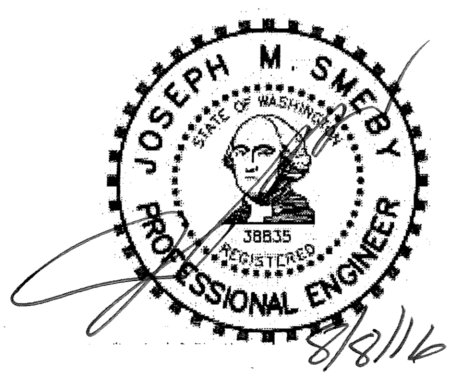
Preliminary Drainage Report
Commons Phase II

for

David & Claudia Lee
19021 NE 8th St
Suite 202
Bellevue, WA 98008



Prepared by:
Joseph M. Smeby, P.E.

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I. PROJECT OVERVIEW

The Commons Phase II Development project is located west of the Bothell-Everett Highway at 16824 Bothell-Everett Hwy, Mill Creek, Washington 98012 (see the attached vicinity map). This project will consist of three new buildings, on-site parking, and associated storm drainage and other utility construction to serve the future project. A Binding Site Plan is being submitted along with the preliminary engineering and other associated documents/designs. The developable area on this site totals approximately 1.45 acres that are to be developed for commercial uses. The total parcel area is 4.81 acres. Currently, the developable portion of the site is along a high point on the site and slopes generally drain east or west. The site is bordered to the south, east and west by a stream and wetland system and to the north by an existing commercial development. The developed site will include impervious surface areas of approximately 1.16 acres, or 24% impervious.

This project has been designed with multiple infiltration/water quality systems. The different infiltration systems have been designed to maximize the disposal of runoff generated into the ground. The infiltration trenches are located under the proposed site access and parking areas and have been designed to fully infiltrate the runoff up to the 100-year design event. In addition, the trenches will be constructed with a treatment filter layer so that all PGIS will be treated prior to infiltration from the site.

The infiltration/water quality systems have been designed per the flow control and quality control standards in the Washington State Department of Ecology's Stormwater Management Manual for Western Washington, August 2012 edition (WSDOE Manual).

The 2012 WSDOE Manual, Volume I, lists 10 Minimum Requirements for New Development. Each of the items was addressed as follows:

1. **Preparation of Stormwater Site Plans** - A grading and storm drainage plan has been submitted with this report along with detailed information for the layout and construction of the stormwater facilities. The storm drainage plan accurately shows how the drainage basins for each of the five systems will be collected, conveyed and discharged. The storm drainage plan corresponds with the basin maps and the narrative in this report. A final construction plan has been prepared for the drainage system serving this project.

2. **Construction Stormwater Pollution Prevention (SWPP)** – A SWPP plan has been prepared for this project and is shown on sheet 2 of the engineering plan set. The plan has been designed to protect the downstream system during the construction of the frontage and on-site improvements. This section is a summary of the proposed measures to reduce the impacts to the downstream system.

Element 1: Marking Clearing Limits

The proposed clearing limits are shown on the SWPPP/ESC Plan contained in the Construction plan set submitted with this report. In addition, staking of the clearing limits along with approval of the limits by the City is required before any construction activities may begin.

Contractor's Note: Plastic, metal or stake wire fence may be used to mark the clearing limits, any material must first be approved by the City of Mill Creek.

Element 2: Establish Construction Entrance

The proposed construction entrance location is shown on the SWPPP/ESC Plan contained in the Construction plan set submitted with this report. There is one entrance location shown. In addition to the construction entrance, the standard

City of Mill Creek Note, included on sheet 2 requires the cleaning of the City Streets once per day or as directed by the City, and flushing of the streets will not be allowed.

Element 3: Control Flow Rates

The site as it exists is currently cleared with grasses and brush covering the majority of the site to be disturbed. This condition will not change much during the construction of the stormwater vault. Once complete, this vault will be used as a sediment pond for the remainder of the construction. Therefore, this site's runoff will be controlled using the proposed control structure designed for the developed condition.

Element 4: Install Sediment Controls

This site has already been cleared. In addition, the proposed commercial development will be 36% impervious. Therefore, only few areas of native topsoil will been retained. So stormwater sediment will need to be controlled in a different manner.

