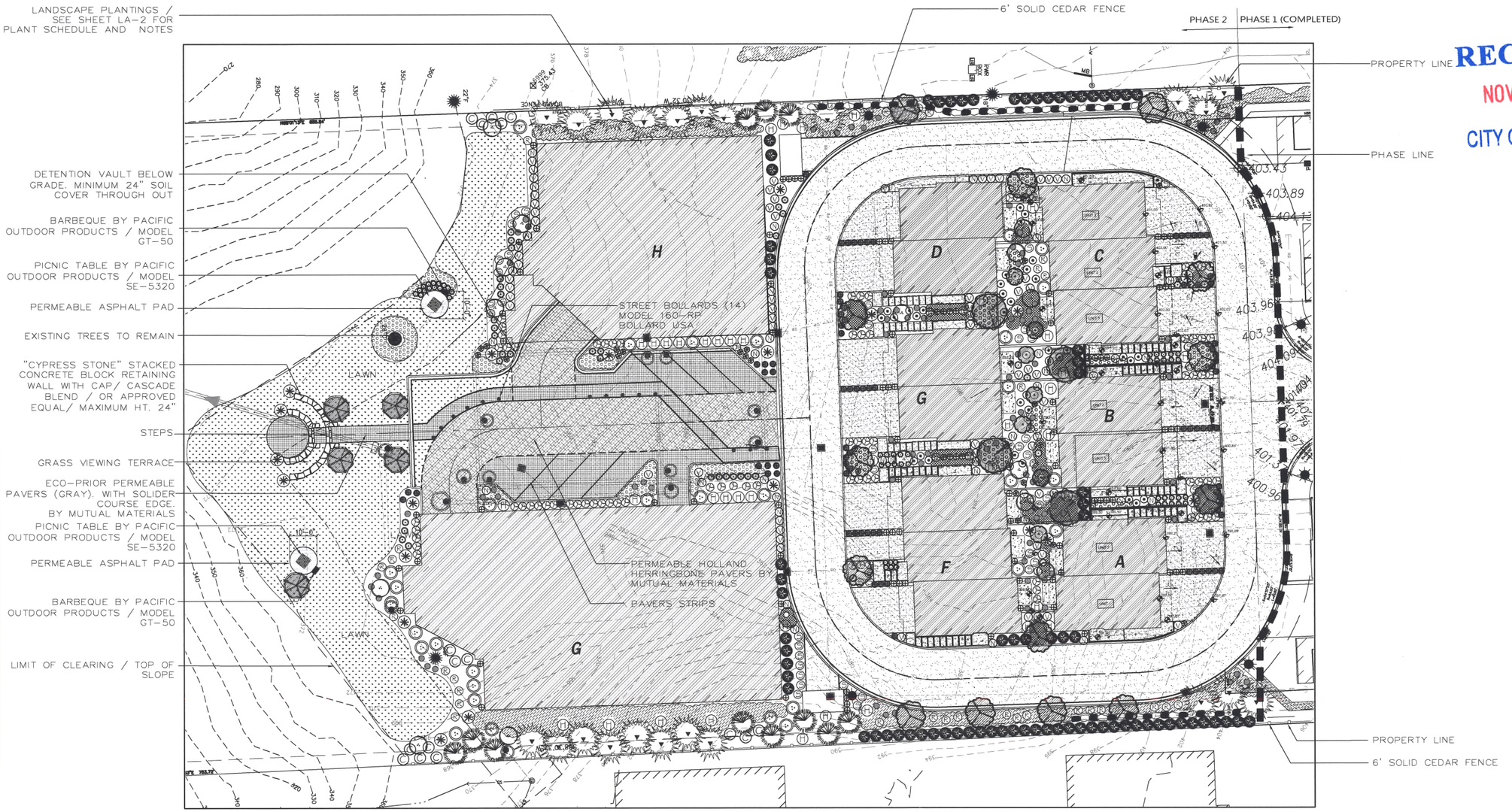
CPH CONSULTANTS
Site Planning • Civil Engineering
Land Use Consulting • Project Management
733 7th Avenue, Suite 100 | Kirkland, WA 98033
Phone: (425) 285-2390 | FAX: (425) 285-2389
www.cphconsultants.com

PROJECT NO.
0079-13-005

DRAWING
C5.01

SHEET 6 OF 7

SEC. 29, TWP. 21N, R4E W.M.

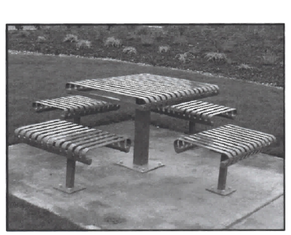


LANDSCAPE PLAN

NORTH

SCALE: 1"=20'-0"

0 20' 40' 80'



PICNIC TABLE MODEL SE-5320
PACIFIC OUTDOOR STRUCTURES

BARBEQUE MODEL GT-50
PACIFIC OUTDOOR STRUCTURES

STREET BOLLARD (S SERIES) #160-RP
BOLLARD USA

RECEIVED
NOV 20 2018
CITY OF MUKILTEO

Revisions
By
Revised per new site plan 09-15-2017
Revised per building permit comments dated 8-11-2017 10-26-2017
Revised per new building layout and Wisconi entry drive 10-29-2018

STATE OF WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT
BRUCE CAMERON LANE
CERTIFICATE No. 375

Lane & Associates
Landscape Architecture
13802 26TH AVE. NW. TULALIP, WA. 98052 (425) 885-2319

SARATOGA HEIGHTS - PHASE 2

WINDWARD REAL ESTATE SERVICES INC.
335 PARK PLACE CENTER
KIRKLAND, WA. 98033

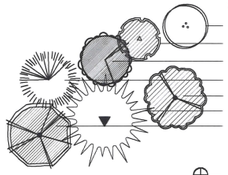
LANDSCAPE PLAN

Date
April 28 2017
Scale
AS SHOWN
Drawn
BCL
Job
19-2017
Sheet
LA-1
Of (2) Sheets

811
Know what's below.
Call before you dig.

SEC. 29, TWP. 21N, R4E W.M.

PLANT SCHEDULE



BOTANICAL NAME	COMMON NAME	SIZE	COMMENTS
TREES			
Acer circinatum	Vine Maple	1 1/2"cal.	Min. 3 stems/ Well Branched / Native
Acer rubrum 'Armstrong'	Armstrong Maple	2 "cal.	Single trunk/ Well branched / Matching
Acer palmatum 'Bloodgood'	Bloodgood Japanese Maple	2 "cal.	Single trunk/ Well branched / Matching
Picea omorika	Serbian Spruce	8'	Well Branched / Matching
Pyrus calleryana 'Chantiecleer'	Flowering Pear	2 " cal.	Well Branched / Matching
Pseudotsuga menziesii	Douglas Fir	7' - 8'	Well Branched / Matching/ Native
Cercis canadensis	Eastern Redbud	2" cal.	Well Branched / Matching
SHRUBS			
Thuja o. 'Emerald Green'	Emerald Green Arborvitae	5' - 6'	Full / Compact / Matching
Rosa rugosa 'Hansa'	Hansa Japanese Rose	18"	Full / Compact /Drought tolerant
Polystichum munitum	Sword Fern	2 gal	Full / Compact / Native
Arbutus unedo	Strawberry Tree	5 gal	Full / Compact /Drought tolerant
Cornus a. 'Elegantissima'	Variegated Dogwood	2 gal	Full / Compact
Pinus mugo 'Pumillio'	Dwarf Mugo Pine	2 gal	Full / Compact /Drought tolerant
Spiraea bum.'Goldmound'	Goldmound Spiraea	18"	Full / Compact
Miscanthus s. 'Yakushima'	Dwf. Maiden Grass	5 gal	Full / Compact /Drought tolerant
Prunus l. 'Otto Luyken'	Otto Luyken Laurel	24"	Full / Compact /Drought tolerant
Berberis t.'Crimson Pygmy'	Crimson Pygmy barberry	2 gal	Full / Compact /Drought tolerant
Erica d. 'Med. White'	Medit. White Heather	1 gal	Full / Compact /Drought tolerant
Hydrangea macrophyhlla	Bigleaf Hydrangea	5 gal	Full / Compact
Sarcococca ruslfolia	Fragrant Sweet Box	2 gal	Full / Compact
Nandina d. 'Gulf Stream'	Gulf Stream Nandina	2 gal	Full / Compact
Rudbeckia f. 'Goldstrum'	Goldsturm Black-Eye Susan	2 gal	Full / Compact
Viburnum davidii	David Viburnum	2 gal	Full / Compact
Prunus laurocerasus 'Nana'	Dwarf English laurel	2 gal	Full / Compact
Gaultheria shallon	Salal	1 gal.	Full / Compact / Plant 30" on center Native
GROUNDCOVERS			
Arctostaphylos uva ursi	Kinnickinnick	4" pots	Full / Compact / Plant 18" on center/ Drought tolerant
Liriope musc. 'Big Blue'	Blue Lilly Turf	1 gal.	Full / Compact / Plant 18" on center in rows.
Helictotrichon sempervirens	Blue Oat Grass	1 gal.	Full / Compact
	Lawn		

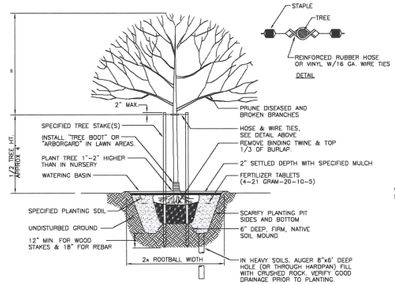
LANDSCAPE NOTES

1. CONTRACTOR SHALL BE RESPONSIBLE FOR FAMILIARIZING THEMSELVES WITH ALL OTHER SITE IMPROVEMENTS AND CONDITIONS PRIOR TO STARTING LANDSCAPE WORK.
2. CONTRACTOR SHALL USE CAUTION WHILE EXCAVATING TO AVOID DISTURBING ANY UTILITIES ENCOUNTERED. CONTRACTOR IS TO PROMPTLY ADVISE OWNER OF ANY DISTURBED UTILITIES. (LOCATION SERVICE PHONE: 1-800-424-5555)
3. CONTRATOR SHALL MAINTAIN AND WATER ALL PLANT MATERIAL FOR 1 YEAR OR UNTIL FINAL INSPECTION AND ACCEPTANCE.
4. CONTRACTOR SHALL BE RESPONSIBLE FOR COMPUTING SPECIFIC QUANTITIES OF GROUND COVERS AND PLANT MATERIALS UTILIZING ON-CENTER SPACING FOR PLANTS AS STATED ON THE LANDSCAPE PLAN AND MINIMUM PLANTING DISTANCES.
5. GROUND COVERS SHALL BE PLANTED IN AN EQUILATERAL TRIANGULAR SPACING PATTERN AT THE ON-CENTER DISTANCES SHOWN ON THE PLAN OR IN THE PLAN SCHEDULE. WHERE GROUND COVER ABUTS CURBING, SIDEWALKS, SIGNS OR POLES, MINIMUM PLANTING DISTANCES SHALL BE 12" FROM CENTER OF PLANT TO CURB, SIDEWALK, ETC. MINIMUM PLANTING DISTANCE SHALL BE 24" FROM CENTER OF TREES AND SHRUBS.
6. CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING THE QUANTITIES OF PLANTS THAT ARE REPRESENTED BY SYMBOLS ON
7. SUBGRADE IS TO BE WITHIN 1/10TH OF ONE FOOT AS PROVIDED BY OTHERS. ALL PLANTING AREAS TO BE CLEARED OF ALL CONSTRUCTION MATERIAL AND ROCKS AND STICKS LARGER THAN 2" IN DIAMETER.
8. SOIL QUALITY.
   ALL AREAS SUBJECT TO CLEARING AND GRADING THAT HAVE NOT BEEN COVERED BY IMPERVIOUS SURFACE, INCORPORATED INTO A DRAINAGE FACILITY OR ENGINEERED AS STGRUCTURAL FILL OR SLOPE SHALL, AT PROJECT COMPLETION, DEMONSTRATE THE FOLLOWING,
   1. A TOPSOIL LAYER WITH A MINIMUM ORGANIS MATTER CONTENT OF 10% DRY WEIGHT IN PLANTING BEDS, AN 5% ORGANIC MATTER CONTENT IN TURF AREAS, AND PH FROM 6.0 TO8.0 OR MATCHING THE PH OF UNDISTURBED SOIL. THE TOPSOIL LAYER SHALL HAVE A MINIMUM DEPTH OF EIGHT (8") INCHES EXCEPT WHERE TREE ROOTS LIMIT THE DEPTH OF INCORPORATION OF AMENDMENTS NEEDED TO MEET THE CRITERIA. SUBSOILS BELOW THE TOPSOIL LAYER SHOULD BE SCARIFIED AT LEAST 4 INCHES WITH SOME INCORPORATION OF THE UPPER MATERIAL TO AVOID STRATIFIED LAYERS, WHERE FEASIBLE.
   2. MULCH PLANTING BEDS WITH 2 INCHES OF ORGANIC MATERIAL.
   3. USE COMPOST AND OTHER MATERIAL THAT MEET THESE ORGANIC CONTENT REQUIREMENTS:
      A. THE ORGANIC CONTENT FOR "PER-APPROVED" AMENDMENT RATES CON BE MET ONLY USING COMPOST MEETING THE COMPOST SPECIFICATION FOR BMP T7.30: BIORETENTION CELLS, SWALES, AND PLANTER BOXES, WITH THE EXCEPTION THAT THE COMPOST MAY HAVE UP TO 35% BIOSOLIDS OR MANURE.

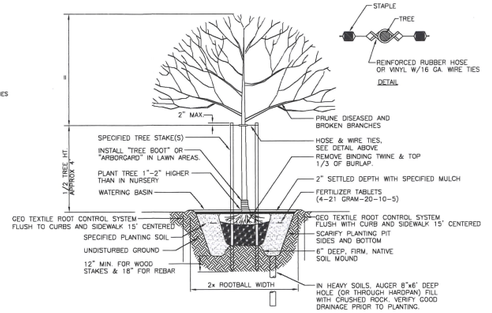
         THE COMPOST MUST ALSO HAVE AN ORGANIC MATTER CONTENT OF 40% TO 65%, AND A CARBON TO MITROGEN RATIO BELOW 25:1

      B. CALCULATED AMENDMENT RATES MAY BE MET THROUGH USE OF COMPOSTED MATERIAL MEETING (A) ABOVE; OR OTHER ORGANIC MATERIALS AMENDED TO MEET THE CARBON TO NITROGEN RATION REQUIREMENTS, AND NOT EXCEEDING THE CONTAMINANT LIMITS IDENTIFIED IN TABLE 220-B TESTING PARAMETERS, IN WAC 173-350-220.
9. ALL BEDS TO RECEIVE A MINIMUM OF 2" CEDAR GROVE COMPOST MULCH.
10. ALL PLANT MATERIAL SHALL BE FERTILIZED WITH AGRO TRANSPLANT FERTILIZER 4-2-2 PER
11. ALL PLANT MATERIAL SHALL CONFORM TO AAN STANDARDS FOR NURSERY STOCK, LATEST EDITION. ANY
    A. GENERAL: ALL PLANT MATERIALS FURNISHED SHALL BE HEALTHY REPRESENTATIVES, TYPICAL OF THEIR SPECIES OF VARIETY AND SHALL HAVE A NORMAL HABIT OF GROWTH. THEY SHALL BE FULL, WELL-BRANCHED, WELL-PROPORTIONED, AND HAVE A VIGOROUS, WELL-DEVELOPED ROOT SYSTEM. ALL PLANTS SHALL BE HARDY UNDER CLIMATIC CONDITIONS SIMILAR TO THOSE IN THE LOCALITY OF THE PROJECT.
    B. TREES, SHRUBS, AND GROUNDCOVERS: QUANTITIES, SPECIES, AND VARIETIES, SIZES AND CONDITIONS AS SHOWN ON THE PLANTING PLAN. PLANTS TO BE HEALTHY, VIGOROUS, WELL-FOLIATED WHEN IN LEAF. FREE OF DISEASE, INJURY, INSECTS, DECAY, HARMFUL DEFECTS, AND ALL WEEDS. NO SUBSTITUTIONS SHALL BE MADE WITHOUT WRITTEN APPROVAL FROM LANDSCAPE ARCHITECT OR OWNER.
12. PROVIDE DESIGN - BUILD IRRIGATION SYSTEM WITH 100% LAWN AND BED SEPARATION. PROVIDE RAIN SHUTOFF SENSOR /PROVIDE AUTO SHUTOFF MONITORING SYSTEM, FOR POTENTIAL BREAKS IN THE SYSTEM. PROVIDE OWNERS WITH " AS - BUILT " DRAWINGS TO SCALE.
13. CONTRACTOR TO PROVIDE A ONE-YEAR WARRANTY ON ALL PLANT MATERIAL.

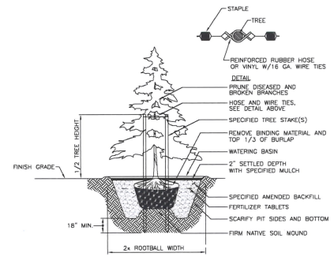
DETAIL SHEET



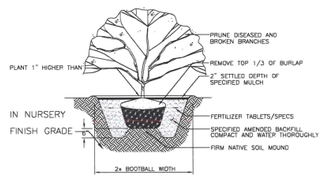
TREE PLANTING & STAKING DETAIL
NOT TO SCALE



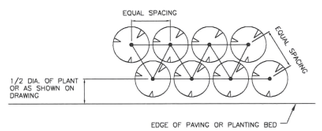
STREET TREE PLANTING & STAKING DETAIL
NOT TO SCALE



CONIFEROUS TREE PLANTING AND STAKING DETAIL
NOT TO SCALE



SHRUB PLANTING DETAIL
NOT TO SCALE



SHRUB AND GROUNDCOVER SPACING DETAIL
NOT TO SCALE

RECEIVED
NOV 20 2018
CITY OF MUKILTEO

811 Know what's below. Call before you dig.

Revisions
Revised per new site plan 09-11-2017 By
Revised per Geotechnical Engineers comments dated 8-17-2017 10-26-2017
Revised per new building layout and flood study data 10-27-2018

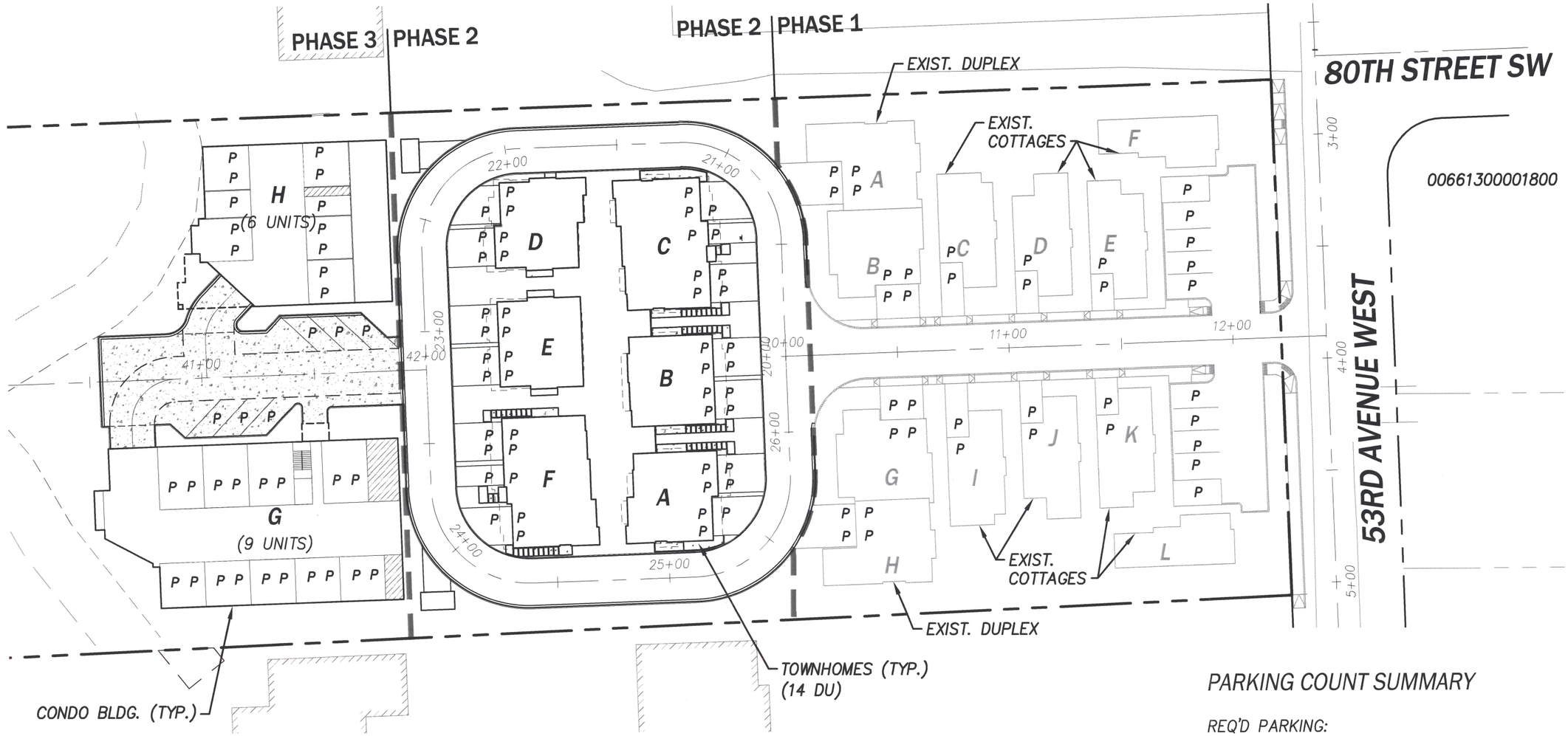
STATE OF WASHINGTON
REGISTERED LANDSCAPE ARCHITECT
BRUCE CAMERON LANE
CERTIFICATE No. 375

Lane & Associates
Landscape Architecture
13802 36TH AVE. NW TULALIP, WA. 98052 (425) 885-2319

SARATOGA HEIGHTS - PHASE 2
WINDWARD REAL ESTATE SERVICES INC.
335 PARK PLACE CENTER
KIRKLAND, WA. 98033

DETAIL SHEET

Date April 28, 2017
Scale AS SHOWN
Drawn BCL
Job 19-2017
Sheet LA-2
Of 2 Sheets



PARKING COUNT SUMMARY

REQ'D PARKING:		
PHASE 1		
COTTAGE	2.5/UNITx8=	20 STALLS
DUPLEX	2.25/UNITx4=	9 STALLS
		29 STALLS
PHASE 2		
TOWNHOME	2.25/UNITx14=	32 STALLS
PHASE 3		
CONDO	2.25/UNITx15=	34 STALLS
PARKING PROVIDED:		
PHASE 1 (EXISTING)	-	38 STALLS
PHASE 2 (NEW)	-	48 STALLS
PHASE 3 (NEW)	-	36 STALLS
TOTAL	-	122 STALLS

RECEIVED
NOV 20 2018
CITY OF MUKILTEO

CP|H
CONSULTANTS
Site Planning • Civil Engineering
Land Use Consulting • Project Management
11431 Willows Rd. NE, Suite 120
Redmond, WA 98052
Phone: (425) 285-2390 | FAX: (425) 285-2389
www.cphconsultants.com

N
0 50 100
PLAN IN FEET

NOVEMBER 16, 2017

PARKING COUNT EXHIBIT

CITY OF MUKILTEO

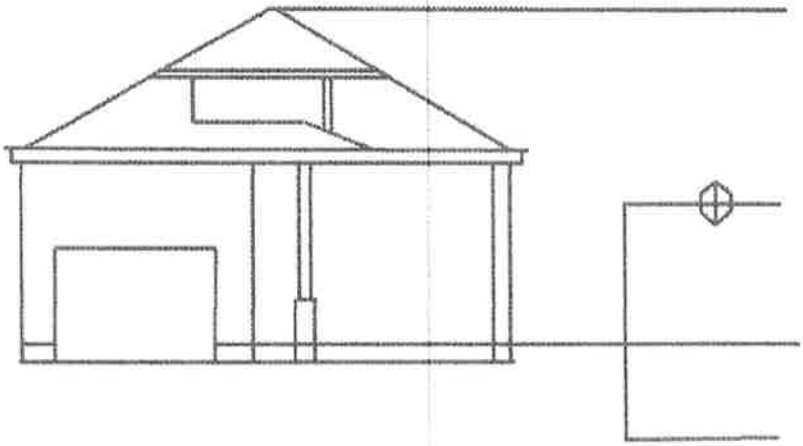
11930 Cyrus Way - Mukilteo, WA 98275

RECEIVED
MAR 18 2019
CITY OF MUKILTEO

Building Height Worksheet

Building Location: 'H' NORTH Legal: SEE CIVIL DWG

Description of permanent bench mark: _____



Ridge Height: 49.47'

First Floor Elevation: 398.33'

Bench Mark: 407.62'

Top of Foundation: 378.33'

Mean Ground Level: 382.8'

Calculated Height of Building 45.0'

Mean Ground Level = 382.8'

A = 374.0'

B = 390.6'

C = 389.5'

D = 377.0'

Prepared By: Priscilla Wong

Note: Attach map showing bench mark and elevations of all points used to determine mean ground level or show the work on the site plan submitted. Draw the smallest rectangle that encloses all of the current or proposed building walls.