For this project stormwater runoff during construction will be directed to the proposed stormwater vault. In addition, all new catch basins along this project's frontage will have silt socks installed to limit sediment discharge to the downstream or infiltration systems. In addition, silt fence will be installed on the downhill side of disturbed areas to protect downstream areas.

Element 5: Stabilize Soils

The construction sequence along with the City of Mill Creek General Notes required the contractor to cover or stabilize all unworked soils. The time exposed soils can be left exposed without protect is different depending upon the season and is specified in both the General Notes and Construction Sequence. In addition, the Construction Sequence lists some methods the contractor may use to protect these soils from erosion.

Element 6: Protect Slopes

The grading of this site was designed to minimize the existence of cut or fill slopes. However, along the south and east sides of the project cut and fill slopes will be necessary. The slopes have been designed as 3:1 or flatter to limit the potential for erosion. These slopes will be vegetated immediately after final grading to protect the exposed soil from erosion. In addition, runoff during construction will be directed toward the future catch basins and stormwater vaults rather than allowed to flow over the slopes to the south. This will protect the wetland buffers to the south and east and the fill slopes to the south.

Element 7: Protect Drain Inlets

All new storm drain inlets along 9th Avenue SE and on-site will be protected with silt socks. Runoff from construction shall not be directed to any proposed infiltration system until a time after the entire tributary basin for the infiltration facility has been stabilized and the threat of sediment laden runoff being conveyed to the facility is minimized. Hydraulic plugs or other methods shall be installed to ensure no runoff enters the infiltration facility during construction and prior to the entire conveyance system being cleaned and flushed.

Element 8: Stabilize Channels and Outlets

The proposed on-site conveyance will be in the form of catch basins and pipes. This system will collect and convey construction runoff to the stormwater vault or infiltration facilities. The vault outlet will be directed to a level spreader that will dissipate the energy in the runoff and disperse it over a wide area to limit the possibility of channeling and erosion along the edge of the wetland to the south.

Element 9: Control Pollutants

The contractor shall be responsible for handling all pollutants used or produced on-site and dispose of the materials in a manner that does not cause contamination of stormwater. Hazardous materials should also be stored in a safe and secure location.

Element 10: Control De-Watering

All dewater discharges shall be directed to the stormwater vault or a sediment pond/trap during construction. Clean, non-turbid de-watering water may be discharged directly to the level spreader at the vault outfall as long as this does not cause erosion or flooding of the downstream system.

Element 11: Maintain BMPs

The contractor shall maintain and repair on-site BMPs as necessary to ensure proper performance. BMPs may need to be relocated during construction as the site changes. Sediment control BMPs shall be inspected weekly or after a run-off producing event during the dry season and daily during the wet season. Sediment control BMPs shall be removed within 30-days of final site stabilization.

Element 12: Manage the Project

The contractor shall work with the City and this engineer to ensure that Seasonal Work Limitations are being met and that the BMPs are working as designed. In addition, the City may require additional BMPs if the existing measures are not adequately protecting the downstream system.

Element 13: Protect LID BMPs

The contractor will flag all proposed infiltration areas to limit vehicular traffic over them during construction and the systems shall be plugged until the site has been stabilized and the CBs and conveyance system cleaned.

3. **Source Control of Pollution** - Source control BMPs have been included with this submittal in Section VIII - Operation and Maintenance.

4. **Preservation of Natural Drainage Systems and Outfalls** – This site will entirely infiltrate all runoff generated from the proposed improvements on-site. Therefore, no changes to the existing downstream system/flow path will be created by this project.

5. **On-site Stormwater Management** – Runoff from the new pervious and impervious surfaces constructed for this project will be collected in roof drains and catch basins and directed to different infiltration trenched around the site, beneath the proposed access/parking areas. The infiltration systems will be sized following State and City requirements to ensure full infiltration and treatment up to the 100-year event and negate any downstream stormwater impacts as a result of this project.

6. **Runoff Treatment** - On-site water quality treatment will occur through the use of a treatment filter layer beneath any infiltration trench that receives runoff from a PGIS/PGHS. Since the trenches will infiltrate 100% of the site runoff the system will treat more than 91% of the flows as required per code. This system for water quality was designed to meet the treatment requirements of the 2012 DOE Manual per Volume V, BMP T7.20.

7. **Flow Control** - On-site flow control will be accomplished through different infiltration facilities. The infiltration facilities will manage all of the roof runoff along with on-site parking/access roads. The infiltration systems were sized based on the project geotech's recommendations along with the required infiltration rates for the treatment filter in the bottom of the trenches.