NOTICE

If the height of the building is at or within three (3) feet of the maximum height allowed of the zoning district, a certificate of mean ground level is required to be prepared by a surveyor licensed in the State of Washington prior to permit issuance and recertified prior to the framing inspection.

CITY OF MUKILTEO

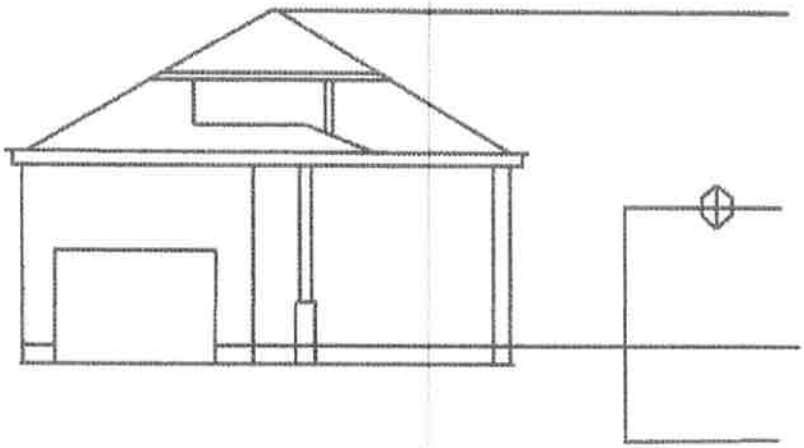
11930 Cyrus Way - Mukilteo, WA 98275

RECEIVED
MAR 18 2019
CITY OF MUKILTEO

Building Height Worksheet

Building Location: 16' SOUTH Legal: SEE CIVIL DWG

Description of permanent bench mark: _____



Ridge Height: 49.85'

First Floor Elevation: 393.65'

Bench Mark: 407.62

Top of Foundation: 373.65'

Mean Ground Level: 378.50'

Calculated Height of Building 45.0'

Mean Ground Level = 378.50'

A = 374.5'

B = 384.0'

C = 385.9'

D = 369.5'

Prepared By: Trish Wagl

Note: Attach map showing bench mark and elevations of all points used to determine mean ground level or show the work on the site plan submitted. Draw the smallest rectangle that encloses all of the current or proposed building walls.

NOTICE

If the height of the building is at or within three (3) feet of the maximum height allowed of the zoning district, a certificate of mean ground level is required to be prepared by a surveyor licensed in the State of Washington prior to permit issuance and recertified prior to the framing inspection.

MEDICI ARCHITECTS

11711 SE 8TH STREET, SUITE 100
BELLEVUE, WA 98005
TEL: (425) 453-9298
FAX: (425) 452-8448

REGISTRATION:

INTAKE DATE:

REVISIONS: DATE:

PROJECT / CLIENT:

SARATOGA HEIGHTS

WINDWARD REAL ESTATE SERVICES, INC

JOB ADDRESS:

8002 53RD AVE W
MUKILTEO, WA 98275

DRAWING NAME:

BUILDING H:
VIEW FROM SOUTHWEST

PHASE: PHASE 3 MODIFICATION

APPROVED FOR CONSTRUCTION:

PROJECT No.: 0079-13-005

DATE: 03/12/2019

01

PLOT SCALE: N/A

MEDICI ARCHITECTS

11711 SE 8TH STREET, SUITE 100
BELLEVUE, WA 98005
TEL: (425) 453-9298
FAX: (425) 452-8448

REGISTRATION:

INTAKE DATE:

REVISIONS: DATE:

PROJECT / CLIENT:

SARATOGA HEIGHTS

WINDWARD REAL ESTATE SERVICES, INC

JOB ADDRESS:

8002 53RD AVE W
MUKILTEO, WA 98275

DRAWING NAME:

BUILDING H:
VIEW FROM SOUTHEAST

PHASE: PHASE 3 MODIFICATION

APPROVED FOR CONSTRUCTION:

PROJECT No.: 0079-13-005

DATE: 03/12/2019

02

PLOT SCALE: N/A

MEDICI ARCHITECTS

11711 SE 8TH STREET, SUITE 100
BELLEVUE, WA 98005
TEL: (425) 453-9298
FAX: (425) 452-8448

REGISTRATION:

INTAKE DATE:

REVISIONS: DATE:

PROJECT / CLIENT:

SARATOGA HEIGHTS

WINDWARD REAL ESTATE SERVICES, INC

JOB ADDRESS:

8002 53RD AVE W
MUKILTEO, WA 98275

DRAWING NAME:

BUILDING H:
VIEW FROM SOUTH

PHASE: PHASE 3 MODIFICATION

APPROVED FOR CONSTRUCTION:

PROJECT No.: 0079-13-005

DATE: 03/12/2019

03

PLOT SCALE: N/A

MEDICI ARCHITECTS

11711 SE 8TH STREET, SUITE 100
BELLEVUE, WA 98005
TEL: (425) 453-9298
FAX: (425) 452-8448

REGISTRATION:

INTAKE DATE:

REVISIONS: DATE:

PROJECT / CLIENT:

SARATOGA HEIGHTS

WINDWARD REAL ESTATE SERVICES, INC

JOB ADDRESS:

8002 53RD AVE W
MUKILTEO, WA 98275

DRAWING NAME:

BUILDING H:
VIEW FROM WEST

PHASE: PHASE 3 MODIFICATION

APPROVED FOR CONSTRUCTION:

PROJECT No.: 0079-13-005

DATE: 03/12/2019

04

PLOT SCALE: N/A

MEDICI ARCHITECTS

11711 SE 8TH STREET, SUITE 100
BELLEVUE, WA 98005
TEL: (425) 453-9298
FAX: (425) 452-8448

REGISTRATION:

INTAKE DATE:

REVISIONS: DATE:

PROJECT / CLIENT:

SARATOGA HEIGHTS

WINDWARD REAL ESTATE SERVICES, INC

JOB ADDRESS:

8002 53RD AVE W
MUKILTEO, WA 98275

DRAWING NAME:

BUILDING H:
VIEW FROM NORTHWEST

PHASE: PHASE 3 MODIFICATION

APPROVED FOR CONSTRUCTION:

PROJECT No.: 0079-13-005

DATE: 03/12/2019

05

PLOT SCALE: N/A

MEDICI ARCHITECTS

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BELLEVUE, WA 98005
TEL: (425) 453-9298
FAX: (425) 452-8448

REGISTRATION:

INTAKE DATE:

REVISIONS: DATE:

PROJECT / CLIENT:

SARATOGA HEIGHTS

WINDWARD REAL ESTATE SERVICES, INC

JOB ADDRESS:

8002 53RD AVE W
MUKILTEO, WA 98275

DRAWING NAME:

BUILDING H:
VIEW FROM NORTHEAST

PHASE: PHASE 3 MODIFICATION

APPROVED FOR CONSTRUCTION:

PROJECT No.: 0079-13-005

DATE: 03/12/2019

06

PLOT SCALE: N/A

MEDICI ARCHITECTS

11711 SE 8TH STREET, SUITE 100
BELLEVUE, WA 98005
TEL: (425) 453-9298
FAX: (425) 452-8448

REGISTRATION:

INTAKE DATE:

REVISIONS: DATE:

PROJECT / CLIENT:

SARATOGA HEIGHTS

WINDWARD REAL ESTATE SERVICES, INC

JOB ADDRESS:

8002 53RD AVE W
MUKILTEO, WA 98275

DRAWING NAME:

BUILDING G:
VIEW FROM SOUTHEAST

PHASE: PHASE 3 MODIFICATION

APPROVED FOR CONSTRUCTION:

PROJECT No.: 0079-13-005

DATE: 03/12/2019

07

PLOT SCALE: N/A

MEDICI ARCHITECTS

11711 SE 8TH STREET, SUITE 100
BELLEVUE, WA 98005
TEL: (425) 453-9298
FAX: (425) 452-8448

REGISTRATION:

INTAKE DATE:

REVISIONS: DATE:

PROJECT / CLIENT:

SARATOGA HEIGHTS

WINDWARD REAL ESTATE SERVICES, INC

JOB ADDRESS:

8002 53RD AVE W
MUKILTEO, WA 98275

DRAWING NAME:

BUILDING G:
VIEW FROM NORTHEAST

PHASE: PHASE 3 MODIFICATION

APPROVED FOR CONSTRUCTION:

PROJECT No.: 0079-13-005

DATE: 03/12/2019

08

PLOT SCALE: N/A

MEDICI ARCHITECTS

11711 SE 8TH STREET, SUITE 100
BELLEVUE, WA 98005
TEL: (425) 453-9298
FAX: (425) 452-8448

REGISTRATION:

INTAKE DATE:

REVISIONS: DATE:

PROJECT / CLIENT:

SARATOGA HEIGHTS

WINDWARD REAL ESTATE SERVICES, INC

JOB ADDRESS:

8002 53RD AVE W
MUKILTEO, WA 98275

DRAWING NAME:

BUILDING G:
VIEW FROM NORTHWEST

PHASE: PHASE 3 MODIFICATION

APPROVED FOR CONSTRUCTION:

PROJECT No.: 0079-13-005

DATE: 03/12/2019

09

PLOT SCALE: N/A

MEDICI ARCHITECTS

11711 SE 8TH STREET, SUITE 100
BELLEVUE, WA 98005
TEL: (425) 453-9298
FAX: (425) 452-8448

REGISTRATION:

INTAKE DATE:

REVISIONS: DATE:

PROJECT / CLIENT:

SARATOGA HEIGHTS

WINDWARD REAL ESTATE SERVICES, INC

JOB ADDRESS:

8002 53RD AVE W
MUKILTEO, WA 98275

DRAWING NAME:

BUILDING G:
VIEW FROM SOUTHWEST

PHASE: PHASE 3 MODIFICATION

APPROVED FOR CONSTRUCTION:

PROJECT No.: 0079-13-005

DATE: 03/12/2019

10

PLOT SCALE: N/A

MEDICI ARCHITECTS

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SARATOGA HEIGHTS

WINDWARD REAL ESTATE SERVICES, INC

JOB ADDRESS:

8002 53RD AVE W
MUKILTEO, WA 98275

DRAWING NAME:

BUILDING G:
VIEW FROM WEST

PHASE: PHASE 3 MODIFICATION

APPROVED FOR CONSTRUCTION:

PROJECT No.: 0079-13-005

DATE: 03/12/2019

11

PLOT SCALE: N/A

MEDICI ARCHITECTS

11711 SE 8TH STREET, SUITE 100
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TEL: (425) 453-9298
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REGISTRATION:

INTAKE DATE:

REVISIONS: DATE:

PROJECT / CLIENT:

SARATOGA HEIGHTS

WINDWARD REAL ESTATE SERVICES, INC

JOB ADDRESS:

8002 53RD AVE W
MUKILTEO, WA 98275

DRAWING NAME:

BUILDING G:
VIEW FROM NORTH

PHASE: PHASE 3 MODIFICATION

APPROVED FOR CONSTRUCTION:

PROJECT No.: 0079-13-005

DATE: 03/12/2019

12

PLOT SCALE: N/A

CP|H
CONSULTANTS

Storm Drainage Report

Saratoga Heights Phase 2 and 3
CPH Project No. 0079-13-005

Engineering Permit

Prepared for:

Windward Real Estate Services, Inc.
Mr. Greg Krabbe
335 Park Place Center, G111
Kirkland, WA 98033

Prepared by:

CPH Consultants
Thomas Joachimides, PE
Jamie Schroeder, PE
11431 Willows Rd NE, Suite 120
Kirkland, WA 98033

April 12, 2017

January 9, 2019 (Revised)

CP|H
CONSULTANTS

STORM DRAINAGE REPORT

FOR

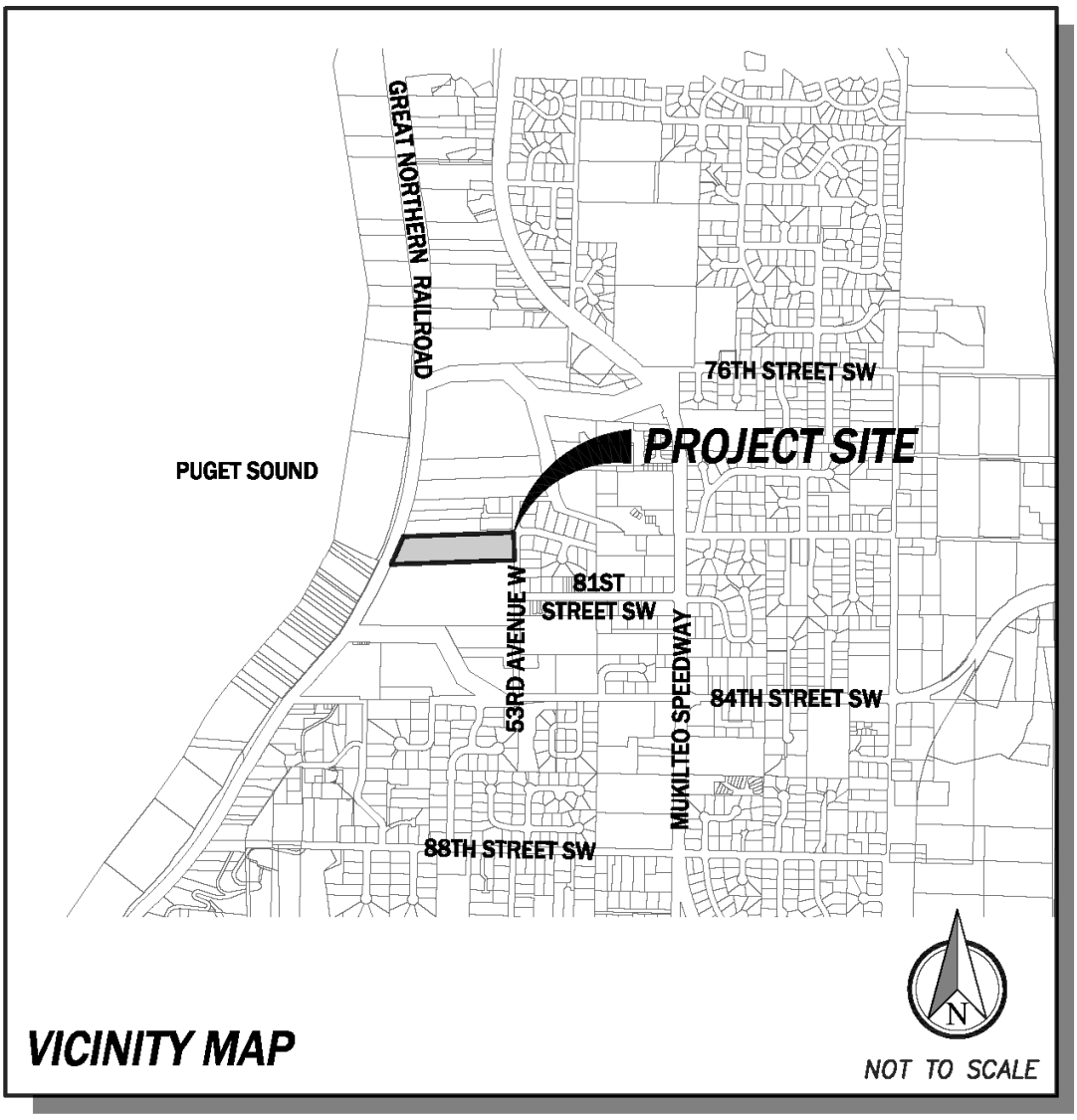
SARATOGA HEIGHTS PHASE 2 AND 3

MUKILTEO, WA

TABLE OF CONTENTS

SECTION 1 – PROJECT OVERVIEW

This Storm Drainage Report (SDR) describes the analysis of the surface water conditions, proposed development improvements, and required storm drainage facilities for Phase 2 and Phase 3 (Phase 2/3) of the Saratoga Heights single-family and multi-family residential project located in the city of Mukilteo, Washington. For the purposes of this report and associated analysis, Phase 2/3 storm water flows are combined into one vault and have been analyzed as such. It summarizes the analysis criteria for the storm drainage collection systems, water quality systems, and temporary construction Best Management Practices (BMPs) proposed for the second phase of the project. The Vicinity Map below illustrates the general location of the project site. Figures 1 and 2 of this report (see *Figures* section) illustrate the existing (i.e., pre-developed) and proposed developed conditions of the project area respectively.



The revised phase 2/3 site plan proposes to construct 14 townhomes (phase 2) and 15 condominium units (phase 3) consistent with current regulations of the City of Mukilteo multi-family residential (MRD) zoning and the Notice of Decision for Saratoga Heights, dated March 26, 2014. The proposed phase 2/3 revision will be subject to the Department of Ecology, 2012 Stormwater Management Manual for Western Washington, as amended in December 2014.

The project itself is situated on 4.95 acres located at 8002 53rd Avenue West within the City of Mukilteo (Snohomish County tax parcel nos. 00611600005400 and 0061600005500) which is south west of the intersection of 53rd Avenue West and 80th Street SW. It is generally located in the SW ¼ of Section 9 Township 28 North, Range 4 East, W.M., Mukilteo, Washington.

The phase 1 storm drainage collection system, the phase 1 and 2/3 stormwater vaults, and the steep slope tightline have all been installed per the approved plans (June 24, 2015). The existing topography generally falls east to west away from 53rd Avenue West at approximately 8-10% grades. The developable portion of the subject properties ends approximately 500 feet west of 53rd Avenue West where it slopes dramatically towards the Puget Sound. The project site has Landslide areas as shown on the city's Geological Features Boundary Map.

The developed Saratoga Heights site plan includes an estimated 2.0 acres of new impervious area in the form of building roofs, new sidewalk, driveway and parking. The primary use of the site will be multifamily residential. The project proposes to construct 8 individual detached single-family cottage residences (phase 1, vault 1), 4 duplex style residences (phase 1, vault 1), 14 townhome units (phase 2, vault 2), and 15 condo units (phase 3, vault 2). The project is proposed to be developed in three separate phases. Phase 1 has already been constructed and flows to vault 1, phase 2 and 3 will both flow to vault 2. Each vault will has its own flow control riser. The phases and vault contributing areas are shown on Figure 3 in the Appendix.

Surface water runoff from the new buildings and impervious area will be conveyed west via pipe and catch basin inlet conveyance to one of the proposed detention vaults. Controlled discharge from the detention vaults will be facilitated by a flow control riser and flow to a treatment vault. From the treatment vault, surface water then drains west through a proposed tightline and dispersed to the westerly property line and ultimately the Puget Sound.

Drainage Basin Summary Form (Snohomish County Form F-3042)

Project Total Area: 4.95 acre (total site)
Project Development Area: 2.75 acres
Number of Lots (project description): Multi-use project that proposes to develop 8 individual detached single-family residences (phase 1), 4 duplex style residences (phase 1), 14 townhome units (Phase 2), and 15 condominium units (phase 3) for a total of 41 dwelling units.

Drainage Basin Information*	**Basin Information**	
	Vault 1 (phase 1)	**Vault 2 (phase 2/3)**
Sub-basin Area, Developed (acres)	1.32	1.43
Type of Storage Proposed	Det. Vault	Det. Vault
Approx. Storage Volume (cu. ft.)	23,184	30,912
Soil Type(s)	C/D	C/D

Flows	**Pre-developed (POC 1)****	**Post-developed (POC 1)****
Q (cfs.) 2 yr.	0.042	0.017
10 yr.	0.078	0.032
100 yr.	0.143	0.064

*Appendix C of this Storm Drainage Report contains for peak flow rate calculations.
**Flows shown are total flows from vault 1 and 2 combined to POC 1.

SECTION 2 – EXISTING CONDITIONS SUMMARY

The Saratoga Heights site generally slopes from east to west at 8-10% slope for approximately 500 feet at which point the property slopes steeply to the Puget Sound. The site is bordered to the north and south by condominiums. 53rd Avenue W runs the length of the east border of the site while the Burlington Northern-Santa Fe Railroad runs the west boundary adjacent to the Puget Sound. The site is comprised of two adjoining parcels totaling 4.95 acres approximately 2.93 acres of which is developable due to the steep slopes on the western portion of the site.

The geotechnical report has been prepared by E3RA, Inc. and is dated September 30, 2013. The geotechnical report found the developable portion of the site consisting of 2 to 5 feet of forest duff overlying loose to medium dense ablation glacial till, comprised of gravely silty sand that can contain copious tree roots. Underlying the ablation glacial till dense to very dense basal glacial till was found.

Phase 1 and the storm drainage system has already been constructed. The remaining developable portion of the site has been cleared and is ready for construction.

SECTION 3 – SITE ANALYSIS

An analysis of the onsite and offsite drainage conditions has been performed in general accordance with the 2012 Department of Ecology's Stormwater Management Manual for Western Washington. This section provides a summary of that analysis. Additional supporting documentation of the existing downstream drainage systems are provided in Appendices of this report.

Off-site Analysis and Mitigation

The proposed project requires roadway frontage improvements that will increase off-site impervious area along 53rd Avenue W. These improvements include street pavement widening and the installation of curb, gutter and sidewalk. Figure 5 in Appendix A shows the proposed improvements. The improved frontages will be treated with the proposed pre-manufactured StormFilter™ treatment systems. These are explained in further detail in Section 4.

Downstream Analysis

Surface runoff generated from the site drains westerly to the steep slopes of the site then continues west eventually reaching the Puget Sound. To prevent erosion of the steep slopes on the western portion of the site a tightline will be used to convey stormwater down the slopes following an existing ravine to the adjacent Burlington Northern-Santa Fe Railroad. An existing 36" culvert will convey the stormwater under the railroad to the Puget Sound. The site will provide detention vaults and prior to discharge to the tightline system and railroad culvert which discharges to the Puget Sound and therefore does not have potential to create downstream flooding and erosion problems.

SECTION 4 – SWPPP, FLOW CONTROL, WATER QUALITY ANALYSIS AND DESIGN

Storm Water Pollution Prevention Plan (SWPPP)

See the SWPPP dated April 12, 2017 for detailed information.

Flow Control

The storm drainage analysis and facilities design for this project are proposed in general accordance with the 2012 Department of Ecology Stormwater Management Manual for Western Washington (DOE). The hydrologic analysis of the runoff conditions for the project site is based on drainage area characteristics such as basin area, soil type, and land use (i.e., pervious, impervious). Western Washington Hydrology Model (WWHM) software was used to evaluate the storm water hydrology/runoff conditions for Vault 1 and Vault 2.

Flow control facilities are proposed to mitigate storm water runoff peak rate increases resulting from the change in land use and additional impervious coverage on the site. This facility has been designed according to the following performance criteria in accordance with SCDM standards and the detention vaults were enlarged to meet the 100-yr event storms for additional safety given the steep slopes to the west:

Table 4.1 – Target Release Rate

Event Storm Recurrence	Target Release for Developed Site Conditions
Half 2-year, 24-hour	0.5 x Pre-developed 2-yr, 24-hour
100-year, 24-hour	Pre-developed 100-yr, 24-hour

On-Site Stormwater Management

Minimum Requirement #5 addresses the application of on-site stormwater management BMPs with the intent to "infiltrate, disperse, and retain stormwater runoff on-site to the extent feasible without causing flooding or erosion impacts." Requirements for this project are specified on Table I-2.5.1 and Figure I-2.5.1. These are included here with the relevant text highlighted.

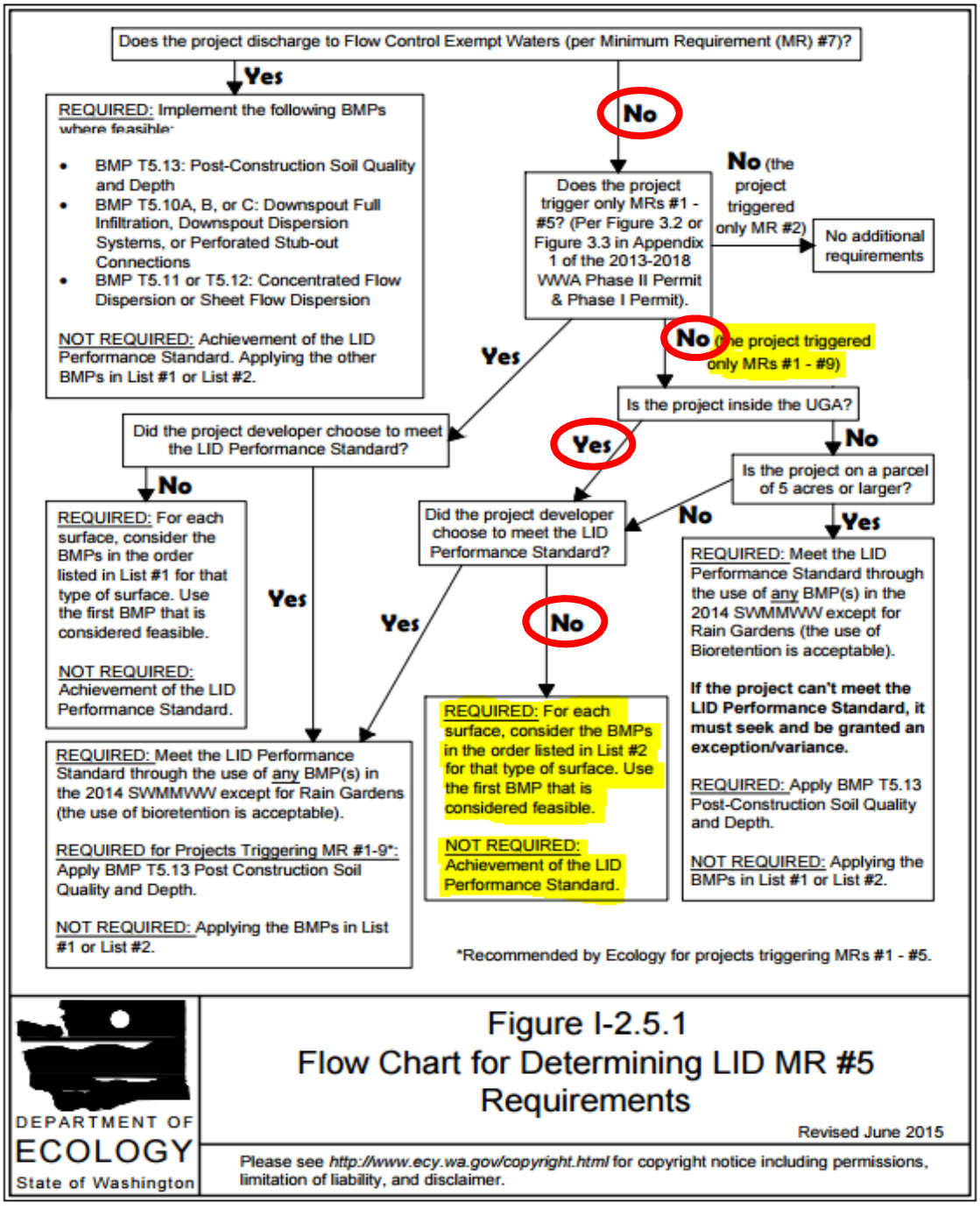


Table 2.5.1 On-site Stormwater Management Requirements for Projects Triggering Minimum Requirements #1 - #9	
Project Type and Location	**Requirement**
New development on any parcel inside the UGA, or new development outside the UGA on a parcel less than 5 acres	Low Impact Development Performance Standard and BMP T5.13; or List #2 (applicant option).
New development outside the UGA on a parcel of 5 acres or larger	Low Impact Development Performance Standard and BMP T5.13.
Redevelopment on any parcel inside the UGA, or redevelopment outside the UGA on a parcel less than 5 acres	Low Impact Development Performance Standard and BMP T5.13; or List #2 (applicant option).
Redevelopment outside the UGA on a parcel of 5 acres or larger	Low Impact Development Performance Standard and BMP T5.13.

The feasibility of the BMPs in DOE List #2 have been evaluated for the *Saratoga Heights Phase 2* project as a new development inside the UGA. BMPs listed were considered for each type of surface to determine if their use/application for this project was feasible based on the following criteria:

1. Design criteria, limitations, and infeasibility criteria identified for each BMP in this manual; and
2. Competing Need Criteria listed in Chapter V-5 – On-Site Stormwater Management.

Lawn and landscaped areas:

1. **Post-Construction Soil Quality and Depth in accordance with BMP T5.13**

   This BMP is feasible. All soils in lawn and landscaped areas will meet the design guidelines of BMP T5.13. This will be accomplished through one or more of the following implementation methods identified in the manual:

   a. retention of undisturbed native vegetation and soil, or
   b. amendment of existing site topsoil, or
   c. stockpiling and reuse of existing topsoil or import of approved topsoil mix.

Roofs:

1. **Full Dispersion in accordance with BMP T5.30, or Downspout Full Infiltration Systems in accordance with BMP T5.10A**

   These BMPs are not feasible. The geotechnical report recommends no water be allowed to flow freely and reach the top of the bluff as significant erosion has already taken place on the steep slopes. There are also no feasible locations on site where the required vegetated flow path length can be accommodated. The glacial till soil on site exhibits low permeability and is not a suitable receptor for infiltration or retention facilities.

2. **Bioretention facilities in accordance with BMP T7.30**

   This BMP is not feasible. The glacial till soil on site exhibits low permeability and is not a suitable receptor for infiltration or retention facilities. In addition, we do not want to introduce groundwater with the potential for migration to the top of the steep slope.

3. **Downspout Dispersion Systems in accordance with BMP T5.10B**

   This BMP is not feasible. The geotechnical report recommends no water be allowed to flow freely and reach the top of the bluff as significant erosion has already taken place on the steep slopes.

4. **Perforated Stub-out Connections in accordance with BMP T5.10C**

   This BMP is not feasible. The glacial till soil on site exhibits low permeability and is not a suitable receptor for infiltration or retention facilities and we do not want to introduce groundwater with the potential to migrate to the top of the steep slope.

Other Hard Surfaces:

1. **Full Dispersion in accordance with BMP T5.30**

   This BMP is not feasible. The geotechnical report recommends no water be allowed to flow freely and reach the top of the bluff as significant erosion has already taken place on the steep slopes to the west.

2. **Permeable Pavement in accordance with BMP T5.156**

   This BMP is not feasible. The glacial till soil on site exhibits low permeability and is not a suitable receptor for infiltration or retention facilities.

3. **Bioretention facilities in accordance with BMP T7.30**

   This BMP is not feasible. The glacial till soil on site exhibits low permeability and is not a suitable receptor for infiltration or retention facilities.

4. **Sheet Flow Dispersion in accordance with BMP T5.12, or Concentrated Flow Dispersion in accordance with BMP T5.11**

   This BMP is not feasible. The geotechnical report recommends no water be allowed to flow freely and reach the top of the bluff as significant erosion has already taken place on the steep slopes to the west.

The Geotechnical Report prepared by E3RA, Inc. (see Appendix A) specifically addresses the application of on-site stormwater management BMPs. In the Infiltration section of that report, Terra concludes that, "The glacial till soils composed of silty sand with gravel characteristically exhibits low permeability and would not be a suitable receptor soil for discharge of development stormwater using infiltration/retention facilities. Conventional stormwater detention with controlled release to the drainage basin should be used to manage development stormwater. Even low impact development

(LID) methods such as rain gardens ore dry wells would likely mound up and overtop during storm events."

Developed Site Hydrology

Developed site conditions within the study area were modeled based on the sub-basin configurations shown in Figure 4 and land use covers summarized in Table 4.2 and Table 4.3. A detailed summary of the peak design rates resulting from the hydrologic model of the developed site is provided in Appendix B. Table 4.4 summarizes the model results for the developed site hydrology. Historic forested site conditions are used for the predeveloped conditions.

Table 4.2 – Peak Design Rates, Predeveloped Conditions

Basin	Total Area (acres)	Pervious Forest Area (acres)	Pervious Lawn Area (acres)	Impervious Area (acres)
Phase 1	1.32	1.20	0.00	0.12
Phase 2/3	1.43	1.43	0.00	0.00
Total	**2.75**	**2.63**	**0.00**	**0.12**

Table 4.3 – Peak Design Rates, Developed Conditions – Mitigated Flow

Basin	Total Area (acres)	Pervious Forest Area (acres)	Pervious Lawn Area (acres)	Impervious Area (acres)
Phase 1	1.32	0.00	0.46	0.86
Phase 2/3	1.43	0.00	0.28	1.15
Total	**2.75**	**0.00**	**0.74**	**2.01**

The area of the first phase of the project which contributes to Vault 1 is approximately 1.34 acres, comprised of rooftops, sidewalks, roadways, and landscape areas. The area of the second phase of the project which contributes to Vault 2 is approximately 1.70 acres, comprised of rooftops, sidewalks, roadways, and landscape areas. Flow rates for on-site flows were determined using the Western Washington Hydrology Model (WWHM). Basin areas for the catchment areas are shown in Figure 4 of this report.

Table 4.4 – Peak Design Rates, Developed Conditions – Mitigated Flow

Contributing Drainage Sub-basins	Contributing Drainage Area (acres)	Developed Conditions (cfs)	
		(1/2) 2-yr	100-yr
POC 1	2.75	0.009	0.064

Water Quality Facilities

Water quality facilities are required to meet the basic water quality standards per the DOE Manual. Onsite water quality requirements are proposed to be met by a stand-alone StormFilter™ facility downstream of detention. Calculations for the minimum required filter performance are provided in Appendix C. The proprietary StormFilter™ facilities would be sited prior to the tightline system. As such, the water quality treatment capacity will be equivalent to the 2-year release rate. Table 4.5 provides a summary of the treatment flow rate provided by the treatment facility.

Table 4.5 – On-site Water Quality Treatment Facility

Treatment Facility	**Treatment Flow (cfs)**
	2-yr Facility Release Rate
SF99	0.02

Conveyance System

An analysis of the capacity of the conveyance facilities for the project was performed using a standard backwater approach. WWHM analysis software was used to generate the 100-year peak design flows as a basis for the backwater calculations for the tightline analysis. The completed backwater analysis confirmed that the proposed conveyance tightline has capacity for the proposed on-site development as well as both the Point View Condo drainage to the north of Saratoga Heights and the View Point Condo drainage to the south of Saratoga Heights. The storm drainage systems designed for the project contains 100-year design flows without overtopping catch basin/manhole inlets on the site. Conveyance calculations and figure are provided in Appendix B.

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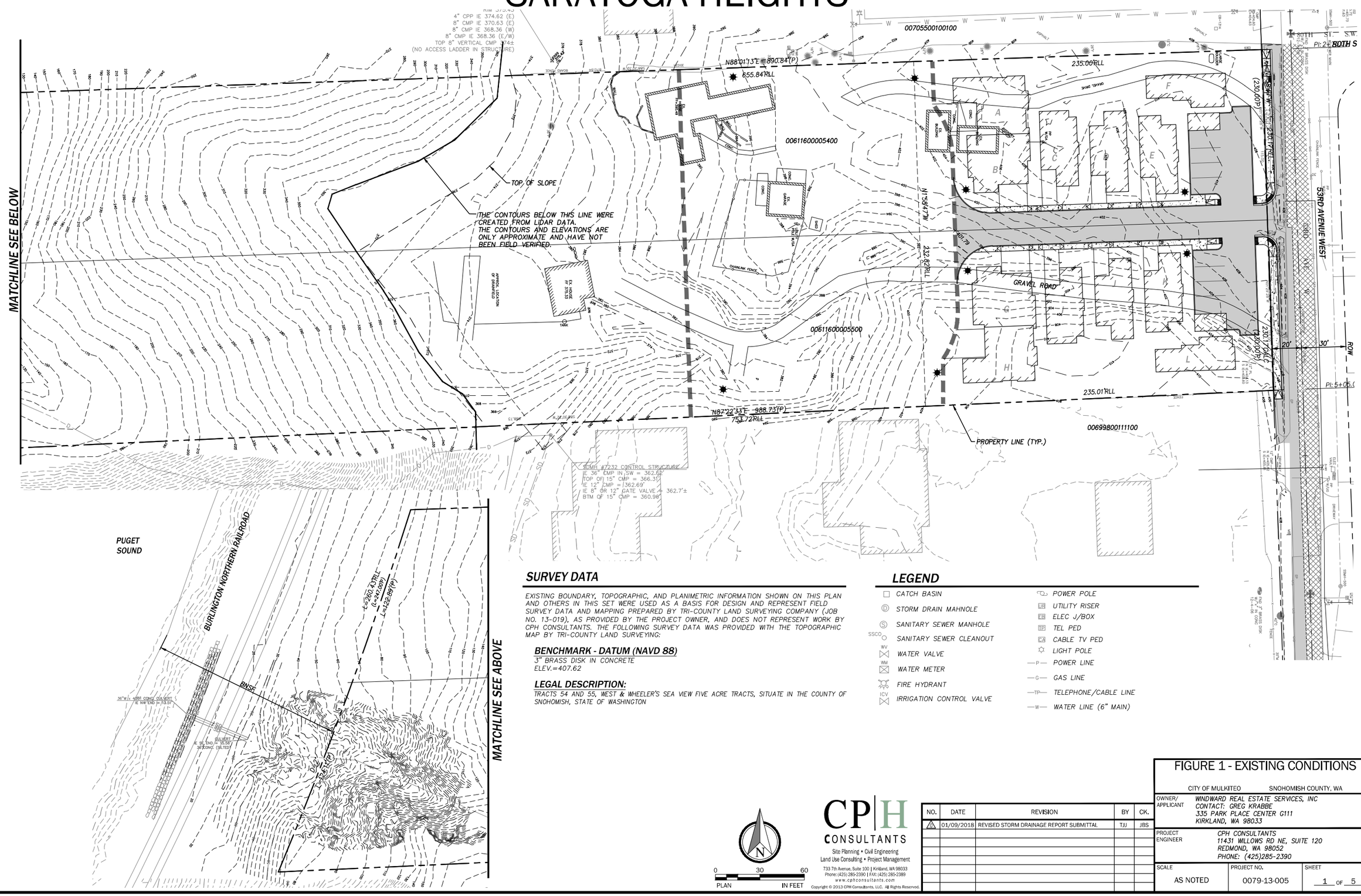
CONSULTANTS

FIGURES

SEC. 9, TWP 28 N, R4E W.M.

SARATOGA HEIGHTS



SURVEY DATA

EXISTING BOUNDARY, TOPOGRAPHIC, AND PLANIMETRIC INFORMATION SHOWN ON THIS PLAN AND OTHERS IN THIS SET WERE USED AS A BASIS FOR DESIGN AND REPRESENT FIELD SURVEY DATA AND MAPPING PREPARED BY TRI-COUNTY LAND SURVEYING COMPANY (JOB NO. 13-019), AS PROVIDED BY THE PROJECT OWNER, AND DOES NOT REPRESENT WORK BY CPH CONSULTANTS. THE FOLLOWING SURVEY DATA WAS PROVIDED WITH THE TOPOGRAPHIC MAP BY TRI-COUNTY LAND SURVEYING:

BENCHMARK - DATUM (NAVD 88)

3" BRASS DISK IN CONCRETE
ELEV.=407.62

LEGAL DESCRIPTION:

TRACTS 54 AND 55, WEST & WHEELER'S SEA VIEW FIVE ACRE TRACTS, SITUATE IN THE COUNTY OF SNOHOMISH, STATE OF WASHINGTON

LEGEND

- CATCH BASIN
- STORM DRAIN MAHNOLE
- SANITARY SEWER MANHOLE
- SANITARY SEWER CLEANOUT
- WATER VALVE
- WATER METER
- FIRE HYDRANT
- IRRIGATION CONTROL VALVE
- POWER POLE
- UTILITY RISER
- ELEC J/BOX
- TEL PED
- CABLE TV PED
- LIGHT POLE
- POWER LINE
- GAS LINE
- TELEPHONE/CABLE LINE
- WATER LINE (6" MAIN)

0 30 60
PLAN IN FEET

CPH CONSULTANTS
Site Planning • Civil Engineering
Land Use Consulting • Project Management
733 7th Avenue, Suite 100 | Kirkland, WA 98033
Phone: (425) 285-2390 | FAX: (425) 285-2389
www.cphconsultants.com

NO.	DATE	REVISION	BY	CK.
1	01/09/2018	REVISED STORM DRAINAGE REPORT SUBMITTAL	TJJ	JBS

FIGURE 1 - EXISTING CONDITIONS

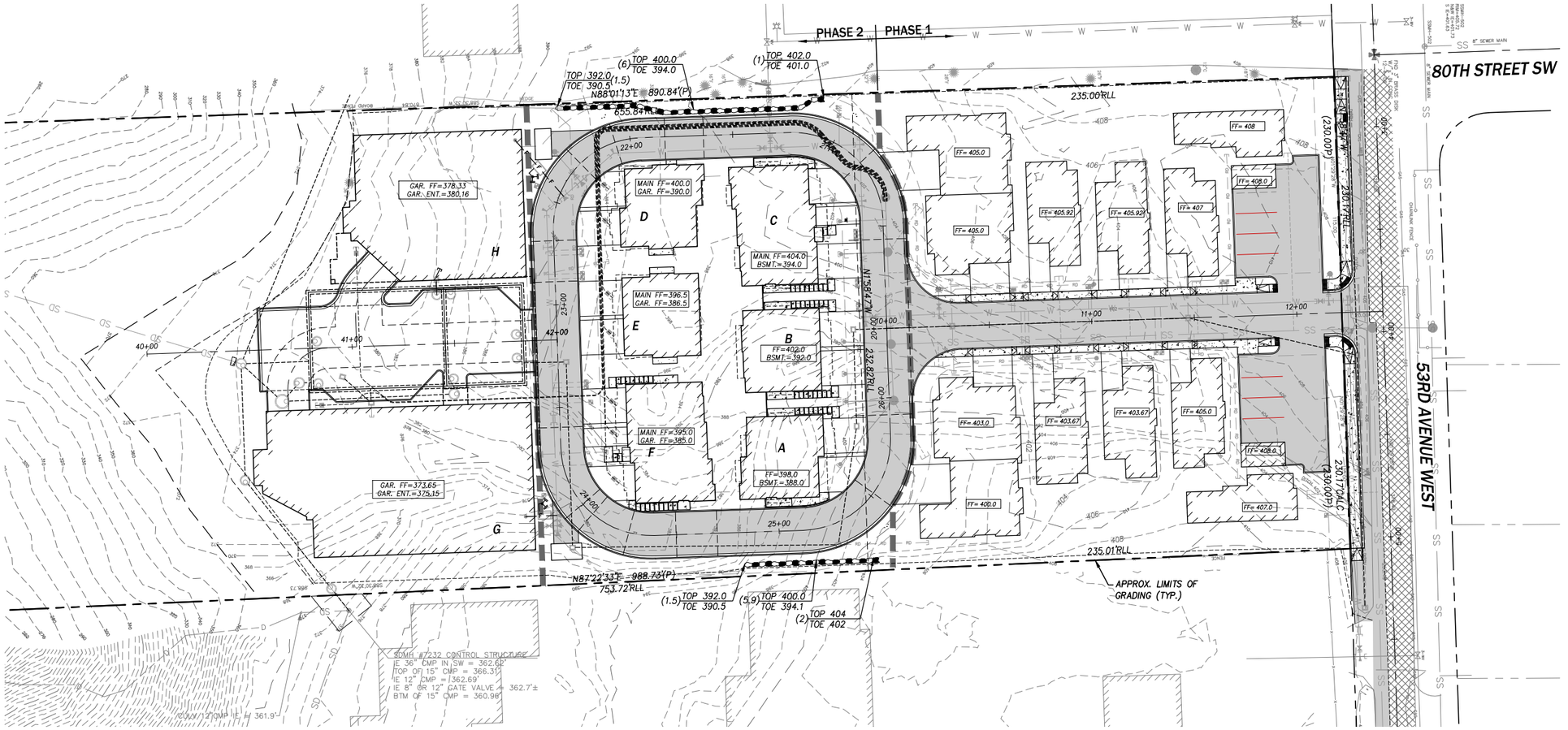
CITY OF MULKITEO SNOHOMISH COUNTY, WA

OWNER/APPLICANT: WINDWARD REAL ESTATE SERVICES, INC
CONTACT: GREG KRABBE
335 PARK PLACE CENTER G111
KIRKLAND, WA 98033

PROJECT ENGINEER: CPH CONSULTANTS
11431 WILLOWS RD NE, SUITE 120
REDMOND, WA 98052
PHONE: (425)285-2390

SCALE	PROJECT NO.	SHEET
AS NOTED	0079-13-005	1 OF 5

SEC. 29, TWP 21 N, R4E W.M.



LEGEND

- GRADE BREAK
- APPROX. LIMITS OF CLEARING
- 100.00 — SPOT ELEVATION
- FF= 500.00 — FINISH FLOOR ELEV.
- CRIBLOCK RETAINING WALL SEE DETAIL ON C3.104
- 160 — EXIST. TOPOGRAPHIC CONTOUR
- 160 — PROPOSED GRADE CONTOUR
- TYPE 1 STORM DRAINAGE CATCH BASIN
- TYPE 2 STORM DRAINAGE CATCH BASIN
- SD — STORM DRAINAGE PIPE
- PROPOSED BLDG.
- TOP 246 TOE 242 (4) — FINISHED GRADE AT TOP/TOE OF WALL
- PROTECT EXIST. TREE(S)
- EXIST. TREE TO BE REMOVED
- STANDARD AC PAVEMENT (PER DETAIL ON C2.101)
- 2" HMA OVERLAY (PER DETAIL ON C2.101)

APPROXIMATE EARTHWORK QUANTITIES

TOTAL PROJECT AREA:	4.95 AC
CLEARED AREA:	2.63 AC
CUT:	7,750 CY
FILL:	7,950 CY
NET (FILL):	200 CY

NOTES:
1. SEE ARCHITECTUAL PLANS FOR LAYOUT GRADES OF ALL STAIRS AND SIDEWALKS BETWEEN BUILDINGS C AND D

NO.	DATE	REVISION	BY	CK.
1	01/09/19	REVISED STORM DRAINAGE REPORT SUBMITTAL	TJJ	JBS

SARATOGA HEIGHTS
ROADWAY, GRADING AND DRAINAGE IMPROVEMENTS
PROPOSED DEVELOPED CONDITIONS
SNOHOMISH COUNTY
MUKILTEO

CLIENT
WINDWARD REAL ESTATE SERVICES, INC
GREG KRABBE
335 PARK PLACE CENTER G111
KIRKLAND, WA 98033

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PROJECT NO.
0079-13-005

DRAWING
FIGURE 2

SHEET 2 OF 5

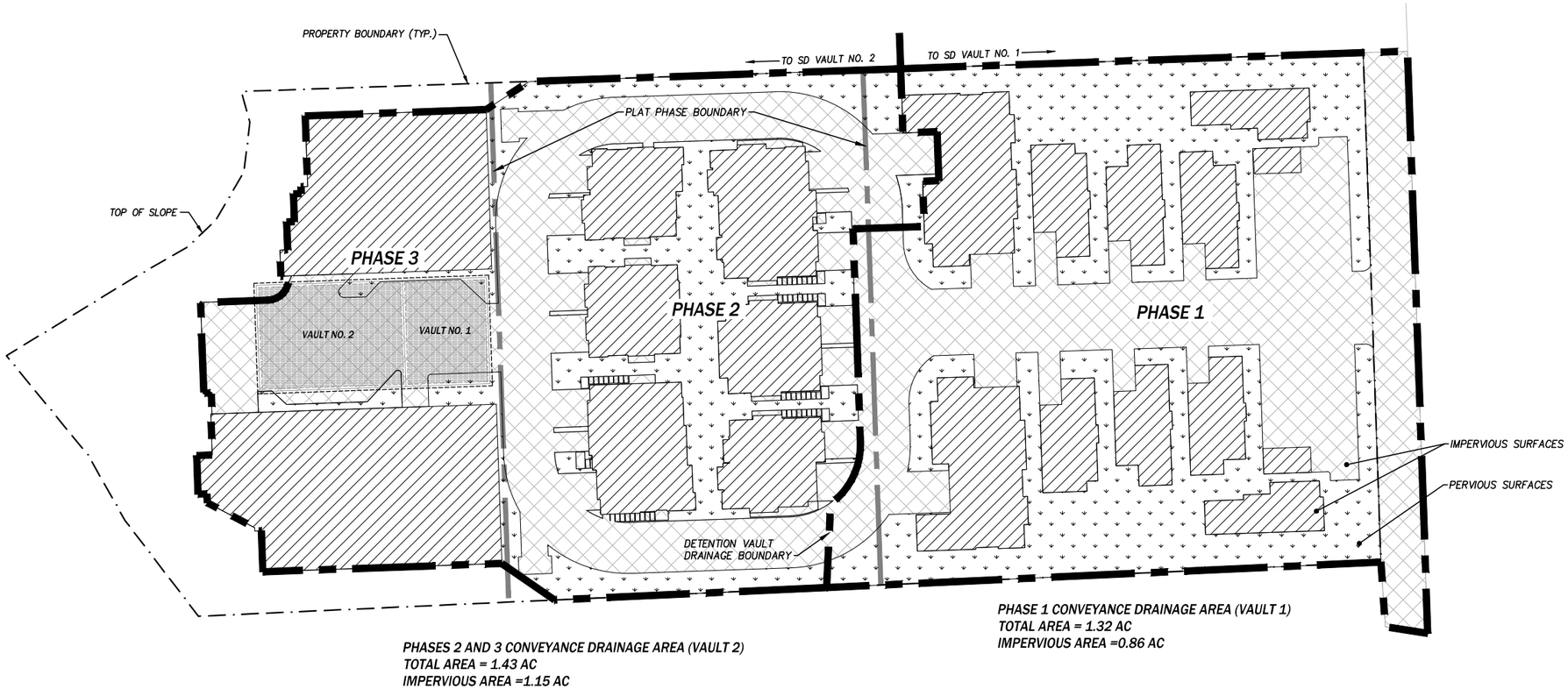
N

0 30 60
PLAN IN FEET

CALL BEFORE YOU DIG
1-800-424-5555

SEC. 9, TWP 28 N, R4E W.M.