8. **Wetlands Protection** – By fully infiltrating the runoff on-site the project will aid in recharging the groundwater in this area surrounded by the stream/wetland systems. The will aid in providing base flows throughout the year as opposed to detention systems which discharge only during and after rain events.

9. **Basin/Watershed Planning** - No significant conveyance problems were observed within the ¼ mile downstream flow path for this project.

10. **Operation and Maintenance Manual** - A complete operation and maintenance manual specific to the final design will be included with the future submittals.

II. EXISTING CONDITIONS SUMMARY

This site contains some significant trees in the area to be developed. The wetland buffers also contain brush with significant trees and the stream buffer contains trees and has been mostly left undisturbed previously. Site soils on this site have been reviewed and classified by The Riley Group, Inc, and were also analyzed for infiltration potential. They found medium dense gravelly sand with some silt and recommend a long-term infiltration rate of 5"/hr be used for this project. In addition, the depth to groundwater was measured and found to be approximately 10-feet below grade around the site.

III. OFF-SITE ANALYSIS

A. UPSTREAM TRIBUTARY AREA

Due to the topography of the surrounding areas there is no upstream area tributary to this site.

B. DOWNSTREAM ANALYSIS

Drainage from the developed portion of the existing site naturally drains into the surrounding stream/wetland complex to the south, east and west. Only a very small portion of the site drains to the north toward the existing commercial development. All of the site runoff will be infiltrated into the existing ground around the site. During a site visit the stream/wetland was found to flow gently from the existing culvert passing beneath the Bothell-Everett Hwy to the southwest and eventually combining with North Creek. The stream channel was well defined and varied from 2-4 feet wide. However, based on the existing channel grades it appears to be adequate with no signs of erosion or other capacity issues.

IV. DEVELOPED CONDITIONS SUMMARY – BASIN OVERVIEW

This site will create multiple drainage facilities to manage runoff from the site improvements. This will consist of three buildings, parking and access roads. Runoff from the vegetated areas around the improvements will be allowed to sheet flow toward the adjacent critical area buffers.

V. DEVELOPED CONDITIONS SUMMARY

A. HYDROLOGIC ANALYSIS

1. Basin A

The hydrologic analysis for the developed area of the site was conducted using WWHM2012 which is based on a continuous runoff model calibrated for western Washington. The site soils in the area of the proposed infiltration facilities for this project have been classified as medium dense gravelly sand with some silt with a long-term infiltration rate of 5"/hr. Please refer to the Geotechnical reports included in Appendix B of this report. Also, please note that in-situ testing was performed to verify the long-term infiltration rate.

The area for this facility was found to have a maximum groundwater table at a depth of 10-feet below existing grade. Therefore, the infiltration trench bottom will be set at 289.0 to maintain adequate clearance between the bottom of the facility and the seasonal high water table.

B. DETENTION ROUTING CALCULATION

The detention routing calculation, a continuation of the hydrologic analysis, uses the WWHM2012 software to size the infiltration bottom areas and volume necessary to mitigate the effects of the proposed development. The printouts from the WWHM 2012 modeling software are included in Appendix 'A'. For the preliminary design the over all site was analyzed and found that there will be far more infiltration trench bottom area provided then required. The final design will provide sizing for each specific system based on the actual tributary areas.

C. WATER QUALITY CALCULATION

Since this project will infiltrate 100% of the site runoff from PGIS/PGHS this exceeds the minimum required 91% to meet the treatment requirements. All trenches receiving PGIS runoff will be constructed with a treatment filter in the base of the trench and sized accordingly. The use of a treatment filter with an infiltration trench is an approved method per the 2012 DOE Manual as provided in Volume V, Ch. 7. In addition, the system should be sized/modeled per Volume III, Ch.3.

In order to provide pre-treatment for this system a permanent catch basin insert will be designed and detailed on the construction plans. This insert will also include an oil-absorbent device which will aid in trapping both sediment and oil/grease in the CB prior to runoff entering the infiltration trenches for full infiltration and treatment. The insert will need to be inspected at a minimum twice a year in April and October and cleaned/maintained as needed. If it is found during the regular inspections that the intervals are too far apart then the on-site manager/operator shall take the necessary steps to reduce the time between inspections.