SARATOGA HEIGHTS



PHASES 2 AND 3 CONVEYANCE DRAINAGE AREA (VAULT 2)
TOTAL AREA = 1.43 AC
IMPERVIOUS AREA =1.15 AC

PHASE 1 CONVEYANCE DRAINAGE AREA (VAULT 1)
TOTAL AREA = 1.32 AC
IMPERVIOUS AREA =0.86 AC

NOTES:

PHASE 2 AND 3 STORMWATER RUNOFF ARE BOTH COLLECTED IN VAULT NO. 2 AND HAVE BEEN ANALYZED AS SUCH.

N

0 30 60
PLAN IN FEET

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NO.	DATE	REVISION	BY	CK.
1	01/09/2019	DETENTION VAULT BASIN AREAS	AMS	TJJ

FIGURE 3 - DETENTION VAULT BASIN AREAS

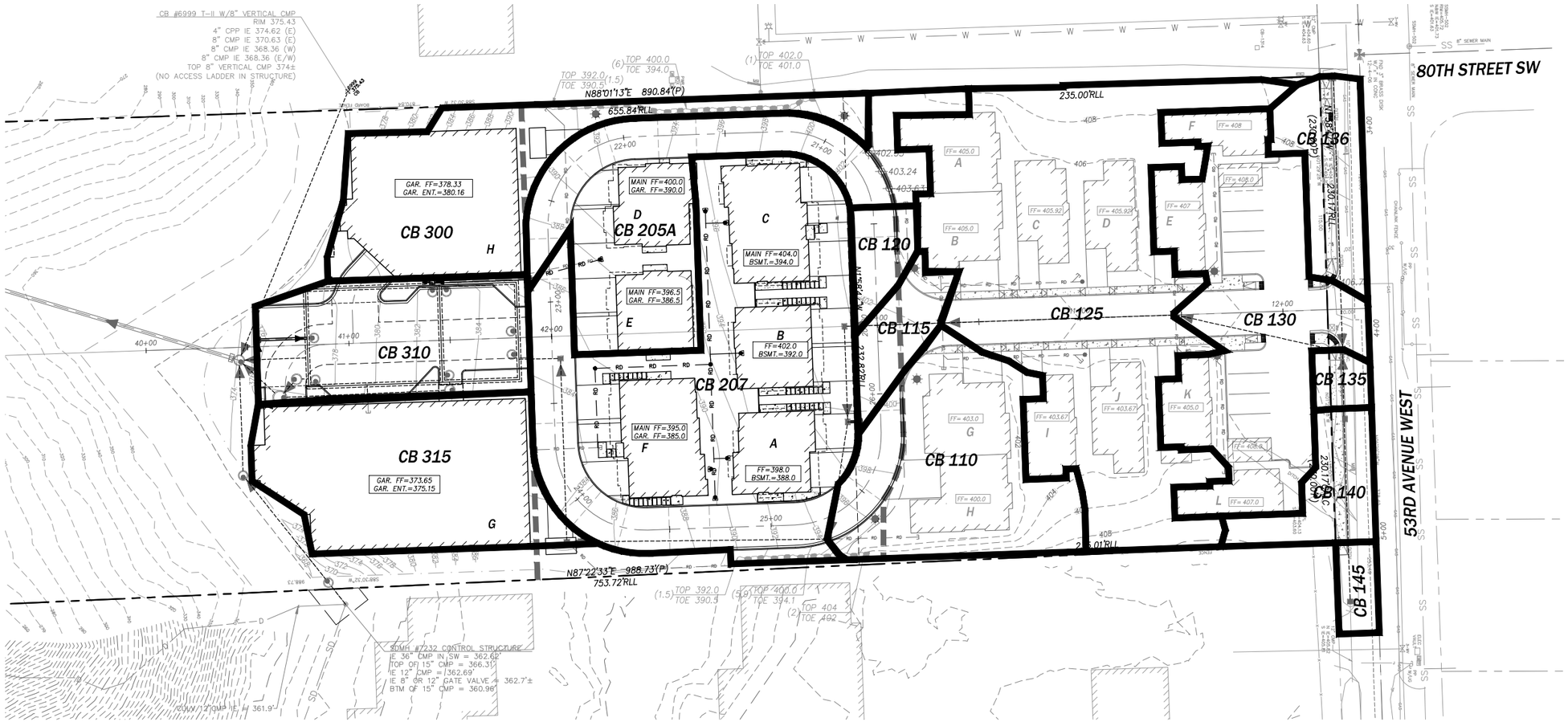
CITY OF MULKITEO SNOHOMISH COUNTY, WA

OWNER/ APPLICANT	*WINDWARD REAL ESTATE SERVICES, INC* *CONTACT: GREG KRABBE* *335 PARK PLACE CENTER G111* *KIRKLAND, WA 98033*
PROJECT ENGINEER	*CPH CONSULTANTS* *11431 WILLOWS RD NE, SUITE 120* *REDMOND, WA 98052* *PHONE: (425)285-2390*

SCALE	PROJECT NO.	SHEET
AS NOTED	0079-13-005	3 OF 5

SEC. 9, TWP 28 N, R4E W.M.

SARATOGA HEIGHTS



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NO.	DATE	REVISION	BY	CK.
1	01/09/2019	REVISED STORM DRAINAGE REPORT SUBMITTAL	TJJ	JBS

FIGURE 4 - CONVEYANCE BASIN AREAS

CITY OF MULKITEO SNOHOMISH COUNTY, WA

OWNER/ APPLICANT: *WINDWARD REAL ESTATE SERVICES, INC*
CONTACT: GREG KRABBE
335 PARK PLACE CENTER G111
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SCALE	PROJECT NO.	SHEET
AS NOTED	0079-13-005	4 OF 5

SEC. 29, TWP 21 N, R4E W.M.

PHASE 3 | PHASE 2 | PHASE 2 | PHASE 1

PROPERTY BOUNDARY (TYP.)

00705500100100

STA 20+81.09, 10.29' RT
END PHASE 1
IMPROVEMENTS

80TH STREET SW

N88°01'13"E 890.84'(P)
655.84'RLL

235.00'RLL

PC=21+84.86
PT=21+22.18

ROAD B

TOWNHOMES (TYP.)

R=55'

PT=22+63.96

PC=20+53.07

TYP.

00611600005400

TOP OF SLOPE

25' BSBL

ROLLED CURB AT PLAZA ENTRY (TYP.)

REC. AREA

WOONERF PLAZA

RECREATION AREA

N15°58'47"W (230.00')

230.17'RLL

00661300001800

ROAD A

00611600005500

232.28'RLL

PC=23+70.02

PT=25+80.86

TYP.

ROAD B

PT=24+39.09

PC=25+11.61

R=55'

N87°22'33"E 988.73'(P)
753.72'RLL

235.01'RLL

STA 25+53.73, 11.50' RT
END PHASE 1
IMPROVEMENTS

PROPERTY LINE (TYP.)

00699800111100

CEMENT CONC. SIDEWALK TRANSITION TO SHOULDER, SEE DTL. ON SHT. C1.102

TOWNHOMES (TYP.)

PHASE 2 (29 BU)

PHASE 1 CONSTRUCTED SEE AS-BUILTS

SDMH #7232 CONTROL STRUCTURE
IE 36" CMP IN SW = 362.60'
TOP OF 15" CMP = 366.31'
IE 12" CMP = 362.69'

53RD AVENUE WEST

ROW 20' 30' ROW

81ST STREET SW

CONSTRUCTION NOTES

1. CRIBLOCK RETAINING WALL PER DETAIL ON SHEET C3.104
2. TYPE SINGLE DIRECTION A CURB RAMP PER WSDOT STD. PLAN F-40.16-02
3. TYPE PARALLEL A CURB RAMP PER WSDOT STANDARD PLAN F-40.12-02
4. CEMENT CONCRETE DRIVEWAY APRON PER COM STD. PLANS, 12' MIN. WIDTH
5. CEMENT CONCRETE BARRIER CURB PER DETAIL ON SHEET C2.102; APPROX. LENGTH PER PLAN
6. CEMENT CONCRETE VERTICAL CURB AND GUTTER PER COM STD. PLANS; APPROX. LENGTH PER PLAN
7. CEMENT CONCRETE SIDEWALK PER COM STD. PLANS; SIDEWALK WIDTH PER PLAN
8. CEMENT CONCRETE SIDEWALK WITH INTEGRAL CURB PER DETAIL ON SHEET C2.102; APPROX. LENGTH PER PLAN
9. STANDARD PARKING STALL PAVEMENT MARKINGS PER DETAIL ON SHEET C2.102
10. SAWCUT, REMOVE, AND REPLACE EXIST. AC PAVEMENT SECTION
11. MAILBOX LOCATION
12. PAINT FACE OF CURB AND MARK ADJACENT PAVEMENT "FIRE LANE NO PARKING"
13. LUMINAIRES, SEE DETAILS ON SHEET C2.102 AND NOTE 4 THIS SHEET.

LEGEND

- PROPOSED BUILDING
- SIDEWALK W/INTEGRAL CURB
- SIDEWALK
- STANDARD AC PAVEMENT (PER DETAIL ON C2.101)
- LUMINAIRE

NOTES:
1. SEE ARCHITECTURAL PLANS W/BUILDING PERMIT FOR ADDITIONAL SITE LAYOUT INFORMATION.
2. ALL DIMENSIONS ARE TO FRONT FACE OF CURB UNLESS NOTED OTHERWISE.
3. ALL UTILITY TRENCHES CONSTRUCTED IN THE PUBLIC RIGHT OF WAY SHALL BE CONSTRUCTED IN ACCORDANCE WITH STD DWG, UTILITY TRENCH RESTORATION AND BACKFILL AND STD DWG, GENERAL RIGHT-OF-WAY RESTORATION REQUIREMENTS.
4. LUMINAIRES LOCATED ADJACENT TO NEIGHBORING PROPERTIES SHALL PROVIDE SHIELDING TO BLOCK LIGHT SPILLAGE ONTO ADJACENT PROPERTIES.

0 30 60
PLAN IN FEET

CALL BEFORE YOU DIG 1-800-424-5555

NO.	DATE	REVISION	BY	CK.
1	01/09/19	REVISED STORM DRAINAGE REPORT SUBMITTAL	TJJ	JBS

SARATOGA HEIGHTS
ROADWAY, GRADING AND DRAINAGE IMPROVEMENTS
SITE LAYOUT

SNOHOMISH COUNTY
MUKILTEO

CLIENT
WINDWARD REAL ESTATE SERVICES, INC
GREG KRABBE
335 PARK PLACE CENTER G111
KIRKLAND, WA 98033

CPH CONSULTANTS
Site Planning • Civil Engineering
Land Use Consulting • Project Management
733 7th Avenue, Suite 100 | Kirkland, WA 98033
Phone: (425) 285-2390 | FAX: (425) 285-2389
www.cphconsultants.com

PROJECT NO.
0079-13-005

DRAWING
FIGURE 5

SHEET 5 OF 5

CP|H
CONSULTANTS

APPENDIX A

GEOTECHINCAL ENGINEERING REPORT (E3RA, INC. SEPTEMBER 30, 2013)

E3RA

Geotechnical Report

Saratoga Passage Residential Development
SW Intersection 53rd Ave W and 80th St SW
Mukilteo, Washington

Submitted to:

Windward Real Estate Services, Inc.
Attention: Jim Tosti
335 Park Place Center G111
Kirkland, Washington 98033

Submitted by:

E3RA, Inc.
9802 29th Avenue W, B102
Everett, Washington 98204

September 30, 2013

Project No. E13052

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APPENDIX A

9802 29th Ave W, B102
Everett, WA 98204
425-356-3372
425-356-3374 Fax

E3RA

September 30, 2013
E13052

Windward Real Estate Services, Inc.
335 Park Place Center G111
Kirkland, Washington 98033

Attention: Jim Tosti

Subject: **Geotechnical Report**
Saratoga Passage Residential Development
Southwest Intersection 53rd Avenue West and 80th Street Southwest
Mukilteo, Washington

Dear Mr. Tosti:

E3RA is pleased to submit this Geotechnical Report for the Saratoga Passage residential development planned at the southwest corner of 53rd Avenue West and 80th Street Southwest in Mukilteo, Washington.

Our scope of services is limited to surface observations, subsurface explorations, geologic research, and report preparation. This report has been prepared for the exclusive use of Windward Real Estate Services, Inc., and their consultants, for specific application to this project in accordance with generally accepted geotechnical practice.

1.0 SITE AND PROJECT DESCRIPTION

The site is located east of Naketa Beach on uplands that overlook Possession Sound in Mukilteo, Washington, as shown on our Topographic and Location Map (Figure 1). It is a rectangular-shaped parcel that measures about 250 feet north to south and extends from 53rd Avenue West over 800 feet west to the top of a steep bluff.

Plans call for the construction of ten two-story, single family and duplex residences on the east and central parts of the site and 4 five-story apartment buildings on the west part of the site. The first floor of the apartment buildings will be used for parking and will be excavated into the gentle slope upon which they will be built. At the present time, cuts and fills of up to ten feet are planned as part of the grading activities for the project.

2.0 EXPLORATORY METHODS

We observed site and subsurface conditions on July 31 and August 12, 2013. Our evaluation program for the project comprised the following elements:

- A surface reconnaissance of the site;
- Six test pit explorations (designated TP-1 through TP-6) advanced across the site;

- One geotechnical auger boring (designated B-1) advanced on the west part of the site near the bluff; and
- A review of published geologic and seismologic maps and literature.

Table 1 summarizes the approximate functional locations and termination depths of the observed septic test pits and Figure 2 depicts the approximate relative locations of the explorations.

TABLE 1
APPROXIMATE LOCATIONS AND DEPTHS OF EXPLORATIONS

Exploration	Functional Location	Depth (feet)
TP-1	East site	4½
TP-2	Central site	7½
TP-3	Central site	5
TP-4	West-central site	10
TP-5	West-central site	9
TP-6	West site	4½
B-1	West site	57

The specific number and locations of our explorations were selected in relation to the existing site features, under the constraints of surface access, underground utility conflicts, and budget considerations.

It should be realized that the explorations performed and utilized for this evaluation reveal subsurface conditions only at discrete locations across the project site and that actual conditions in other areas could vary. Furthermore, the nature and extent of any such variations would not become evident until additional explorations are performed or until construction activities have begun. If significant variations are observed at that time, we may need to modify our conclusions and recommendations contained in this report to reflect the actual site conditions.

2.1 Test Pit Procedures

Our exploratory test pits were excavated with a rubber tracked excavator by a firm contract to E3RA. An engineering geologist from our firm observed the test pit excavations and logged the subsurface conditions.

The enclosed test pit logs indicate the vertical sequence of soils and materials encountered in each test pit, based on our field classifications. Where a soil contact was observed to be gradational or undulating, our logs indicate the average contact depth. We estimated the relative density and consistency of the in-situ soils by means of the excavation characteristics and the stability of the test pit sidewalls. Our logs also indicate the approximate depths of any sidewall caving or groundwater seepage observed in the test pits. The soils were classified visually in general accordance with the system described in Figure A-1, which includes a key to the exploration logs. Summary logs of the explorations are included in Appendix A.

2.2 Auger Boring Procedures

Our exploratory boring was advanced through the soil with a hollow-stem auger, using a track-mounted drill rig operated by an independent drilling firm working under subcontract to E3RA. A geologist from our firm continuously observed the boring, logged the subsurface conditions, and collected representative soil samples. All samples were stored in airtight containers and later transported to a laboratory for further visual examination. After the boring was completed, the borehole was backfilled with bentonite

chips. Soils were classified visually in general accordance with the system described in Figure A-1, which includes a key to the exploration logs. Summary log of the exploration is included in Appendix A.

Throughout the drilling operation, soil samples were obtained at 5-foot depth intervals by means of the Standard Penetration Test (SPT) per American Society for Testing and Materials (ASTM) D-1586. This testing and sampling procedure consists of driving a standard 2-inch-diameter steel split-spoon sampler 18 inches into the soil with a 140-pound hammer free-falling 30 inches. The number of blows required to drive the sampler through each 6-inch interval is counted, and the total number of blows struck during the final 12 inches is recorded as the Standard Penetration Resistance, or "SPT blow count." If a total of 50 blows are struck within any 6-inch interval, the driving is stopped and the blow count is recorded as 50 blows for the actual penetration distance. The resulting Standard Penetration Resistance values indicate the relative density of granular soils and the relative consistency of cohesive soils.

The enclosed boring logs describe the vertical sequence of soils and materials encountered in our borings, based primarily on our field classifications and supported by our subsequent laboratory examination and testing. Where a soil contact was observed to be gradational, our logs indicate the average contact depth. Where a soil type changed between sample intervals, we inferred the contact depth. Our logs also graphically indicate the blow count, sample type, sample number, and approximate depth of each soil sample obtained from the borings, as well as any laboratory tests performed on these soil samples. If any groundwater was encountered in the boreholes, the approximate groundwater depth is depicted on the boring logs. Groundwater depth estimates are typically based on the moisture content of soil samples, the wetted height on the drilling rods, and the water level measured in the boreholes after the auger has been extracted.

3.0 SITE CONDITIONS

The following sections present our observations, measurements, findings, and interpretations regarding, surface, soil, groundwater, seismic, liquefaction, and slope conditions.

3.1 Surface Conditions

Generally, the site can be divided into two general topographic parts. The first is an upland, which is where the development will occur and comprises the east part of the site. The second is a 350 foot high steep bluff and hillside, which extends west and descends down from the upland toward Possession Sound. The bluff descends, at nearly vertical grades, down from the upland at for 40 to 50 feet. Below the bluff, the hillside descends steeply down toward to the Sound.

The upland of the site can be divided into three parts. The first is the forested, level to gently sloping, east half in which a swale, which is located near the east boundary and is aligned east to west, trends down to the west toward the west part of the upland. The second area, which comprises the central-west part of the site, is a slope that descends down to the west at 15 percent or so over an elevation change of about 20 feet. The third part is the relatively level west one-fifth of the site, which terminates, to the west, at the top of the bluff.

The Coastal Zone Atlas maps the entire upland area as S, Stable. The Coastal Zone Atlas maps most of the bluff as Uos, unstable, old landslide, although several small areas near the railroad grade are mapped Urs, unstable, recent landslide. Uos mapping identifies post-glacial but prehistoric landslide areas while Urs mapping identifies recent or historically active landslide areas that occurred prior to the late 1970s, when the field work for the Coastal Zone Atlas was conducted.

Three houses and several outbuildings, all abandoned, currently occupy the upland. A gravel driveway, which parallels the north boundary and extends west from 53rd Avenue west to the central part of the site, provides site access. An abandoned driveway parallels the south boundary. Construction of the south driveway appears to have required some cutting and filling to traverse the swale located there and to address site grades. Reportedly, a septic drain field is located in a grassy area on the northwest part of the site. A small, wooden viewing platform extends out over the top of the central part of the bluff.

Vegetation on the east part of the site consists mostly of large fir, cedars, and maples with an under story of ferns and other brush. Some ornamental shrubbery and fruit trees grow near the abandoned houses. Much of the west part of the site is covered with grass lawn. A vegetative buffer, 20 to 25 feet wide and comprised mostly of salal, extends onto the upland from the top of the central and east parts of the bluff.

E3RA did not perform a reconnaissance of the bluff because of safety considerations. Oblique shoreline photographs, dated June 27, 2006 and available online through the Washington State Department of Ecology, depict the bluff as heavily vegetated with mostly hardwood trees. Bare soils are visible only in a small area near the bluff top, where, viewed by E3RA from the upland, the bluff is nearly vertical and vegetation cannot get a purchase (no slide deposits are visible below this area), and on the lower quarter of the bluff, near the railroad tracks, where it appears that several small landslides have occurred. These landslides are in the same area that is mapped as Urs by the Coastal Zone Atlas.

No seeps, springs or other surface expressions of groundwater were observed on the upland. No streams, channels, or other signs of surface flow were observed on the upland, except for the swale along the south boundary.

3.2 Soil Conditions

Our test pit explorations indicate that soils on the forested eastern half of the upland are comprised of a surface mantling of forest duff overlying, to a depth that varies from 2 to 5 feet, loose to medium dense ablation glacial till, comprised of gravelly silty sand that can contain copious tree roots. Underlying the ablation glacial till, and extending to the termination of our test pit exploration, we observed dense to very dense basal glacial till, which are comprised of silty, gravelly sand with some cobbles.

Our test pit exploration, TP-6, and our auger boring, B-1, conducted in the westernmost part of the upland, indicated that soils there are comprised of the same ablation/basal glacial till deposits encountered on the east pat of the site, except that the surface is mantled with 8 or so inches of sod and topsoil, instead of forest duff. Our auger boring also indicates that the basal glacial till layer extends down to a depth of at least 57 feet (refusal to drilling was met at that depth due to hard soils). The observed ablation and basal glacial till soils were deposited during the Vashon Glaciation, which ended approximately 12,000 years ago.

We conducted two test pit explorations on the sloped, central part of the upland. There native soils are comprised of medium dense to dense, inter-bedded silty sand, silt, and gravelly sand. It is likely that these soils are ice-contact sediments deposited near the end of the Vashon Glaciation, when the Vashon Glacier was down-wasting.

The enclosed exploration logs (Appendix A) provide a description of the soil strata observed in our subsurface explorations.

3.3 Groundwater Conditions

No seeps, springs or other surface expressions of groundwater were observed on the site. Our subsurface explorations, which extended down to a maximum depth of 57 feet, did not encounter groundwater. It is possible that temporary, perched groundwater forms during the rainy season at the contact between the loose to medium dense ablation glacial till layer and the underlying dense to very dense basal glacial till layer. In our opinion, groundwater is not at a depth that will affect site development or site slope stability.

3.4 Seismic Conditions

Based on our analysis of subsurface exploration logs and our review of published geologic maps, we interpret the onsite soil conditions to generally correspond with site class C, as defined by Table 1613.5.2 of the 2012 *International Building Code (IBC)*.

Using 2012 UBC information on the USGS Design Summary Report website, Risk Category I/II/III seismic parameters for the site are as follows:

S_s = 1.449 g	$S_{\mu s}$ = 1.449 g	S_{DS} = 0.966 g
S_1 = 0.566 g	$S_{\mu 1}$ = 0.736 g	S_{D1} = 0.491 g

Using the 2012 IBC information, MCE_R Response Spectrum Graph on the USGS Design Summary Report website, Risk Category I/II/III, S_a at a period of 0.2 seconds is 1.43 g and S_a at a period of 1.0 seconds is 0.70g.