Finally, by placing CBs at the ends and intermittently within the infiltration trench layout there will be ample access points to maintain the system without the need for major pavement disturbance and excavation. However, infiltration systems will require additional maintenance after many years of use and pavement removal and excavation/replacement of the existing trench and treatment filter will be necessary. However, it is anticipated that at that time the remaining pavement will most likely need repair and this can be accomplished at the same time.

D. WATER QUALITY TREATMENT

A treatment filter based on the 2012 DOE standard specs, ie a sand filter with a minimum of 10% organics will be provided with the final drainage design for this project at a future date. This BMP is an approved option for effective water quality treatment and provided in the DOE manual. Refer to Vol. 5, Ch 7. The treatment thickness will be a minimum of 12" of sand and organics to ensure adequate treatment capacity for the long-term function of the proposed system.

F. CONVEYANCE CALCULATIONS

For this project the site conveyance was analyzed using Mannings Equation. Since the maximum peak flow for any pipe is from the roof downspouts connecting to the on-site CBs, and this pipe will receive a maximum flow of 0.66 cfs, a 6" pipe with a slope of 1.0% was analyzed. Since no pipe will have less capacity or receive greater flow, it is assumed that if this pipe provides enough capacity then the remainder of the proposed pipes for this project will also provide the necessary capacity. The following summarizes the peak flow and pipe condition for the roof downspout lines:

Roof Downspout	0.66 cfs	6" PVC S = 0.01000 ft/ft

Refer to Appendix A for Conveyance Calculation Printouts. (This will be provided in the full engineering submittal for the construction permit)

VIII. SPECIAL REPORTS AND STUDIES (Refer to Additional Documents Submitted)

A. CRITICAL AREA STUDY
By: Tallasea

B. GEOTECHNICAL ENGINEERING STUDIES
By: The Riley Group (Refer to Appendix B)

IX. OTHER PERMITS

Other permits that may be necessary for this project in the future are:

Construction Permit

Building Permit

NPDES Permit

X. OPERATION AND MAINTENANCE MANUAL

The Property Owner will be responsible for maintaining the stormwater and landscaping facilities within this development. Included in this manual are checklists for each feature specific to this project. Copies should be made of the checklists as necessary during routine inspections and required maintenance. Specific problems can be recorded along with the appropriate action taken.

These checklists are a guide for inspections and maintenance. The frequency of the inspections/maintenance is identified in the left hand column with the following abbreviations:

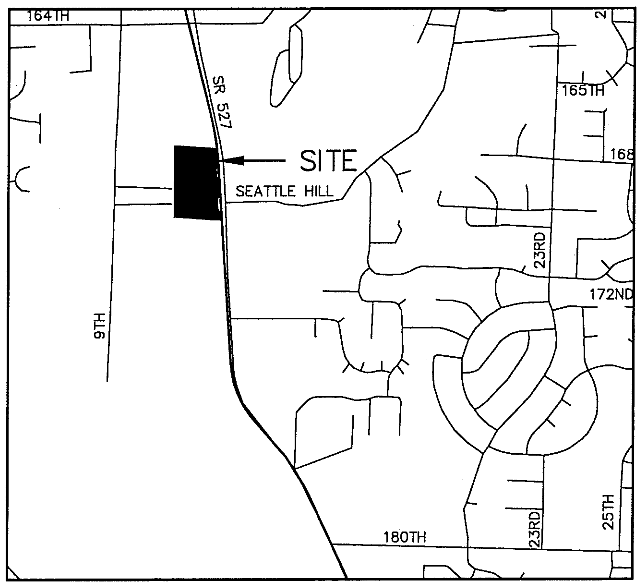
A = Annual (March or April preferred)

M = Monthly

S = After Major Storms (Use 1-inch in 24 hours as a guideline)

Routine inspections and maintenance will improve the long-term performance of the stormwater facilities. If at any time you are unsure if a problem exists or how to address a specific problem contact a Professional Engineer.