The Design Response Spectrum Graph from the same website, using the same IBC information and Risk Category, S_a at a period of 0.2 seconds is 0.97 g and S_a at a period of 1.0 seconds is 0.50 g.

3.5 Liquefaction Potential

Liquefaction is a sudden increase in pore water pressure and a sudden loss of soil shear strength caused by shear strains, as could result from an earthquake. Research has shown that saturated, loose sand with fines (silt and clay) content less than about 20 percent are most susceptible to liquefaction. No easily liquefiable soils underlie the project site.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Plans call for the construction of ten two-story, single family and duplex residences on the east and central parts of the site and 4 five-story apartment buildings on the west part of the site. A steep bluff is located on the westernmost part of the site.

The first floor of the apartment buildings will be used for parking and will be excavated into the gentle slope upon which they will be built. We offer the following general geotechnical conclusions and recommendations concerning this project.

- Landslide Hazards: In our opinion, based on our site observations, and geologic research, the site is globally stable. The planned development will not adversely affect slope stability on the site if our recommendations are followed.
- Storm Water Disposal: Storm water should not be allowed to flow freely over the top of the bluff or down the bluff face. Storm water should either be tight-lined down to Possession Sound or directed to an offsite storm water system. Runoff from the

neighboring property to the south should be combined with site runoff as part of the tight-line to the Sound.

- Erosion Hazards: We recommend that silt fences be placed down gradient from work areas where soils have been disturbed. Specific recommendations for silt fences are provided in the Section 4.1.
- Foundation Subgrades: Foundations should bear on medium dense or denser soils that are free of organics, which are usually present within 3 feet of the surface, although, root-rich soils can extend down deeper than 3 feet in heavily timbered areas.
- Buffers and Setbacks: We recommend that all of the brushy vegetation that grows on the upland near the top-of-slope of the bluff (which is dominated by salal) remain as a vegetative buffer. We recommend that buildings set back at least 25 feet from the top-of-slope of the bluff, and that all of the area between the westernmost buildings and the top-of-slope not included in the vegetative buffer area just described be vegetated.
- Groundwater: Surface expressions of groundwater were not observed on site. It is our opinion that groundwater does not currently affect slope stability on site or nearby off site and, based on observations on site and nearby off site, that it is too deep to affect the planned construction.

The following sections present our specific geotechnical conclusions and recommendations concerning site preparation, concrete foundations, slab-on-grade floors, drainage systems, and structural fill. The Washington State Department of Transportation (WSDOT) Standard Specifications and Standard Plans cited herein refer to WSDOT publications M41-10, *1996 Standard Specifications for Road, Bridge, and Municipal Construction*, and M21-01, *Standard Plans for Road, Bridge, and Municipal Construction*, respectively.

4.1 Site Preparation

Preparation of the project site should involve demolition, erosion control, temporary drainage, clearing, stripping, cutting, filling, excavations, and subgrade compaction.

Demolition and Clean-Up: The first step in site preparation will likely consist of demolishing existing structures. Any associated underground structural elements or utilities, such as old footings, stemwalls, and drainpipes, should be exhumed as part of this demolition operation.

Erosion Control: Before new construction begins, an appropriate erosion control system should be installed. This system should collect and filter all surface run off from the construction areas through silt fencing. We anticipate a system of berms and drainage ditches around construction areas will provide an adequate collection system. Silt fencing fabric should meet the requirements of WSDOT Standard Specification 9-33.2 Table 3. In addition, silt fencing should embed a minimum of 6 inches below existing grade. An erosion control system requires occasional observation and maintenance. Specifically, holes in the filter and areas where the filter has shifted above ground surface should be replaced or repaired as soon as they are identified.

As an alternative, mulch-type berms, such as described in the latest Washington Department of Ecology Storm Water Manual, can be deployed immediately down slope of construction areas until vegetation has been re-established.

Temporary Drainage: We recommend intercepting and diverting any potential sources of surface or near-surface water within the construction zones before stripping begins. Because the selection of an appropriate drainage system will depend on the water quantity, season, weather conditions, construction sequence, and contractor's methods, final decisions regarding drainage systems are best made in the field at the time of construction. Based on our current understanding of the construction plans, surface and subsurface conditions, we anticipate that curbs, berms, or ditches placed around the work areas will adequately intercept surface water runoff.

Clearing and Stripping: After surface and near-surface water sources have been controlled, the construction areas should be cleared and stripped of all sod, topsoil, and root-rich soil. Based on our subsurface explorations, the organic layer can be 1½ feet thick in the forested, central and east regions of the site, and root-rich looser soils that extended down to a depth of 5 feet was observed in one of our explorations on the forested east part of the site.

Site Excavations: Based on our explorations, we expect that site excavations will encounter dense to very dense glacial till. Although it can be excavated using conventional earth working equipment, special teeth or rippers might be necessary to rapidly excavate deeply into this soil.

Dewatering: Our explorations did not encounter groundwater within their termination depths, nor do we expect that groundwater will be present in the planned excavations. However, if groundwater is encountered, we anticipate that an internal system of ditches, sump holes, and pumps will be adequate to temporarily dewater excavations.

Temporary Cut Slopes: All temporary soil slopes associated with site cutting or excavations should be adequately inclined to prevent sloughing and collapse. Temporary cut slopes in site soils should be no steeper than 1¼ H:1V, and should conform to Washington Industrial Safety and Health Act (WISHA) regulations.

Subgrade Compaction: Exposed subgrades for footings, slabs, and floors should be compacted to a firm, unyielding state before new concrete or fill soils are placed. Any localized zones of looser granular soils observed within a subgrade should be compacted to a density commensurate with the surrounding soils. In contrast, any organic, soft, or pumping soils observed within a subgrade should be overexcavated and replaced with a suitable structural fill material. Surface compaction of all footing and slab subgrades is recommended, although surface compaction could become problematic during wet weather conditions or when in situ site soils become wet.

Site Filling: Our conclusions regarding the reuse of onsite soils and our comments regarding wet-weather filling are presented subsequently. Regardless of soil type, all fill should be placed and compacted according to our recommendations presented in the Structural Fill section of this report. Specifically, building pad fill soil should be compacted to a uniform density of at least 95 percent (based on ASTM D-1557).

Onsite Soils: We offer the following evaluation of these onsite soils in relation to potential use as structural fill:

- *Surficial Organic Soils*: The topsoil and root-rich soil that overlies the site is *not* suitable for use as structural fill under any circumstances, due to high organic content.

- *Ablation and Basal Glacial Till*: Both glacial till layers are currently dry of optimum moisture content so would need slight hydration before reuse. However, both till layers contain significant amounts of silt, so become increasingly difficult to reuse as conditions become wetter.
- *Inter-Bedded Ice Contact Sediments*: Both inter-bedded silt, silty sand, and gravel observed sloped, central part of the upland contains significant amounts of silt and will be difficult or impossible to reuse as structural fill during wet weather.

Permanent Slopes: All permanent cut slopes and fill slopes should be adequately inclined to reduce long-term raveling, sloughing, and erosion. We generally recommend that no permanent slopes be steeper than 2H:1V. For all soil types, the use of flatter slopes (such as 2½H:1V) would further reduce long-term erosion and facilitate revegetation.

Slope Protection: We recommend that a permanent berm, swale, or curb be constructed along the top edge of all permanent slopes to intercept surface flow. Also, a hardy vegetative groundcover should be established as soon as feasible, to further protect the slopes from runoff water erosion. Alternatively, permanent slopes could be armored with quarry spalls or a geosynthetic erosion mat.

4.2 Spread Footings

In our opinion, conventional spread footings will provide adequate support for the proposed structures if the subgrades are properly prepared.

Footing Depths and Widths: For frost and erosion protection, the bases of all exterior footings should bear at least 18 inches below adjacent outside grades, whereas the bases of interior footings need bear only 12 inches below the surrounding slab surface level. To reduce post-construction settlements, continuous (wall) and isolated (column) footings should be at least 18 and 24 inches wide, respectively.

Bearing Subgrades: Footings should bear on medium dense or denser, undisturbed native soils or on properly compacted structural fill which bears on undisturbed medium dense or very dense native soils. In general, before footing concrete is placed, any localized zones of loose soils exposed across the footing subgrades should be compacted to a firm, unyielding condition, and any localized zones of soft, organic, or debris-laden soils should be over-excavated and replaced with suitable structural fill. We recommend vigorous surface compaction of footing subgrades to a medium dense or denser condition.

Subgrade Observation: All footing subgrades should consist of firm, unyielding, native soils or structural fill materials compacted to a density of at least 95 percent based on ASTM:D-1557. Footings should never be cast atop loose, soft, or frozen soil, slough, debris, existing uncontrolled fill, or surfaces covered by standing water.

Bearing Pressures: In our opinion, for static loading, footings that bear on properly prepared subgrades can be designed for a maximum allowable soil bearing pressure of 2,500 pounds per square foot (psf). This value is somewhat conservative and may be increased for specific locations if we are consulted. A one-third increase in allowable soil bearing capacity may be used for short-term loads created by seismic or wind related activities.

Footing Settlements: Assuming that structural fill soils are compacted to a medium dense or denser state, we estimate that total post-construction settlements of properly designed footings bearing on properly prepared subgrades will not exceed ¾ inch. Differential settlements for comparably loaded elements may approach one-half of the actual total settlement over horizontal distances of approximately 50 feet.

Footing Backfill: To provide erosion protection and lateral load resistance, we recommend that all footing excavations be backfilled on both sides of the footings and stemwalls after the concrete has cured. Either imported structural fill or non-organic onsite soils can be used for this purpose, contingent on suitable moisture content at the time of placement. Regardless of soil type, all footing backfill soil should be compacted to a density of at least 90 percent (based on ASTM:D-1557).

Lateral Resistance: Footings that have been properly backfilled as recommended above will resist lateral movements by means of passive earth pressure and base friction. We recommend using an allowable passive earth pressure of 300 pcf and an allowable base friction coefficient of 0.35.

4.3 Slab-On-Grade Floors

In our opinion, soil-supported slab-on-grade floors can be used in the proposed structures if the subgrades are properly prepared. We offer the following comments and recommendations concerning slab-on-grade floors.

Floor Subbase: Structural fill subbases do not appear to be needed under soil-supported slab-on-grade floors at the site. However, the final decision regarding the need for subbases should be based on actual subgrade conditions observed at the time of construction. If a subbase is needed, all subbase fill should be compacted to a density of at least 95 percent (based on ASTM:D-1557). All subgrades should be vigorously surface compacted to a medium dense or denser condition before slab construction begins.

Capillary Break and Vapor Barrier: To retard the upward wicking of groundwater beneath the floor slab, we recommend that a capillary break be placed over the subgrade. Ideally, this capillary break would consist of a 6-inch-thick layer of pea gravel or other clean, uniform, well-rounded gravel, such as "Gravel Backfill for Drains" per WSDOT Standard Specification 9-03.12(4), but clean angular gravel can be used if it adequately prevents capillary wicking. In addition, a layer of plastic sheeting (such as Crosstuff, Visqueen, or Moistop) should be placed over the capillary break to serve as a vapor barrier. During subsequent casting of the concrete slab, the contractor should exercise care to avoid puncturing this vapor barrier.

Vertical Deflections: Due to elastic compression of subgrades, soil-supported slab-on-grade floors can deflect downwards when vertical loads are applied. In our opinion, a subgrade reaction modulus of 250 pounds per cubic inch can be used to estimate such deflections.

4.4 Subgrade Walls

Because many of the planned buildings will have a story below grade, we offer these recommendations for subgrade walls. These general recommendations can also be applied to the design of retaining walls.

Wall Foundations: Subgrade walls can be supported on shallow footings bearing on suitable soils as described in the Spread Footings section of this report. Footings should be designed using the recommended allowable bearing pressures and lateral resistance values presented for building foundations.

Wall Drainage: Drainage should be provided behind subgrade and retaining walls by placing a zone of drain rock containing less than 3 percent fines (material passing No. 200 sieve) against the wall. This drainage zone should be at least 24 inches wide (measured horizontally) and extend from the base of the wall to within 1 foot of the finished grade behind the wall. Smooth-walled perforated PVC drainpipe having a minimum diameter of 4 inches should be embedded within the sand and gravel at the base of the wall along its entire length. This drainpipe should discharge into a tightline leading to an appropriate collection and disposal system. Collected water should not discharge over the steep shoreline slope.

Backfill Soil: Ideally, all subgrade wall backfill would consist of clean, free-draining, granular material, such as "Gravel Backfill for Walls" per WSDOT Standard Specification 9-03.12(2). A geotextile should be placed between the drainage zone and the backfill soil to prevent drain clogging.

Backfill Compaction: Because soil compactors place significant lateral pressures on subgrade walls, we recommend that only small, hand-operated compaction equipment be used within 2 feet of a backfilled wall. Also, all backfill should be compacted to a density as close as possible to 90 percent of the maximum dry density based on ASTM:D-1557; a greater degree of compaction closely behind the wall would increase the lateral earth pressure, whereas a lesser degree of compaction might lead to excessive post-construction settlements.

Grading and Capping: To retard the infiltration of surface water into the backfill soils, we recommend that the backfill surface of exterior walls be adequately sloped to drain away from the wall. Ideally, the backfill surface directly behind the wall would be capped with asphalt, concrete, or 12 inches of low-permeability (silty) soils to minimize or preclude surface water infiltration.

Applied Soil Pressure: Walls that are designed to move 0.1 percent of the wall height during and after construction are usually referred to as unrestrained walls. We recommend that unrestrained cantilever walls supporting slopes inclined at 2H:1V or flatter be designed to resist an active pressure (triangular distribution) of 55 pounds per cubic foot (pcf). If level backslopes are present, this pressure may be reduced to 35 pcf. The recommended pressure does not include the effects of surcharges from surface loads hydrostatic pressures, or structural loads. If such surcharges are to apply, they should be added to the above design lateral pressures.

Wall Settlements: We estimate that the settlement of the wall footings constructed as recommended will be on the order of ¾ inch or less. Most of this settlement is expected to occur as soon as the loads are applied. Differential settlement along the walls is expected to be 1 inch or less over a 50-foot span.

4.5 Drainage Systems

In our opinion, the planned structures should be provided with permanent drainage systems to reduce the risk of future moisture problems. We offer the following recommendations and comments for drainage design and construction purposes.

Perimeter Drains: We recommend that structures be encircled with a perimeter drain system to collect seepage water. This drain should consist of a 6-inch-diameter perforated pipe within an envelope of pea gravel or washed rock, extending at least 6 inches on all sides of the pipe, and the gravel envelope should be wrapped with filter fabric to reduce the migration of fines from the surrounding soils. Ideally, the drain invert would be installed no more than 8 inches above the base of the perimeter footings.

Subfloor Drains: Based on the groundwater conditions observed in our site explorations, we do not infer a need for subfloor drains.

Discharge Considerations: If possible, all perimeter drains should discharge to a storm sewer system or other suitable location by gravity flow. Check valves should be installed along any drainpipes that discharge to a sewer system, to prevent sewage backflow into the drain system. If gravity flow is not feasible a pump system is recommended to discharge any water that enters the drainage system.

Runoff Water: Roof-runoff and surface-runoff water should *not* discharge into the perimeter drain system. Instead, these sources should discharge into separate tightline pipes and be routed away from the building to a storm drain or other appropriate location.

Grading and Capping: Final site grades should slope downward away from the buildings so that runoff water will flow by gravity to suitable collection points, rather than ponding near the building. Ideally, the area surrounding the building would be capped with concrete, asphalt, or low-permeability (silty) soils to minimize or preclude surface-water infiltration.

4.6 Asphalt Pavement

We offer the following comments and recommendations for asphalt pavement design and construction.

Subgrade Preparation: Structural fill subbases do not appear to be needed under pavements at the site. However, the final decision regarding the need for subbases should be based on actual subgrade conditions observed at the time of construction. If a subbase is needed, all subbase fill should be compacted to a density of at least 95 percent (based on ASTM:D-1557).

All soil subgrades should be thoroughly compacted, then proof-rolled with a loaded dump truck or heavy compactor. Any localized zones of yielding subgrade disclosed during this proof-rolling operation should be over excavated to a minimum depth of 12 inches and replaced with a suitable structural fill material. All structural fill should be compacted according to our recommendations given in the structural fill section. Specifically, the upper 2 feet of soils underlying pavement section should be compacted to at least 95 percent (based on ASTM D-1557), and all soils below 2 feet should be compacted to at least 90 percent.

Pavement Materials: For the base course, we recommend using imported crushed rock, such as "Crushed Surfacing Top Course" per WSDOT Standard Specification 9-03.9(3). If a subbase course is needed, we recommend using imported, clean, well-graded sand and gravel such as "Ballast" or "Gravel Borrow" per WSDOT Standard Specifications 9-03.9(1) and 9-03.14, respectively.

Conventional Asphalt Sections: A conventional pavement section typically comprises an asphalt concrete pavement over a crushed rock base course. We recommend using the following conventional pavement sections:

	Minimum Thickness	
Pavement Course	**Parking Areas**	**Access Roads and Areas Subject to Truck Traffic**
Asphalt Concrete Pavement	2 inches	3 inches
Crushed Rock Base	4 inches	6 inches
Granular Fill Subbase (if needed)	6 inches	12 inches

Compaction and Observation: All subbase and base course material should be compacted to at least 95 percent of the Modified Proctor maximum dry density (ASTM D-1557), and all asphalt concrete should be compacted to at least 92 percent of the Rice value (ASTM D-2041). We recommend that an E3RA representative be retained to observe the compaction of each course before any overlying layer is placed. For the subbase and pavement course, compaction is best observed by means of frequent density testing. For the base course, methodology observations and hand-probing are more appropriate than density testing.

Pavement Life and Maintenance: No asphalt pavement is maintenance-free. The above described pavement sections present our minimum recommendations for an average level of performance during a 20-year design life; therefore, an average level of maintenance will likely be required. Furthermore, a 20-year pavement life typically assumes that an overlay will be placed after about 10 years. Thicker asphalt and/or thicker base and subbase courses would offer better long-term performance, but would cost more initially; thinner courses would be more susceptible to "alligator" cracking and other failure modes. As such, pavement design can be considered a compromise between a high initial cost and low maintenance costs versus a low initial cost and higher maintenance costs.

4.7 Structural Fill

The term "structural fill" refers to any material placed under foundations, retaining walls, slab-on-grade floors, sidewalks, pavements, and other structures. Our comments, conclusions, and recommendations concerning structural fill are presented in the following paragraphs.

Materials: Typical structural fill materials include clean sand, gravel, pea gravel, washed rock, crushed rock, well-graded mixtures of sand and gravel (commonly called "gravel borrow" or "pit-run"), and miscellaneous mixtures of silt, sand, and gravel. Recycled asphalt, concrete, and glass, which are derived from pulverizing the parent materials, are also potentially useful as structural fill in certain applications. Soils used for structural fill should not contain any organic matter or debris, nor any individual particles greater than about 6 inches in diameter.

Fill Placement: Clean sand, gravel, crushed rock, soil mixtures, and recycled materials should be placed in horizontal lifts not exceeding 8 inches in loose thickness, and each lift should be thoroughly compacted with a mechanical compactor.

Compaction Criteria: Using the Modified Proctor test (ASTM:D-1557) as a standard, we recommend that structural fill used for various onsite applications be compacted to the following minimum densities:

Fill Application	Minimum Compaction
Footing subgrade and bearing pad	95 percent
Foundation backfill	90 percent
Slab-on-grade floor subgrade and subbase	95 percent
Asphalt pavement base and subbase	95 percent
Asphalt pavement subgrade (upper 2 feet)	95 percent
Asphalt pavement subgrade (below 2 feet)	90 percent

Subgrade Observation and Compaction Testing: Regardless of material or location, all structural fill should be placed over firm, unyielding subgrades prepared in accordance with the Site Preparation section of this report. The condition of all subgrades should be observed by geotechnical personnel before filling or construction begins. Also, fill soil compaction should be verified by means of in-place density tests

performed during fill placement so that adequacy of soil compaction efforts may be evaluated as earthwork progresses.

Soil Moisture Considerations: The suitability of soils used for structural fill depends primarily on their grain-size distribution and moisture content when they are placed. As the "fines" content (that soil fraction passing the U.S. No. 200 Sieve) increases, soils become more sensitive to small changes in moisture content. Soils containing more than about 5 percent fines (by weight) cannot be consistently compacted to a firm, unyielding condition when the moisture content is more than 2 percentage points above or below optimum. For fill placement during wet-weather site work, we recommend using "clean" fill, which refers to soils that have a fines content of 5 percent or less (by weight) based on the soil fraction passing the U.S. No. 4 Sieve.

5.0 RECOMMENDED ADDITIONAL SERVICES

Because the future performance and integrity of the structural elements will depend largely on proper site preparation, drainage, fill placement, and construction procedures, monitoring and testing by experienced geotechnical personnel should be considered an integral part of the construction process. Consequently, we recommend that E3RA be retained to provide the following post-report services:

- Review all construction plans and specifications to verify that the design criteria presented in this report have been properly integrated into the design;
- Prepare a letter summarizing all review comments (if required); and
- Prepare a post-construction letter summarizing all field observations, inspections, and test results (if required).

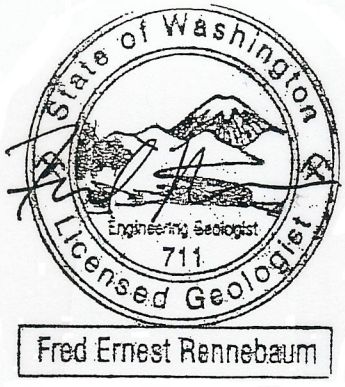
6.0 CLOSURE

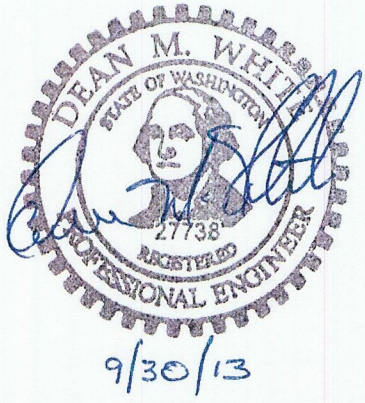
The conclusions and recommendations presented in this report are based, in part, on the explorations that we observed for this study; therefore, if variations in the subgrade conditions are observed at a later time, we may need to modify this report to reflect those changes. Also, because the future performance and integrity of the project elements depend largely on proper initial site preparation, drainage, and construction procedures, monitoring and testing by experienced geotechnical personnel should be considered an integral part of the construction process. E3RA is available to provide geotechnical monitoring of soils throughout construction.

We appreciate the opportunity to be of service on this project. If you have any questions regarding this report or any aspects of the project, please feel free to contact our office.

Sincerely,

E3RA, Inc.



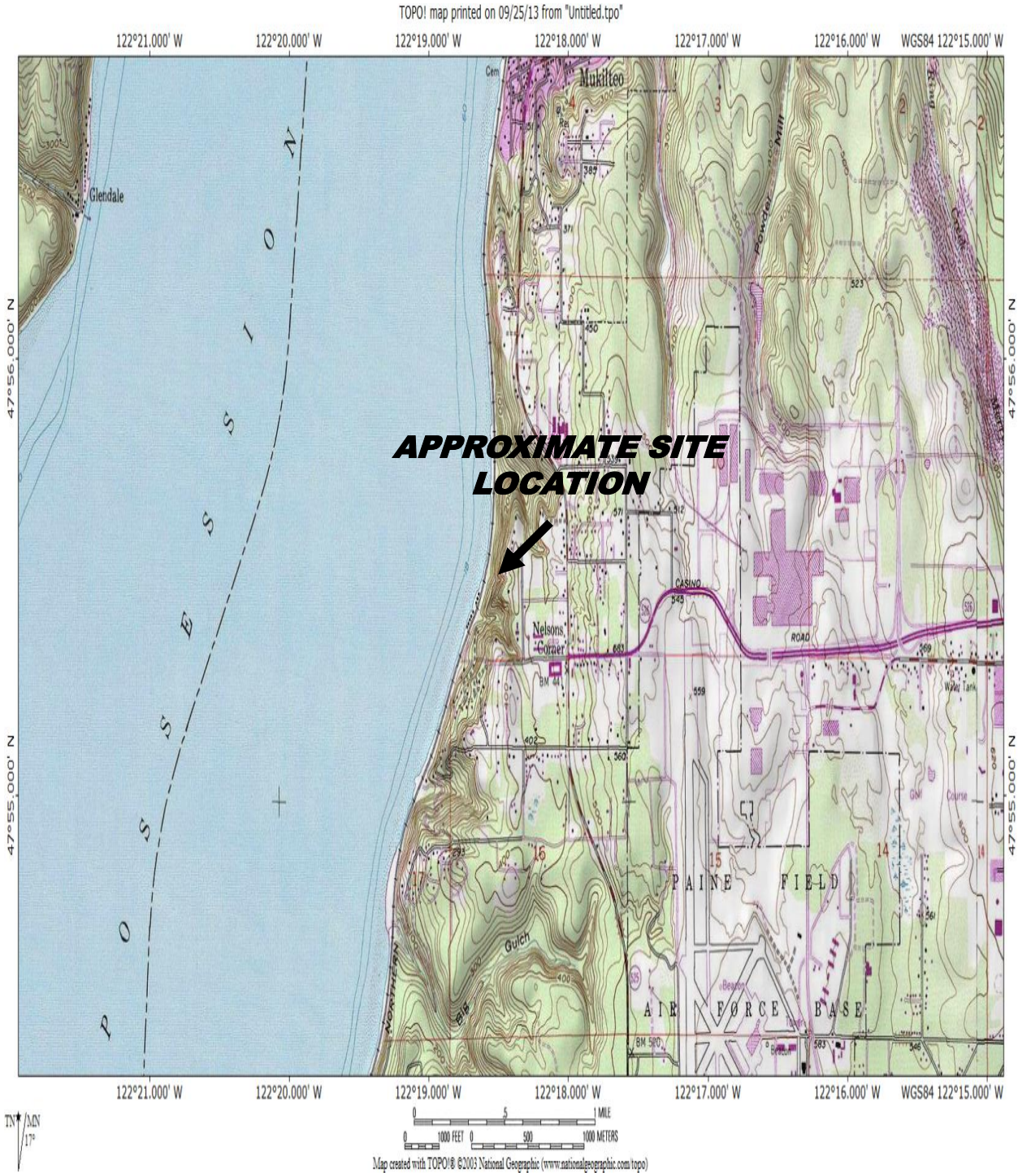


Fred E. Rennebaum, L.E.G.
Senior Geologist

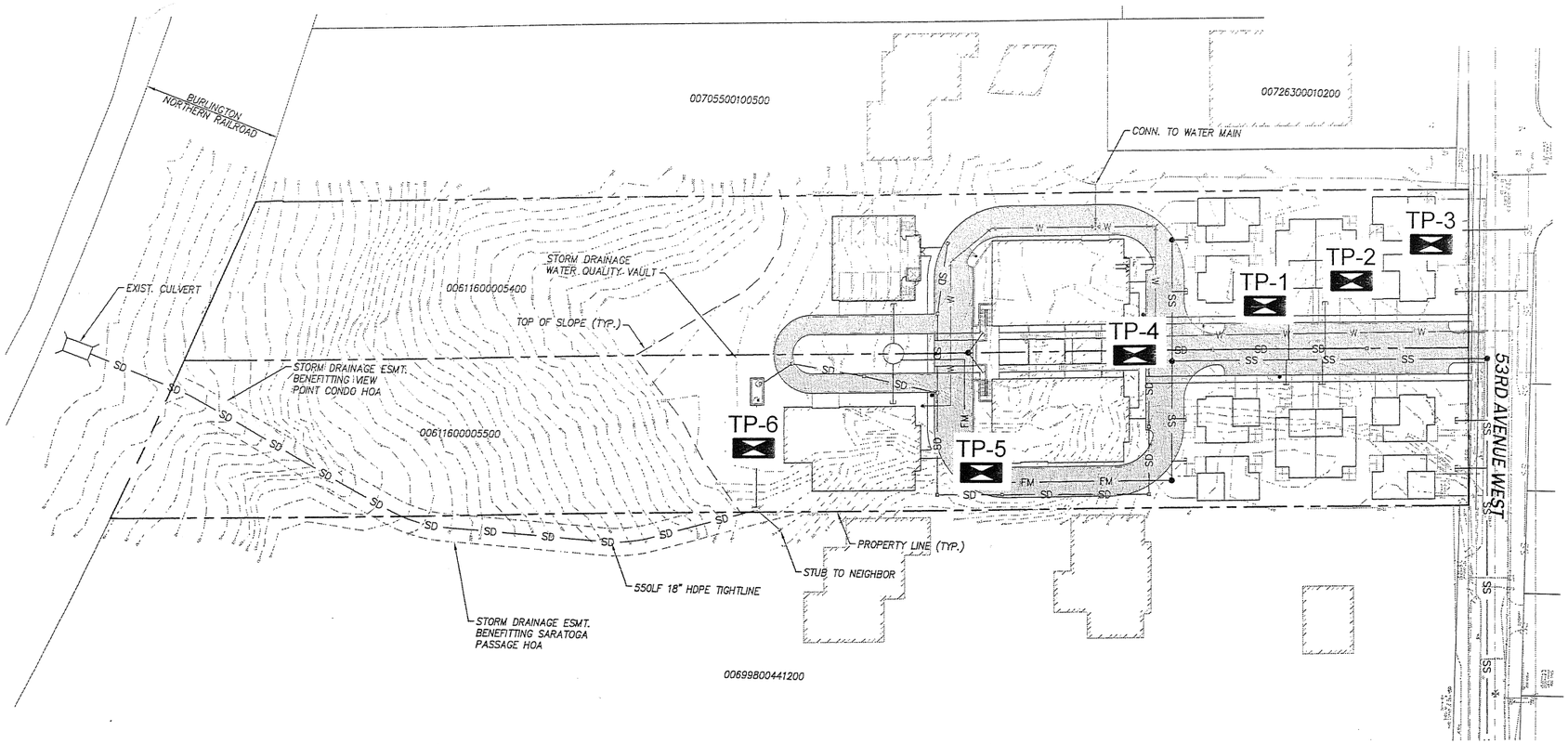
Dean M. White, P.E.
Principal Engineer

FER:DMW:jb
TACO\\Tacnew\f\everett job files\2013 JOB FILES\E13052 Saratoga Passage Geotech\E13052 Saratoga Geotechnical Report.doc

Four copies submitted



E3RA, Inc. **9802 29th Ave W, B102** **Everett, WA 98204**	SARATOGA PASSAGE RESIDENTIAL DEVELOPMENT TOPOGRAPHIC AND LOCATION MAP MUKILTEO, WASHINGTON	**FIGURE 1** **E13052**



100 0 100 200

SCALE IN FEET

N

W — E

TEST PIT LOCATIONS

TP-1

NOTE:
BOUNDARY AND TOPOGRAPHY ARE BASED ON MAPPING PROVIDED TO E3RA AND OBSERVATIONS MADE IN THE FIELD. THE INFORMATION SHOWN DOES NOT CONSTITUTE A FIELD SURVEY BY E3RA.

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PROJECT: 8002 53rd Ave W Mukilteo, Washington	
SHEET TITLE: Site and Exploration Plan	
DESIGNER: CRL	JOB NO. E13052
DRAWN BY: CRL	SCALE: 1" = 100'
CHECKED BY: DMW	FIGURE: 2
DATE: Sept. 30, 2013	FILE: E13052.dwg

APPENDIX A
SOILS CLASSIFICATION CHART AND KEY TO TEST DATA

LOGS OF TEST PITS AND BORING

MAJOR DIVISIONS				TYPICAL NAMES
COARSE GRAINED SOILS More than Half > #200 sieve	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES
			GP	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES
		GRAVELS WITH OVER 15% FINES	GM	SILTY GRAVELS, POORLY GRADED GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, POORLY GRADED GRAVEL-SAND-CLAY MIXTURES
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL GRADED SANDS, GRAVELLY SANDS
			SP	POORLY GRADED SANDS, GRAVELLY SANDS
		SANDS WITH OVER 15% FINES	SM	SILTY SANDS, POOORLY GRADED SAND-SILT MIXTURES
			SC	CLAYEY SANDS, POORLY GRADED SAND-CLAY MIXTURES
FINE GRAINED SOILS More than Half < #200 sieve	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 CLAYS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACIOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS

⊠	Modified California	RV	R-Value
☒	Split Spoon	SA	Sieve Analysis
■	Pushed Shelby Tube	SW	Swell Test
▮	Auger Cuttings	TC	Cyclic Triaxial
	Grab Sample	TX	Unconsolidated Undrained Triaxial
■	Sample Attempt with No Recovery	TV	Torvane Shear
CA	Chemical Analysis	UC	Unconfined Compression
CN	Consolidation	(1.2)	(Shear Strength, ksf)
CP	Compaction	WA	Wash Analysis
DS	Direct Shear	(20)	(with % Passing No. 200 Sieve)
PM	Permeability	▽	Water Level at Time of Drilling
PP	Pocket Penetrometer	▼	Water Level after Drilling(with date measured)

SOIL CLASSIFICATION CHART AND KEY TO TEST DATA

Figure A-1

E3RA

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Fax: 253-537-9401

TEST PIT NUMBER TP-1

Figure A-2

CLIENT Windward Real Estate Services, Inc.
PROJECT NAME Saratoga Passage Geotechnical
PROJECT NUMBER E13052
PROJECT LOCATION Mukilteo, Washington
DATE STARTED 7/31/13 **COMPLETED** 7/31/13
GROUND ELEVATION _____ **TEST PIT SIZE** _____
EXCAVATION CONTRACTOR _____
GROUND WATER LEVELS:
EXCAVATION METHOD Rubber Tracked Excavator
AT TIME OF EXCAVATION ---
LOGGED BY FER **CHECKED BY** DMW
AT END OF EXCAVATION ---
NOTES _____
AFTER EXCAVATION ---

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0				Duff and Topsoil
			1.0	
		SM		(SM) Light brown gravelly silty sand with copious roots (loose to medium dense, damp) (Ablation Glacial Till)
2.5				
			3.0	
		SM		(SM) Light gray-brown and mottled silty gravelly sand with scattered cobbles (very dense, damp to moist) (Basal Glacial Till)
			4.5	

No caving observed
No groundwater seepage observed; saturated soils encountered below 7 feet

The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

Bottom of test pit at 4.5 feet.

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TEST PIT NUMBER TP-2

Figure A-3

CLIENT Windward Real Estate Services, Inc.
PROJECT NAME Saratoga Passage Geotechnical
PROJECT NUMBER E13052
PROJECT LOCATION Mukilteo, Washington
DATE STARTED 7/31/13 **COMPLETED** 7/31/13
GROUND ELEVATION _____ **TEST PIT SIZE** _____
EXCAVATION CONTRACTOR _____
GROUND WATER LEVELS:
EXCAVATION METHOD Rubber Tracked Excavator
AT TIME OF EXCAVATION ---
LOGGED BY FER **CHECKED BY** DMW
AT END OF EXCAVATION ---
NOTES _____
AFTER EXCAVATION ---

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0				Duff and Topsoil
1.5				
2.5		SM		(SM) Light brown gravelly silty sand with copious roots (loose to medium dense, damp) (Ablation Glacial Till)
5.0				
5.0		SM		(SM) Light gray-brown and mottled silty gravelly sand with scattered cobbles (very dense, damp to moist) (Basal Glacial Till)
7.5				

No caving observed
No groundwater seepage observed; saturated soils encountered below 7 feet

The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

Bottom of test pit at 7.5 feet.

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TEST PIT NUMBER TP-3

Figure A-4

CLIENT Windward Real Estate Services, Inc.
PROJECT NAME Saratoga Passage Geotechnical
PROJECT NUMBER E13052
PROJECT LOCATION Mukilteo, Washington
DATE STARTED 7/31/13 **COMPLETED** 7/31/13
GROUND ELEVATION _____ **TEST PIT SIZE** _____
EXCAVATION CONTRACTOR _____
GROUND WATER LEVELS:
EXCAVATION METHOD Rubber Tracked Excavator
AT TIME OF EXCAVATION ---
LOGGED BY FER **CHECKED BY** DMW
AT END OF EXCAVATION ---
NOTES _____
AFTER EXCAVATION ---

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0				Duff and Topsoil
				1.5
		SM		(SM) Light brown gravelly silty sand with copious roots (medium dense, damp) (Ablation Glacial Till)
				2.0
2.5		SM		(SM) Light gray-brown and mottled silty gravelly sand with scattered cobbles (dense, damp to moist) (Basal Glacial Till)
5.0				5.0

No caving observed
No groundwater seepage observed; saturated soils encountered below 7 feet

The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

Bottom of test pit at 5.0 feet.

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TEST PIT NUMBER TP-4

Figure A-5

CLIENT Windward Real Estate Services, Inc.
PROJECT NAME Saratoga Passage Geotechnical
PROJECT NUMBER E13052
PROJECT LOCATION Mukilteo, Washington
DATE STARTED 7/31/13 **COMPLETED** 7/31/13
GROUND ELEVATION _____ **TEST PIT SIZE** _____
EXCAVATION CONTRACTOR _____
GROUND WATER LEVELS:
EXCAVATION METHOD Rubber Tracked Excavator
AT TIME OF EXCAVATION ---
LOGGED BY FER **CHECKED BY** DMW
AT END OF EXCAVATION ---
NOTES _____
AFTER EXCAVATION ---

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0				Duff and Topsoil
			1.0	
		SM		(SM) Light brown gravelly silty sand (medium dense, damp) (Ablation Glacial Till)
			2.0	
2.5		ML		(ML) Gray and brown fine sandy silty with trace gravel (stiff, moist)
5.0			5.0	
		SP-SM		(SP-SM) Brown and mottled gravelly sand with some silt (dense, moist)
			7.0	
7.5		SM		(SM) Gray silty fine sand with trace gravel and interbeds of hard silt (dense, moist to wet)
10.0			10.0	

No caving observed
No groundwater seepage observed; saturated soils encountered below 7 feet

The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

Bottom of test pit at 10.0 feet.

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TEST PIT NUMBER TP-5

Figure A-6

CLIENT Windward Real Estate Services, Inc.
PROJECT NAME Saratoga Passage Geotechnical
PROJECT NUMBER E13052
PROJECT LOCATION Mukilteo, Washington
DATE STARTED 7/31/13 **COMPLETED** 7/31/13
GROUND ELEVATION _____ **TEST PIT SIZE** _____
EXCAVATION CONTRACTOR _____
GROUND WATER LEVELS:
EXCAVATION METHOD Rubber Tracked Excavator
AT TIME OF EXCAVATION ---
LOGGED BY FER **CHECKED BY** DMW
AT END OF EXCAVATION ---
NOTES _____
AFTER EXCAVATION ---

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0				8 inches Crushed Rock (Fill)
0.7		SM		(SM) Light brown gravelly silty sand with cobbles (medium dense, damp to moist) (Fill)
2.5				
5.0				
6.0		SM		(SM) Gray silty fine sand (dense, moist to wet)
7.5				
9.0				

No caving observed
No groundwater seepage observed; saturated soils encountered below 7 feet

The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

Bottom of test pit at 9.0 feet.

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TEST PIT NUMBER TP-6

Figure A-7

CLIENT Windward Real Estate Services, Inc.
PROJECT NAME Saratoga Passage Geotechnical
PROJECT NUMBER E13052
PROJECT LOCATION Mukilteo, Washington
DATE STARTED 7/31/13 **COMPLETED** 7/31/13
GROUND ELEVATION _____ **TEST PIT SIZE** _____
EXCAVATION CONTRACTOR _____
GROUND WATER LEVELS:
EXCAVATION METHOD Rubber Tracked Excavator
AT TIME OF EXCAVATION ---
LOGGED BY FER **CHECKED BY** DMW
AT END OF EXCAVATION ---
NOTES _____
AFTER EXCAVATION ---

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0				8 inches Sod and Topsoil
0.7		SM		(SM) Light brown gravelly silty sand with copious roots (medium dense, damp) (Ablation Glacial Till)
2.5				
3.5		SM		(SM) Light gray-brown and mottled silty gravelly sand with scattered cobbles (dense, damp to moist) (Basal Glacial Till)
4.5				

No caving observed
No groundwater seepage observed; saturated soils encountered below 7 feet

The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

Bottom of test pit at 4.5 feet.

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BORING NUMBER B-1

Figure A-8

CLIENT Windward Real Estate Services, Inc.
PROJECT NAME Saratoga Passage Phase I ESA
PROJECT NUMBER E13052
PROJECT LOCATION Mukilteo, Washington
DATE STARTED 8/12/13 **COMPLETED** 8/12/13
GROUND ELEVATION _____ **HOLE SIZE** 4.25" ID HSA
DRILLING CONTRACTOR Holocene
GROUND WATER LEVELS:
DRILLING METHOD _____
AT TIME OF DRILLING ---
LOGGED BY FER and ZLL **CHECKED BY** DMW
AT END OF DRILLING ---
NOTES _____
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0				SM		(SM) Light brown gravelly silty sand (medium dense, damp)
5	SS S-1	14	4-12-9 (21)			Grades to moist
6.5				SM		(SM) Gray silty gravelly sand (very dense, moist) (Glacial Till)
10	SS S-2	18	10-46-48 (94)			
15	SS S-3	4	23 50/3			
20	SS S-4	6	45 50/3			
25	SS S-5	3	35 50/1			
30	SS S-6	3	0 50/6			
35						

(Continued Next Page)

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BORING NUMBER B-1

Figure A-8

CLIENT Windward Real Estate Services, Inc.
PROJECT NAME Saratoga Passage Phase I ESA
PROJECT NUMBER E13052
PROJECT LOCATION Mukilteo, Washington

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY (in) (RQD)	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
35	SS S-7	3	0 50/4	SM		(SM) Gray silty gravelly sand (very dense, moist) (Glacial Till) *(continued)*
40	SS S-8	4	0 50/3			41.5
45				SP		(SP) Brown gravelly sand with trace silt (very dense, moist)
50	SS S-9	6	0 50/4			50.0
55	SS S-10	5	0 50/3	SM		(SM) Gray silty gravelly sand (very dense, moist) (Glacial Till)
	SS S-11	4	0 50/5			Gray and brown
						57.0

Bottom of borehole at 57.0 feet.

CP|H
CONSULTANTS

APPENDIX B

WWHM OUTPUT AND CONVEYANCE CALCULATIONS

WWHM2012

PROJECT REPORT

General Model Information

Project Name:	Saratoga Heights Phase 2 Mod
Site Name:	Saratoga Heights
Site Address:	
City:	Mukilteo
Report Date:	1/9/2019
Gage:	Everett
Data Start:	1948/10/01
Data End:	2009/09/30
Timestep:	Hourly
Precip Scale:	0.800
Version Date:	2018/10/10
Version:	4.2.16

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data

Predeveloped Land Use

Ex Basin Phase 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C, Forest, Mod	1.203
Pervious Total	1.203

Impervious Land Use	acre
ROADS FLAT	0.12
Impervious Total	0.12
Basin Total	1.323

Element Flows To:

Surface	Interflow	Groundwater

Ex Basin Phase 2/3

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Mod	1.428
Pervious Total	1.428
Impervious Land Use	acre
Impervious Total	0
Basin Total	1.428

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Dev Basin Phase 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C, Lawn, Mod	0.462
Pervious Total	0.462

Impervious Land Use	acre
ROADS MOD	0.502
ROOF TOPS FLAT	0.356
Impervious Total	0.858
Basin Total	1.32

Element Flows To:

Surface	Interflow	Groundwater
Phase 1 Vault	Phase 1 Vault	

Dev Basin Phase 2/3

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C, Lawn, Mod	0.281
Pervious Total	0.281

Impervious Land Use	acre
ROADS MOD	0.518
ROOF TOPS FLAT	0.627
Impervious Total	1.145
Basin Total	1.426

Element Flows To:

Surface	Interflow	Groundwater
Vault 2	Vault 2	

Routing Elements
Predeveloped Routing

Mitigated Routing

Phase 1 Vault

Width: 45.5 ft.
Length: 36 ft.
Depth: 14 ft.
Discharge Structure
Riser Height: 13.5 ft.
Riser Diameter: 18 in.
Orifice 1 Diameter: 0.32 in. Elevation:0 ft.
Orifice 2 Diameter: 0.5 in. Elevation:10.2 ft.
Orifice 3 Diameter: 0.5 in. Elevation:12 ft.
Element Flows To:
Outlet 1 Outlet 2

Vault Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.037	0.000	0.000	0.000
0.1556	0.037	0.005	0.001	0.000
0.3111	0.037	0.011	0.001	0.000
0.4667	0.037	0.017	0.001	0.000
0.6222	0.037	0.023	0.002	0.000
0.7778	0.037	0.029	0.002	0.000
0.9333	0.037	0.035	0.002	0.000
1.0889	0.037	0.040	0.002	0.000
1.2444	0.037	0.046	0.003	0.000
1.4000	0.037	0.052	0.003	0.000
1.5556	0.037	0.058	0.003	0.000
1.7111	0.037	0.064	0.003	0.000
1.8667	0.037	0.070	0.003	0.000
2.0222	0.037	0.076	0.004	0.000
2.1778	0.037	0.081	0.004	0.000
2.3333	0.037	0.087	0.004	0.000
2.4889	0.037	0.093	0.004	0.000
2.6444	0.037	0.099	0.004	0.000
2.8000	0.037	0.105	0.004	0.000
2.9556	0.037	0.111	0.004	0.000
3.1111	0.037	0.117	0.004	0.000
3.2667	0.037	0.122	0.005	0.000
3.4222	0.037	0.128	0.005	0.000
3.5778	0.037	0.134	0.005	0.000
3.7333	0.037	0.140	0.005	0.000
3.8889	0.037	0.146	0.005	0.000
4.0444	0.037	0.152	0.005	0.000
4.2000	0.037	0.157	0.005	0.000
4.3556	0.037	0.163	0.005	0.000
4.5111	0.037	0.169	0.005	0.000
4.6667	0.037	0.175	0.006	0.000
4.8222	0.037	0.181	0.006	0.000
4.9778	0.037	0.187	0.006	0.000
5.1333	0.037	0.193	0.006	0.000
5.2889	0.037	0.198	0.006	0.000
5.4444	0.037	0.204	0.006	0.000
5.6000	0.037	0.210	0.006	0.000
5.7556	0.037	0.216	0.006	0.000

5.9111	0.037	0.222	0.006	0.000
6.0667	0.037	0.228	0.006	0.000
6.2222	0.037	0.234	0.006	0.000
6.3778	0.037	0.239	0.007	0.000
6.5333	0.037	0.245	0.007	0.000
6.6889	0.037	0.251	0.007	0.000
6.8444	0.037	0.257	0.007	0.000
7.0000	0.037	0.263	0.007	0.000
7.1556	0.037	0.269	0.007	0.000
7.3111	0.037	0.274	0.007	0.000
7.4667	0.037	0.280	0.007	0.000
7.6222	0.037	0.286	0.007	0.000
7.7778	0.037	0.292	0.007	0.000
7.9333	0.037	0.298	0.007	0.000
8.0889	0.037	0.304	0.007	0.000
8.2444	0.037	0.310	0.008	0.000
8.4000	0.037	0.315	0.008	0.000
8.5556	0.037	0.321	0.008	0.000
8.7111	0.037	0.327	0.008	0.000
8.8667	0.037	0.333	0.008	0.000
9.0222	0.037	0.339	0.008	0.000
9.1778	0.037	0.345	0.008	0.000
9.3333	0.037	0.351	0.008	0.000
9.4889	0.037	0.356	0.008	0.000
9.6444	0.037	0.362	0.008	0.000
9.8000	0.037	0.368	0.008	0.000
9.9556	0.037	0.374	0.008	0.000
10.111	0.037	0.380	0.008	0.000
10.267	0.037	0.386	0.010	0.000
10.422	0.037	0.391	0.012	0.000
10.578	0.037	0.397	0.013	0.000
10.733	0.037	0.403	0.014	0.000
10.889	0.037	0.409	0.014	0.000
11.044	0.037	0.415	0.015	0.000
11.200	0.037	0.421	0.016	0.000
11.356	0.037	0.427	0.016	0.000
11.511	0.037	0.432	0.017	0.000
11.667	0.037	0.438	0.017	0.000
11.822	0.037	0.444	0.018	0.000
11.978	0.037	0.450	0.018	0.000
12.133	0.037	0.456	0.021	0.000
12.289	0.037	0.462	0.023	0.000
12.444	0.037	0.468	0.024	0.000
12.600	0.037	0.473	0.025	0.000
12.756	0.037	0.479	0.026	0.000
12.911	0.037	0.485	0.027	0.000
13.067	0.037	0.491	0.028	0.000
13.222	0.037	0.497	0.029	0.000
13.378	0.037	0.503	0.030	0.000
13.533	0.037	0.508	0.127	0.000
13.689	0.037	0.514	1.323	0.000
13.844	0.037	0.520	3.041	0.000
14.000	0.037	0.526	4.672	0.000
14.156	0.037	0.532	5.737	0.000
14.311	0.000	0.000	6.417	0.000

Vault 2

Width: 45.5 ft.
Length: 64 ft.
Depth: 10.5 ft.
Discharge Structure
Riser Height: 10 ft.
Riser Diameter: 18 in.
Orifice 1 Diameter: 0.358 in. Elevation:0 ft.
Orifice 2 Diameter: 0.5781 in Elevation:8.7 ft.
Orifice 3 Diameter: 0.5313 in Elevation:9.5 ft.
Element Flows To:
Outlet 1 Outlet 2

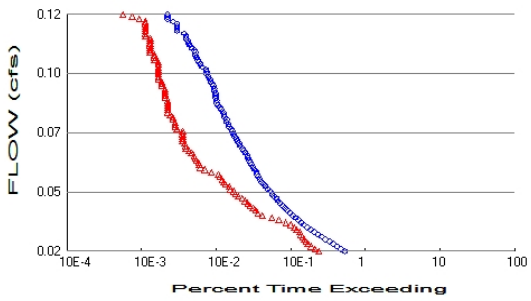
Vault Hydraulic Table

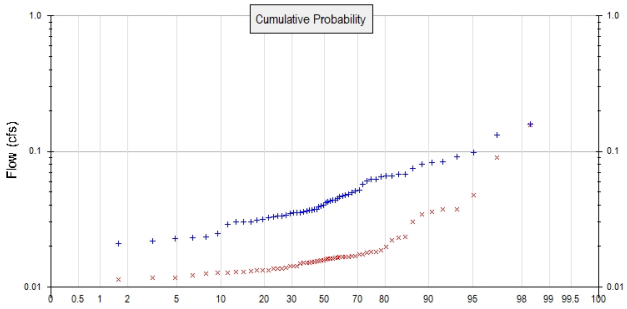
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.066	0.000	0.000	0.000
0.1167	0.066	0.007	0.001	0.000
0.2333	0.066	0.015	0.001	0.000
0.3500	0.066	0.023	0.002	0.000
0.4667	0.066	0.031	0.002	0.000
0.5833	0.066	0.039	0.002	0.000
0.7000	0.066	0.046	0.002	0.000
0.8167	0.066	0.054	0.003	0.000
0.9333	0.066	0.062	0.003	0.000
1.0500	0.066	0.070	0.003	0.000
1.1667	0.066	0.078	0.003	0.000
1.2833	0.066	0.085	0.003	0.000
1.4000	0.066	0.093	0.004	0.000
1.5167	0.066	0.101	0.004	0.000
1.6333	0.066	0.109	0.004	0.000
1.7500	0.066	0.117	0.004	0.000
1.8667	0.066	0.124	0.004	0.000
1.9833	0.066	0.132	0.004	0.000
2.1000	0.066	0.140	0.005	0.000
2.2167	0.066	0.148	0.005	0.000
2.3333	0.066	0.156	0.005	0.000
2.4500	0.066	0.163	0.005	0.000
2.5667	0.066	0.171	0.005	0.000
2.6833	0.066	0.179	0.005	0.000
2.8000	0.066	0.187	0.005	0.000
2.9167	0.066	0.195	0.005	0.000
3.0333	0.066	0.202	0.006	0.000
3.1500	0.066	0.210	0.006	0.000
3.2667	0.066	0.218	0.006	0.000
3.3833	0.066	0.226	0.006	0.000
3.5000	0.066	0.234	0.006	0.000
3.6167	0.066	0.241	0.006	0.000
3.7333	0.066	0.249	0.006	0.000
3.8500	0.066	0.257	0.006	0.000
3.9667	0.066	0.265	0.006	0.000
4.0833	0.066	0.273	0.007	0.000
4.2000	0.066	0.280	0.007	0.000
4.3167	0.066	0.288	0.007	0.000
4.4333	0.066	0.296	0.007	0.000
4.5500	0.066	0.304	0.007	0.000

4.6667	0.066	0.312	0.007	0.000
4.7833	0.066	0.319	0.007	0.000
4.9000	0.066	0.327	0.007	0.000
5.0167	0.066	0.335	0.007	0.000
5.1333	0.066	0.343	0.007	0.000
5.2500	0.066	0.351	0.008	0.000
5.3667	0.066	0.358	0.008	0.000
5.4833	0.066	0.366	0.008	0.000
5.6000	0.066	0.374	0.008	0.000
5.7167	0.066	0.382	0.008	0.000
5.8333	0.066	0.390	0.008	0.000
5.9500	0.066	0.397	0.008	0.000
6.0667	0.066	0.405	0.008	0.000
6.1833	0.066	0.413	0.008	0.000
6.3000	0.066	0.421	0.008	0.000
6.4167	0.066	0.429	0.008	0.000
6.5333	0.066	0.436	0.008	0.000
6.6500	0.066	0.444	0.009	0.000
6.7667	0.066	0.452	0.009	0.000
6.8833	0.066	0.460	0.009	0.000
7.0000	0.066	0.468	0.009	0.000
7.1167	0.066	0.475	0.009	0.000
7.2333	0.066	0.483	0.009	0.000
7.3500	0.066	0.491	0.009	0.000
7.4667	0.066	0.499	0.009	0.000
7.5833	0.066	0.506	0.009	0.000
7.7000	0.066	0.514	0.009	0.000
7.8167	0.066	0.522	0.009	0.000
7.9333	0.066	0.530	0.009	0.000
8.0500	0.066	0.538	0.009	0.000
8.1667	0.066	0.545	0.009	0.000
8.2833	0.066	0.553	0.010	0.000
8.4000	0.066	0.561	0.010	0.000
8.5167	0.066	0.569	0.010	0.000
8.6333	0.066	0.577	0.010	0.000
8.7500	0.066	0.584	0.012	0.000
8.8667	0.066	0.592	0.014	0.000
8.9833	0.066	0.600	0.015	0.000
9.1000	0.066	0.608	0.016	0.000
9.2167	0.066	0.616	0.017	0.000
9.3333	0.066	0.623	0.017	0.000
9.4500	0.066	0.631	0.018	0.000
9.5667	0.066	0.639	0.021	0.000
9.6833	0.066	0.647	0.023	0.000
9.8000	0.066	0.655	0.024	0.000
9.9167	0.066	0.662	0.025	0.000
10.033	0.066	0.670	0.123	0.000
10.150	0.066	0.678	0.947	0.000
10.267	0.066	0.686	2.153	0.000
10.383	0.066	0.694	3.478	0.000
10.500	0.066	0.701	4.670	0.000
10.617	0.066	0.709	5.532	0.000
10.733	0.000	0.000	6.046	0.000

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 2.631
Total Impervious Area: 0.12

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.743
Total Impervious Area: 2.003

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.042086
5 year	0.062446
10 year	0.07843
25 year	0.10171
50 year	0.121448
100 year	0.143372

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.016583
5 year	0.025631
10 year	0.033434
25 year	0.045749
50 year	0.056984
100 year	0.070241

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1949	0.023	0.013
1950	0.062	0.017
1951	0.035	0.015
1952	0.033	0.014
1953	0.043	0.013
1954	0.065	0.017
1955	0.080	0.047
1956	0.048	0.091
1957	0.068	0.014
1958	0.063	0.016

1959	0.045	0.016
1960	0.039	0.014
1961	0.061	0.017
1962	0.035	0.012
1963	0.067	0.014
1964	0.044	0.014
1965	0.031	0.016
1966	0.023	0.013
1967	0.066	0.016
1968	0.051	0.017
1969	0.043	0.015
1970	0.029	0.015
1971	0.057	0.037
1972	0.050	0.013
1973	0.030	0.016
1974	0.046	0.018
1975	0.030	0.013
1976	0.031	0.016
1977	0.020	0.012
1978	0.035	0.013
1979	0.098	0.011
1980	0.030	0.014
1981	0.040	0.012
1982	0.042	0.017
1983	0.032	0.017
1984	0.037	0.023
1985	0.066	0.036
1986	0.132	0.023
1987	0.052	0.022
1988	0.036	0.016
1989	0.048	0.013
1990	0.033	0.015
1991	0.038	0.017
1992	0.036	0.015
1993	0.023	0.012
1994	0.021	0.016
1995	0.033	0.018
1996	0.083	0.018
1997	0.159	0.156
1998	0.034	0.015
1999	0.042	0.019
2000	0.040	0.017
2001	0.022	0.009
2002	0.037	0.030
2003	0.025	0.013
2004	0.047	0.016
2005	0.035	0.014
2006	0.091	0.037
2007	0.074	0.034
2008	0.083	0.020
2009	0.037	0.015

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.1594	0.1558
2	0.1323	0.0906
3	0.0983	0.0473

4	0.0913	0.0374
5	0.0832	0.0372
6	0.0828	0.0359
7	0.0800	0.0341
8	0.0745	0.0301
9	0.0680	0.0234
10	0.0674	0.0232
11	0.0661	0.0220
12	0.0657	0.0196
13	0.0645	0.0186
14	0.0626	0.0181
15	0.0624	0.0180
16	0.0606	0.0178
17	0.0569	0.0175
18	0.0518	0.0173
19	0.0507	0.0169
20	0.0496	0.0169
21	0.0479	0.0167
22	0.0478	0.0165
23	0.0471	0.0165
24	0.0465	0.0165
25	0.0448	0.0164
26	0.0436	0.0164
27	0.0435	0.0162
28	0.0431	0.0161
29	0.0423	0.0161
30	0.0417	0.0159
31	0.0400	0.0158
32	0.0397	0.0157
33	0.0388	0.0155
34	0.0375	0.0154
35	0.0372	0.0153
36	0.0370	0.0152
37	0.0366	0.0151
38	0.0361	0.0151
39	0.0359	0.0150
40	0.0354	0.0148
41	0.0354	0.0143
42	0.0351	0.0142
43	0.0347	0.0142
44	0.0336	0.0138
45	0.0335	0.0137
46	0.0331	0.0137
47	0.0328	0.0136
48	0.0322	0.0133
49	0.0315	0.0133
50	0.0312	0.0132
51	0.0304	0.0130
52	0.0302	0.0129
53	0.0301	0.0129
54	0.0288	0.0128
55	0.0246	0.0127
56	0.0235	0.0124
57	0.0230	0.0123
58	0.0226	0.0116
59	0.0218	0.0116
60	0.0208	0.0114
61	0.0203	0.0086

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0210	2841	1271	44	Pass
0.0221	2499	1126	45	Pass
0.0231	2232	1012	45	Pass
0.0241	1997	911	45	Pass
0.0251	1771	858	48	Pass
0.0261	1553	814	52	Pass
0.0271	1390	775	55	Pass
0.0281	1236	738	59	Pass
0.0292	1107	704	63	Pass
0.0302	1000	639	63	Pass
0.0312	896	590	65	Pass
0.0322	813	537	66	Pass
0.0332	741	463	62	Pass
0.0342	675	372	55	Pass
0.0352	618	297	48	Pass
0.0363	571	224	39	Pass
0.0373	525	194	36	Pass
0.0383	474	181	38	Pass
0.0393	447	167	37	Pass
0.0403	417	153	36	Pass
0.0413	384	143	37	Pass
0.0423	363	132	36	Pass
0.0434	344	120	34	Pass
0.0444	316	105	33	Pass
0.0454	301	97	32	Pass
0.0464	284	92	32	Pass
0.0474	262	83	31	Pass
0.0484	244	80	32	Pass
0.0494	234	71	30	Pass
0.0505	218	67	30	Pass
0.0515	206	64	31	Pass
0.0525	197	60	30	Pass
0.0535	190	57	30	Pass
0.0545	185	46	24	Pass
0.0555	176	38	21	Pass
0.0565	168	33	19	Pass
0.0576	159	32	20	Pass
0.0586	153	31	20	Pass
0.0596	148	29	19	Pass
0.0606	144	28	19	Pass
0.0616	140	27	19	Pass
0.0626	132	25	18	Pass
0.0636	126	23	18	Pass
0.0647	120	21	17	Pass
0.0657	112	21	18	Pass
0.0667	109	20	18	Pass
0.0677	103	19	18	Pass
0.0687	99	19	19	Pass
0.0697	95	19	20	Pass
0.0707	91	19	20	Pass
0.0718	89	19	21	Pass
0.0728	85	16	18	Pass
0.0738	80	15	18	Pass

0.0748	78	15	19	Pass
0.0758	75	15	20	Pass
0.0768	74	14	18	Pass
0.0778	69	14	20	Pass
0.0789	68	13	19	Pass
0.0799	67	12	17	Pass
0.0809	63	12	19	Pass
0.0819	61	12	19	Pass
0.0829	56	12	21	Pass
0.0839	55	12	21	Pass
0.0849	55	12	21	Pass
0.0860	53	11	20	Pass
0.0870	53	11	20	Pass
0.0880	52	11	21	Pass
0.0890	51	11	21	Pass
0.0900	51	11	21	Pass
0.0910	49	10	20	Pass
0.0920	47	10	21	Pass
0.0931	45	10	22	Pass
0.0941	44	9	20	Pass
0.0951	42	9	21	Pass
0.0961	40	9	22	Pass
0.0971	40	9	22	Pass
0.0981	39	9	23	Pass
0.0991	35	9	25	Pass
0.1001	33	9	27	Pass
0.1012	31	9	29	Pass
0.1022	30	8	26	Pass
0.1032	29	8	27	Pass
0.1042	28	8	28	Pass
0.1052	28	7	25	Pass
0.1062	27	7	25	Pass
0.1072	25	7	28	Pass
0.1083	24	7	29	Pass
0.1093	23	7	30	Pass
0.1103	22	7	31	Pass
0.1113	21	7	33	Pass
0.1123	21	6	28	Pass
0.1133	20	6	30	Pass
0.1143	16	6	37	Pass
0.1154	16	6	37	Pass
0.1164	16	6	37	Pass
0.1174	16	6	37	Pass
0.1184	14	6	42	Pass
0.1194	12	5	41	Pass
0.1204	12	4	33	Pass
0.1214	12	3	25	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	0 acre-feet
On-line facility target flow:	0 cfs.
Adjusted for 15 min:	0 cfs.
Off-line facility target flow:	0 cfs.
Adjusted for 15 min:	0 cfs.

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Phase 1 Vault POC	☐	110.98			☐	0.00			
Vault 2 POC	☐	135.03			☐	0.00			
Total Volume Infiltrated		246.01	0.00	0.00		0.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Failed

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

No PERLND changes have been made.

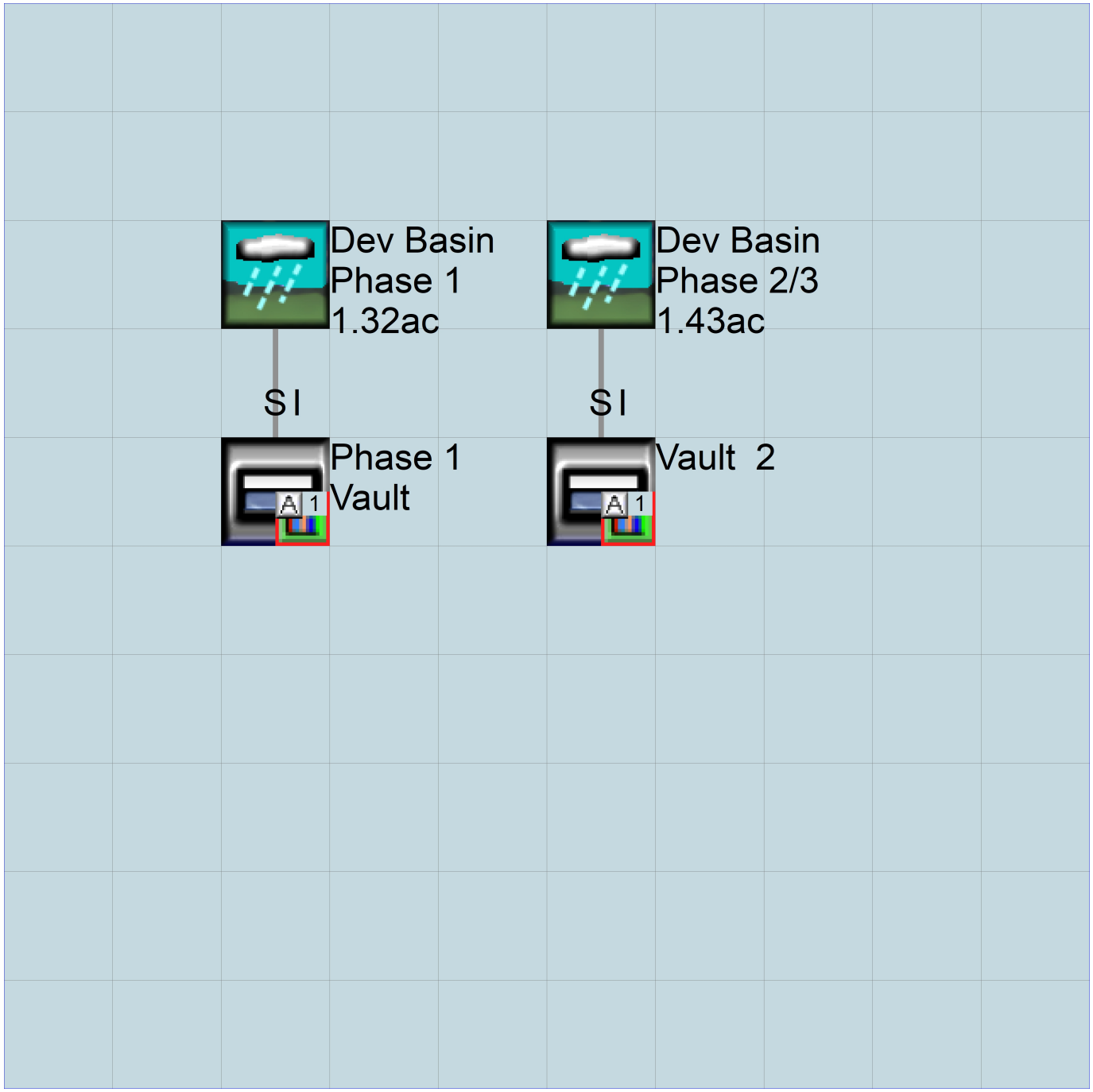
IMPLND Changes

No IMPLND changes have been made.

Appendix

Predeveloped Schematic

Mitigated Schematic



Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1948 10 01        END    2009 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   Saratoga Heights Phase 2 Mod.wdm
MESSU       25   PreSaratoga Heights Phase 2 Mod.MES
            27   PreSaratoga Heights Phase 2 Mod.L61
            28   PreSaratoga Heights Phase 2 Mod.L62
            30   POCSaratoga Heights Phase 2 Mod1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:60
      PERLND      11
      IMPLND       1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Ex Basin Phase 1            MAX                   1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
   11     C, Forest, Mod          1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   11         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   11         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO
```

```
  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   11         0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   11             0       4.5      0.08       400       0.1       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   11              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   11            0.2       0.5      0.35         6       0.5       0.7
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
             ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   11             0         0         0         0       2.5         1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
    1      ROADS/FLAT             1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    1         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    1         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    1         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    1            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    1              0         0
```

```
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    1              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Ex Basin Phase 1 ***
PERLND  11                       1.203     COPY   501     12
PERLND  11                       1.203     COPY   501     13
IMPLND   1                        0.12     COPY   501     15
Ex Basin Phase 2/3***
PERLND  11                       1.428     COPY   501     12
PERLND  11                       1.428     COPY   501     13

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   12.1        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<----------------><---> User T-series  Engl Metr LKFG             ***
                                      in  out                               ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                 ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><--------->      ***
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                    ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><---->
  END HYDR-INIT
```

```
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    0.8       SUM  PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    0.8       SUM  IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    0.76           PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.76           IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY   501 OUTPUT MEAN   1 1     12.1      WDM    501 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1948 10 01        END    2009 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   Saratoga Heights Phase 2 Mod.wdm
MESSU       25   MitSaratoga Heights Phase 2 Mod.MES
            27   MitSaratoga Heights Phase 2 Mod.L61
            28   MitSaratoga Heights Phase 2 Mod.L62
            30   POCSaratoga Heights Phase 2 Mod1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:60
      PERLND      17
      IMPLND       2
      IMPLND       4
      RCHRES       1
      RCHRES       2
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Phase 1 Vault               MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
   17     C, Lawn, Mod            1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   17         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
```

```
    <PLS > ***************** Print-flags **************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   17         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   17         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   17              0       4.5      0.03       400       0.1       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   17              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                                 ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   17            0.1      0.25      0.25         6       0.5      0.25
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
             ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS       IFWS       LZS       AGWS      GWVS
   17              0         0         0         0       2.5          1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                  in  out           ***
    2      ROADS/MOD              1    1    1   27    0
    4      ROOF TOPS/FLAT         1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    2         0    0    1    0    0    0
    4         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    2         0    0    4    0    0    0    1    9
    4         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    2         0    0    0    0    0
    4         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
```

```
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    2            400      0.05       0.1      0.08
    4            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    2              0         0
    4              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    2              0         0
    4              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Dev Basin Phase 1***
PERLND  17                       0.462     RCHRES   1      2
PERLND  17                       0.462     RCHRES   1      3
IMPLND   2                       0.502     RCHRES   1      5
IMPLND   4                       0.356     RCHRES   1      5
Dev Basin Phase 2/3***
PERLND  17                       0.281     RCHRES   2      2
PERLND  17                       0.281     RCHRES   2      3
IMPLND   2                       0.518     RCHRES   2      5
IMPLND   4                       0.627     RCHRES   2      5

******Routing******
PERLND  17                       0.462     COPY     1     12
IMPLND   2                       0.502     COPY     1     15
IMPLND   4                       0.356     COPY     1     15
PERLND  17                       0.462     COPY     1     13
PERLND  17                       0.281     COPY     1     12
IMPLND   2                       0.518     COPY     1     15
IMPLND   4                       0.627     COPY     1     15
PERLND  17                       0.281     COPY     1     13
RCHRES   1                           1     COPY   501     16
RCHRES   2                           1     COPY   501     16
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   12.1        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<----------------><---> User T-series  Engl Metr LKFG             ***
                                        in  out                             ***
    1     Phase 1 Vault          1    1    1    1   28    0    1
    2     Vault  2               1    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
```

```
    <PLS > ************* Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
    2         1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
    2         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                    ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *        ***
    1        0  1  0  0    4  0  0  0  0       0  0  0  0  0       2  2  2  2  2
    2        0  1  0  0    4  0  0  0  0       0  0  0  0  0       2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN      DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><--------><--------> ***
    1              1      0.01       0.0       0.0       0.5       0.0
    2              2      0.01       0.0       0.0       0.5       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                       ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1            0         4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    2            0         4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
  FTABLE      1
   92    4
     Depth      Area    Volume  Outflow1 Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.037603  0.000000  0.000000
  0.155556  0.037603  0.005849  0.001096
  0.311111  0.037603  0.011699  0.001550
  0.466667  0.037603  0.017548  0.001898
  0.622222  0.037603  0.023398  0.002192
  0.777778  0.037603  0.029247  0.002451
  0.933333  0.037603  0.035096  0.002685
  1.088889  0.037603  0.040946  0.002900
  1.244444  0.037603  0.046795  0.003100
  1.400000  0.037603  0.052645  0.003288
  1.555556  0.037603  0.058494  0.003466
  1.711111  0.037603  0.064343  0.003635
  1.866667  0.037603  0.070193  0.003797
  2.022222  0.037603  0.076042  0.003952
  2.177778  0.037603  0.081892  0.004101
  2.333333  0.037603  0.087741  0.004245
  2.488889  0.037603  0.093590  0.004384
  2.644444  0.037603  0.099440  0.004519
  2.800000  0.037603  0.105289  0.004650
  2.955556  0.037603  0.111139  0.004777
  3.111111  0.037603  0.116988  0.004901
  3.266667  0.037603  0.122837  0.005022
  3.422222  0.037603  0.128687  0.005141
  3.577778  0.037603  0.134536  0.005256
  3.733333  0.037603  0.140386  0.005369
```

```
3.888889  0.037603  0.146235  0.005480
4.044444  0.037603  0.152084  0.005588
4.200000  0.037603  0.157934  0.005695
4.355556  0.037603  0.163783  0.005799
4.511111  0.037603  0.169633  0.005902
4.666667  0.037603  0.175482  0.006003
4.822222  0.037603  0.181331  0.006102
4.977778  0.037603  0.187181  0.006200
5.133333  0.037603  0.193030  0.006296
5.288889  0.037603  0.198880  0.006391
5.444444  0.037603  0.204729  0.006484
5.600000  0.037603  0.210579  0.006576
5.755556  0.037603  0.216428  0.006667
5.911111  0.037603  0.222277  0.006756
6.066667  0.037603  0.228127  0.006844
6.222222  0.037603  0.233976  0.006932
6.377778  0.037603  0.239826  0.007018
6.533333  0.037603  0.245675  0.007103
6.688889  0.037603  0.251524  0.007187
6.844444  0.037603  0.257374  0.007270
7.000000  0.037603  0.263223  0.007352
7.155556  0.037603  0.269073  0.007433
7.311111  0.037603  0.274922  0.007514
7.466667  0.037603  0.280771  0.007593
7.622222  0.037603  0.286621  0.007672
7.777778  0.037603  0.292470  0.007750
7.933333  0.037603  0.298320  0.007827
8.088889  0.037603  0.304169  0.007903
8.244444  0.037603  0.310018  0.007979
8.400000  0.037603  0.315868  0.008054
8.555556  0.037603  0.321717  0.008128
8.711111  0.037603  0.327567  0.008202
8.866667  0.037603  0.333416  0.008274
9.022222  0.037603  0.339265  0.008347
9.177778  0.037603  0.345115  0.008418
9.333333  0.037603  0.350964  0.008489
9.488889  0.037603  0.356814  0.008560
9.644444  0.037603  0.362663  0.008630
9.800000  0.037603  0.368512  0.008699
9.955556  0.037603  0.374362  0.008768
10.11111  0.037603  0.380211  0.008836
10.26667  0.037603  0.386061  0.010655
10.42222  0.037603  0.391910  0.012169
10.57778  0.037603  0.397759  0.013207
10.73333  0.037603  0.403609  0.014058
10.88889  0.037603  0.409458  0.014800
11.04444  0.037603  0.415308  0.015469
11.20000  0.037603  0.421157  0.016084
11.35556  0.037603  0.427006  0.016657
11.51111  0.037603  0.432856  0.017196
11.66667  0.037603  0.438705  0.017708
11.82222  0.037603  0.444555  0.018195
11.97778  0.037603  0.450404  0.018663
12.13333  0.037603  0.456253  0.021590
12.28889  0.037603  0.462103  0.023193
12.44444  0.037603  0.467952  0.024489
12.60000  0.037603  0.473802  0.025629
12.75556  0.037603  0.479651  0.026667
12.91111  0.037603  0.485500  0.027631
13.06667  0.037603  0.491350  0.028538
13.22222  0.037603  0.497199  0.029399
13.37778  0.037603  0.503049  0.030221
13.53333  0.037603  0.508898  0.127862
13.68889  0.037603  0.514747  1.323485
13.84444  0.037603  0.520597  3.041905
14.00000  0.037603  0.526446  4.672308
14.15556  0.037603  0.532296  5.737321
END FTABLE  1
FTABLE      2
 92    4
```

Depth (ft)	Area (acres)	Volume (acre-ft)	Outflow1 (cfs)	Velocity (ft/sec)	Travel Time*** (Minutes)***
0.000000	0.066850	0.000000	0.000000		
0.116667	0.066850	0.007799	0.001188		
0.233333	0.066850	0.015598	0.001680		
0.350000	0.066850	0.023398	0.002058		
0.466667	0.066850	0.031197	0.002376		
0.583333	0.066850	0.038996	0.002656		
0.700000	0.066850	0.046795	0.002910		
0.816667	0.066850	0.054594	0.003143		
0.933333	0.066850	0.062394	0.003360		
1.050000	0.066850	0.070193	0.003564		
1.166667	0.066850	0.077992	0.003757		
1.283333	0.066850	0.085791	0.003940		
1.400000	0.066850	0.093590	0.004115		
1.516667	0.066850	0.101390	0.004283		
1.633333	0.066850	0.109189	0.004445		
1.750000	0.066850	0.116988	0.004601		
1.866667	0.066850	0.124787	0.004752		
1.983333	0.066850	0.132586	0.004898		
2.100000	0.066850	0.140386	0.005040		
2.216667	0.066850	0.148185	0.005178		
2.333333	0.066850	0.155984	0.005313		
2.450000	0.066850	0.163783	0.005444		
2.566667	0.066850	0.171582	0.005572		
2.683333	0.066850	0.179382	0.005697		
2.800000	0.066850	0.187181	0.005820		
2.916667	0.066850	0.194980	0.005940		
3.033333	0.066850	0.202779	0.006057		
3.150000	0.066850	0.210579	0.006173		
3.266667	0.066850	0.218378	0.006286		
3.383333	0.066850	0.226177	0.006397		
3.500000	0.066850	0.233976	0.006507		
3.616667	0.066850	0.241775	0.006614		
3.733333	0.066850	0.249575	0.006720		
3.850000	0.066850	0.257374	0.006824		
3.966667	0.066850	0.265173	0.006927		
4.083333	0.066850	0.272972	0.007028		
4.200000	0.066850	0.280771	0.007128		
4.316667	0.066850	0.288571	0.007226		
4.433333	0.066850	0.296370	0.007323		
4.550000	0.066850	0.304169	0.007419		
4.666667	0.066850	0.311968	0.007513		
4.783333	0.066850	0.319767	0.007607		
4.900000	0.066850	0.327567	0.007699		
5.016667	0.066850	0.335366	0.007790		
5.133333	0.066850	0.343165	0.007880		
5.250000	0.066850	0.350964	0.007969		
5.366667	0.066850	0.358763	0.008057		
5.483333	0.066850	0.366563	0.008144		
5.600000	0.066850	0.374362	0.008230		
5.716667	0.066850	0.382161	0.008316		
5.833333	0.066850	0.389960	0.008400		
5.950000	0.066850	0.397759	0.008484		
6.066667	0.066850	0.405559	0.008566		
6.183333	0.066850	0.413358	0.008648		
6.300000	0.066850	0.421157	0.008730		
6.416667	0.066850	0.428956	0.008810		
6.533333	0.066850	0.436755	0.008890		
6.650000	0.066850	0.444555	0.008969		
6.766667	0.066850	0.452354	0.009047		
6.883333	0.066850	0.460153	0.009125		
7.000000	0.066850	0.467952	0.009202		
7.116667	0.066850	0.475751	0.009278		
7.233333	0.066850	0.483551	0.009354		
7.350000	0.066850	0.491350	0.009429		
7.466667	0.066850	0.499149	0.009504		
7.583333	0.066850	0.506948	0.009578		
7.700000	0.066850	0.514747	0.009651		
7.816667	0.066850	0.522547	0.009724		

```
  7.933333  0.066850  0.530346  0.009796
  8.050000  0.066850  0.538145  0.009868
  8.166667  0.066850  0.545944  0.009939
  8.283333  0.066850  0.553743  0.010010
  8.400000  0.066850  0.561543  0.010080
  8.516667  0.066850  0.569342  0.010150
  8.633333  0.066850  0.577141  0.010219
  8.750000  0.066850  0.584940  0.012316
  8.866667  0.066850  0.592740  0.014059
  8.983333  0.066850  0.600539  0.015252
  9.100000  0.066850  0.608338  0.016227
  9.216667  0.066850  0.616137  0.017078
  9.333333  0.066850  0.623936  0.017843
  9.450000  0.066850  0.631736  0.018546
  9.566667  0.066850  0.639535  0.021178
  9.683333  0.066850  0.647334  0.023096
  9.800000  0.066850  0.655133  0.024595
  9.916667  0.066850  0.662932  0.025900
  10.03333  0.066850  0.670732  0.123935
  10.15000  0.066850  0.678531  0.947251
  10.26667  0.066850  0.686330  2.153026
  10.38333  0.066850  0.694129  3.478431
  10.50000  0.066850  0.701928  4.670189
  10.61667  0.066850  0.709728  5.532588
  END FTABLE  2
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    0.8       SUM  PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    0.8       SUM  IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    0.76           PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.76           IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   1 HYDR   RO     1 1        1      WDM   1000 FLOW     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1001 STAG     ENGL      REPL
COPY     1 OUTPUT MEAN   1 1     12.1      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     12.1      WDM    801 FLOW     ENGL      REPL
RCHRES   2 HYDR   RO     1 1        1      WDM   1002 FLOW     ENGL      REPL
RCHRES   2 HYDR   STAGE  1 1        1      WDM   1003 STAG     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    2

  MASS-LINK        3
PERLND     PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    3

  MASS-LINK        5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13
```

```
  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15

  MASS-LINK       16
RCHRES     ROFLOW                          COPY           INPUT  MEAN
  END MASS-LINK   16


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

```
ERROR/WARNING ID:   238   1

The continuity error reported below is greater than 1 part in 1000 and is
therefore considered high.

Did you specify any "special actions"?  If so, they could account for it.

Relevant data are:
DATE/TIME: 1948/12/31 24: 0

RCHRES :    1

RELERR       STORS        STOR       MATIN      MATDIF
-6.524E-03     0.00000  0.0000E+00     0.00000  -4.629E-08

Where:

RELERR is the relative error (ERROR/REFVAL).
ERROR  is (STOR-STORS) - MATDIF.
REFVAL is the reference value (STORS+MATIN).
STOR   is the storage of material in the processing unit (land-segment or
reach/reservior) at the end of the present interval.
STORS  is the storage of material in the pu at the start of the present
printout reporting period.
MATIN  is the total inflow of material to the pu during the present printout
reporting period.
MATDIF is the net inflow (inflow-outflow) of material to the pu during the
present printout reporting period.
```

```
ERROR/WARNING ID:   238   1

The continuity error reported below is greater than 1 part in 1000 and is
therefore considered high.

Did you specify any "special actions"?  If so, they could account for it.

Relevant data are:
DATE/TIME: 1958/ 8/31 24: 0

RCHRES :    1

RELERR       STORS        STOR       MATIN      MATDIF
-1.454E-03     0.00000  0.0000E+00     0.00000  -2.091E-07

Where:

RELERR is the relative error (ERROR/REFVAL).
ERROR  is (STOR-STORS) - MATDIF.
REFVAL is the reference value (STORS+MATIN).
STOR   is the storage of material in the processing unit (land-segment or
reach/reservior) at the end of the present interval.
STORS  is the storage of material in the pu at the start of the present
printout reporting period.
MATIN  is the total inflow of material to the pu during the present printout
reporting period.
MATDIF is the net inflow (inflow-outflow) of material to the pu during the
present printout reporting period.
```

```
ERROR/WARNING ID:   238   1

The continuity error reported below is greater than 1 part in 1000 and is
therefore considered high.

Did you specify any "special actions"?  If so, they could account for it.

Relevant data are:
```

DATE/TIME: 1967/ 8/31 24: 0

RCHRES :   1

RELERR	STORS	STOR	MATIN	MATDIF
-1.788E-03	0.00000	0.0000E+00	0.00000	-1.716E-07

Where:

RELERR is the relative error (ERROR/REFVAL).
ERROR is (STOR-STORS) - MATDIF.
REFVAL is the reference value (STORS+MATIN).
STOR   is the storage of material in the processing unit (land-segment or reach/reservior) at the end of the present interval.
STORS is the storage of material in the pu at the start of the present printout reporting period.
MATIN is the total inflow of material to the pu during the present printout reporting period.
MATDIF is the net inflow (inflow-outflow) of material to the pu during the present printout reporting period.

ERROR/WARNING ID: 238   1

The continuity error reported below is greater than 1 part in 1000 and is therefore considered high.

Did you specify any "special actions"? If so, they could account for it.

Relevant data are:
DATE/TIME: 1994/ 8/31 24: 0

RCHRES :   1

RELERR	STORS	STOR	MATIN	MATDIF
-1.611E-03	0.00000	0.0000E+00	0.00000	-1.861E-07

Where:

RELERR is the relative error (ERROR/REFVAL).
ERROR is (STOR-STORS) - MATDIF.
REFVAL is the reference value (STORS+MATIN).
STOR   is the storage of material in the processing unit (land-segment or reach/reservior) at the end of the present interval.
STORS is the storage of material in the pu at the start of the present printout reporting period.
MATIN is the total inflow of material to the pu during the present printout reporting period.
MATDIF is the net inflow (inflow-outflow) of material to the pu during the present printout reporting period.

ERROR/WARNING ID: 238   1

The continuity error reported below is greater than 1 part in 1000 and is therefore considered high.

Did you specify any "special actions"? If so, they could account for it.

Relevant data are:
DATE/TIME: 2003/ 7/31 24: 0

RCHRES :   1

RELERR	STORS	STOR	MATIN	MATDIF
-9.664E-03	0.00000	0.0000E+00	0.00000	-3.151E-08

Where:

RELERR is the relative error (ERROR/REFVAL).
ERROR is (STOR-STORS) - MATDIF.

REFVAL is the reference value (STORS+MATIN).
STOR is the storage of material in the processing unit (land-segment or reach/reservior) at the end of the present interval.
STORS is the storage of material in the pu at the start of the present printout reporting period.
MATIN is the total inflow of material to the pu during the present printout reporting period.
MATDIF is the net inflow (inflow-outflow) of material to the pu during the present printout reporting period.

The count for the WARNING printed above has reached its maximum.

If the condition is encountered again the message will not be repeated.

Disclaimer

Legal Notice

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CONSULTANTS

APPENDIX C

WATER QUALITY CALCULATIONS

Size and Cost Estimate

Prepared by Stephanie Jacobsen on March 5, 2015

Saratoga Heights – Stormwater Treatment System

Mukilteo, WA

Information provided:

- Total contributing area = 3.044ac
- Impervious area = 1.903ac
- Detention release rate, Q_{treat} = 0.024cfs
- Presiding agency = City of Mukilteo

Assumptions:

- Media = ZPG cartridges
- Per cartridge flow rate = 11.25gpm
- Drop required from inlet to outlet = 3.05' minimum

Size and cost estimates:

The StormFilter is a flow-based system, and therefore, is sized by calculating the peak water quality flow rate associated with the design storm. However, when the StormFilter is placed downstream of detention the flow rate generated at the water quality storm is not always representative of the total volume of water that will go through the system or type of pollutant-loading the system may experience in one year.

For this site, Contech Engineered Solutions LLC recommends using a 72" Manhole StormFilter with 5 cartridges (see attached detail). The estimated cost of this system is $24,300, complete and delivered to the job site. This estimate assumes that the vault is 6 feet deep. The final system cost will depend on the actual depth of the unit and whether extras like doors rather than castings are specified. The contractor is responsible for setting the StormFilter and all external plumbing.

Typically, precast StormFilters have internal bypass capacities of 1.8 cfs. If the peak discharge off the site is expected to exceed this rate, we recommend placing a high-flow bypass upstream of the StormFilter system. Contech Engineered Solutions could provide our high-flow bypass, the StormGate, which provides a combination weir-orifice control structure to limit the flow to the StormFilter. The estimated cost of this structure is $4,500. The final cost would depend on the actual depth and size of the unit.

Determining Number of Cartridges for Systems Downstream of Detention

CONTECH Stormwater Solutions Inc. Engineer:	**SKJ**	
Date	**3/5/2015**	

Site Information

Project Name	**Saratoga Heights**	
Project State	**Washington**	
Project Location	**Mukilteo**	
Drainage Area, Ad	**3.04**	ac
Impervious Area, Ai	**1.80**	ac
Pervious Area, Ap	**1.24**	
% Impervious	**59%**	
Runoff Coefficient, Rc	**0.58**	

Upstream Detention System

Peak release rate from detention, $Q_{release\ peak}$	**0.04**	cfs
Treatment release rate from detention, $Q_{release\ treat}$	**0.02**	cfs
Detention pretreatment credit (from removal efficiency calcs)	**50%**	

Mass loading calculations

Mean Annual Rainfall, P	**38**	in
Agency required % removal	**80%**	
Percent Runoff Capture	**90%**	
Mean Annual Runoff,V_t	**220,347**	ft^3
Event Mean Concentration of Pollutant, EMC	**60**	mg/l
Annual Mass Load, M_{total}	**824.85**	lbs

Filter System

Filtration brand	**StormFilter**	
Cartridge height	**27**	in
Specific Flow Rate	**1.00**	gpm/ft^2

Number of cartridges - mass loading

Mass removed by pretreatment system, M_{pre}	**412.42**	lbs
Mass load to filters after pretreatment, M_{pass1}	**412.42**	lbs
Estimate the required filter efficiency, E_{filter}	**0.60**	
Mass to be captured by filters, M_{filter}	**247.45**	lbs
Allowable Cartridge Flow rate, Q_{cart}	**11.25**	
Mass load per cartridge, M_{cart} (lbs)	**54.00**	lbs
Number of Cartridges required, N_{mass}	**5**	
Treatment Capacity	**0.13**	cfs

Determine Critical Sizing Value

Number of Cartridges using $Q_{release\ treat}$, N_{flow}	**1**

Method to Use: **MASS-LOADING**

SUMMARY

Treatment Flow Rate, cfs	0.13
Cartridge Flow Rate, gpm	11.3
Number of Cartridges	5

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APPENDIX D

EROSION CONTROL CALCULATIONS

WWHM2012
PROJECT REPORT

Flow Frequency Return Periods for Mitigated. POC #2

Return Period	Flow(cfs)
2 year	0.237567
5 year	0.324582
10 year	0.38606
25 year	0.468216
50 year	0.53272
100 year	0.600094

Sediment Trap Vault 2 Dimensions:

SA = 2 x Q_{10}/.00096

SA: Required surface area of vault when depth is at the top of riser.

Q_{10}: Flow into the vault during a ten-year rain event.

SA = 2 x 0.3861/.00096 = 804.375 ft^2

SA < area provided (Vault 2, 2994 ft^2) therefore, **OK**.

CITY OF
MUKILTEO
11930 Cyrus Way, Mukilteo, WA 98275
(425) 263-8000
mukilteowa.gov

SOIL MANAGEMENT PLAN WORKSHEET

Site Address: SARATOGA HEIGHTS

Permit Number: _____

REQUIRED ATTACHMENTS

_____Three (3) original scaled site plans, as a separate sheet in Civil set, showing soil management option(s) for:

- Lawn / Turf Areas (with square footage shown)
- Planting Bed Areas (with square footage shown)
- Show on SWPPP where soil will be left undisturbed and protected during construction and/or where stockpile locations will be

_____Soil test results (if proposing custom amendment rates).

LAWN / TURF AREAS

TOTAL LAWN / TURF AREAS Sq. Ft. 8,908

SELECT TREATMENT*	✓ Pre-approved compost amendment 1.75" minimum required	_____ Custom compost amendment** _____ inches (attach soils tests and calculations)	_____ Topsoil import 8" minimum required
DETERMINE COMPOST/ TOPSOIL QUANTITY	1.75 inches compost / topsoil to be applied (as selected above) X 3.1 5.42 = cubic yards / 1,000 sq. ft. X 9 ,000s sq. ft. (Total Lawn / Turf Areas above) 50 = **TOTAL CUBIC YARDS**		

PLANTING BED AREAS

TOTAL PLANTING BED AREAS Sq. Ft. 15,835

SELECT TREATMENT*	✓ Pre-approved compost amendment 1.75" minimum required	_____Custom compost amendment** _____inches (attach soils tests and calculations)	_____Topsoil import _____8" minimum required
DETERMINE COMPOST/ TOPSOIL QUANTITY	1.75 inches compost / topsoil to be applied (as selected above) X 3.1 5.42 = cubic yards / 1,000 sq. ft. X 16 ,000s sq. ft. (Total Lawn/Turf Areas above) 87 = **TOTAL CUBIC YARDS**		
MULCH QUANTITY	2 inches mulch to be applied (minimum 2") X 3.1 6.2 = cubic yards / 1,000 sq. ft. X 16 ,000s sq. ft.		

CITY OF
MUKILTEO
11930 Cyrus Way, Mukilteo, WA 98275
(425) 263-8000
mukilteowa.gov

SOIL MANAGEMENT PLAN WORKSHEET

Site Address: SARATOGA HEIGHTS

Permit Number: _____

	100 = TOTAL CUBIC YARDS

*For previously graded sites, soils shall require custom amendment or topsoil import.

TOTAL SOIL CALCULATIONS FOR ENTIRE SITE

Pre-Approved Compost Amendment **Specific product and supplier** _____	**Quantity:** _____ **cu. yds.**
Custom Compost Amendment** **Test Results Required to be Attached** **Specific product and supplier** _____	**Quantity:** _____ **cu. yds.**
Mulch **Specific product and supplier** _____	**Quantity:** _____ **cu. yds.**

1. Pre-Approved Compost Amendment must:
   a. Meet the definition for "composted materials" in WAC 173-350, section 220;
   b. Have organic matter content of 35%-65%, and a carbon to nitrogen ratio below 25:1;
   c. The carbon to nitrogen ratio may be as high as 35:1, if plantings are entirely native to Puget Sound lowland regions.
2. Custom compost amendment calculations must be provided by a qualified professional to meet organic content requirements. Qualified professionals include licensed Landscape Architects, Civil Engineers or Geologists; certified Agronomists, Soil Scientists, or Crop Advisors.

RETAIN YOUR RECEIPTS

Keep your receipts for all imported soils and mulch. You will be required to verify material type and quantity prior to Permit Final.

Mukilteo Water & Wastewater District
7824 Mukilteo Speedway
Mukilteo, WA 98275-0645
Ph. 425-355-3355 • *Fx.* 425-348-0645

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MAR 18 2019
CITY OF MUKILTEO

WATER AND SEWER SERVICE AVAILABILITY

Index Map Page No. 13

Property Owner:	**Saratoga 44, LLC.**
Proposed Use:	**28 3-Story Townhomes**
Location:	**8002 53rd Ave W**
Property Tax ID:	**00611600005402**

In response to your request for a letter of water and sewer availability, it is the Mukilteo Water and Wastewater District's (Districts) understanding that you wish to construct 28 3-Story Townhomes on the above referenced property. This property lies within the District's water and sewer service area boundary.

The Developer will need to enter into a Developer Extension Agreement (DEA) with Mukilteo Water and Wastewater District to make the necessary water and sewer improvements to serve the property. Service will be provided upon the completion of the water and sewer system improvements and Transfer of Ownership in accordance with the terms of the District's Developer Extension Agreement. Once the DEA is completed the Developer may make application and payment for water and sewer permits and fill out a Water Use Survey.

The District has a 6-inch looped water main in 53rd Ave W, an 8-inch water main in the property to the south (View Point Condo's) and an 8-inch water main in the property to the north (Faraway Condo's). A Water main would need to loop through the proposed development connecting the two 8-inch water mains to provide domestic and fire protection to the site. The Developer will need to provide the District the required fire flow, from the City of Mukilteo, required to protect the site and pay to have a fire flow analysis performed to determine if off-site water system improvements will be required to meet the fire flow requirements of the project.

The existing sewer main in 53rd Ave W is not deep enough to provide gravity sewer flow to the proposed development. The Developer will need to prepare an engineering analysis showing the option to either install a new system in 53rd Ave W, parallel to the existing, or lower the approximately 1,255 feet of existing sewer main to maximize gravity sewer service to the development. Upon District review of the analysis and the proposed plans, the Developer will be required to perform one of these options. As many of the proposed buildings as possible shall connect to the gravity system. Any structures not connected to the gravity system will require Hold Harmless and Joint Side Sewer Agreements with the District.

For the portion of the proposed development where standard conforming gravity sewer service cannot be achieved and denial of service is the only remaining option, private ownership of individual grinder pumps may be considered by the District. The Developer's engineer shall provide the District with information utilized in determining gravity service unavailability showing that all means of achieving gravity service, regardless of cost, have been reviewed and eliminated. If it is proven that gravity service is unavailable, only then will the District accept the Developer's engineer's proposal identifying pump design and the areas to be served for District review and approval. (District Standards –Page III-8 & 9).

A portion of the DEA deposit will be allocated for the District's engineers to analyze the sewer pump stations at 84th St SW and 53rd Ave W to verify it has capacity to service the proposed development.

All construction of sewer and water facilities will be in accordance with the Standards, Specifications and Regulations of the Mukilteo Water and Wastewater District. The owner would pay the current charges in effect when application is made to connect to the sewer and water system.

THIS CERTIFICATE IS VALID FOR ONE YEAR FROM DATE OF ISSUANCE.
Permit costs will be those in effect on the day application for service is made at the District.
Application/Permit Fees are subject to change.

For: Greg Krabbe
gkrabbe@comcast.net
(425) 750-8400

Jim Voetberg, General Manager
March 12, 2019