Refer to Appendix C for a list of each facility to be maintained and the appropriate maintenance checklist. (This will be provided with the full engineering report)



VICINITY MAP
SCALE 1" = 2000'

FIG. 1

OMEGA
ENGINEERING, INC.
2707 WETMORE AVE.
Everett, WA 98201
(o)425.387.3820 (f) 425.259.1958

VICINITY MAP
COMMONS PHASE II

DATE	JOB NO.	SCALE	SHEET
6/9/16	16-0502	1" = 2000'	1 OF 1

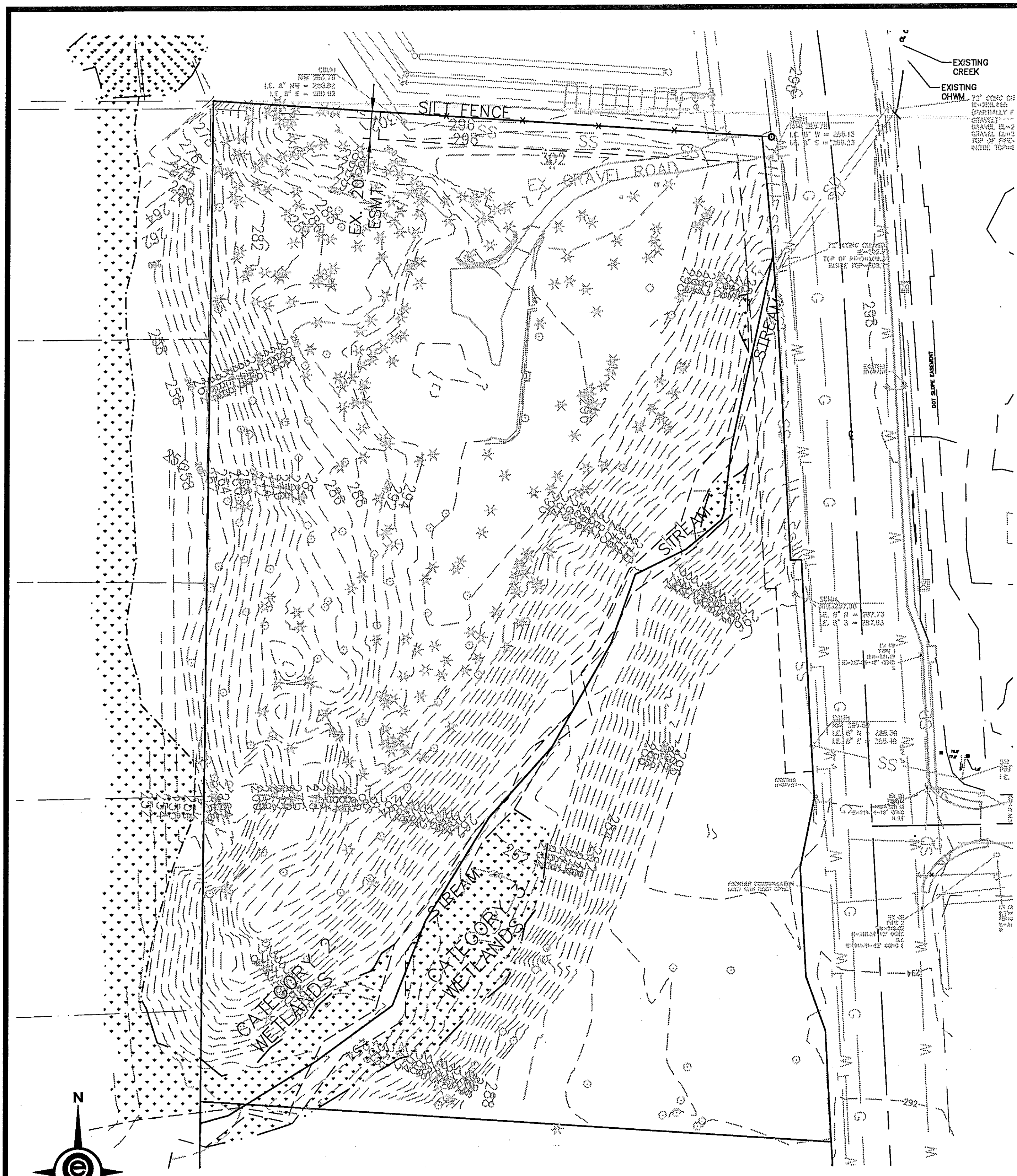


FIG. 2

OMEGA
ENGINEERING, INC.

2707 WETMORE AVE.
Everett, WA 98201
(o)425.387.3820 (f) 425.259.1958

EXISTING BASIN MAP
COMMONS PHASE II

DATE	JOB NO.	SCALE	SHEET
6/9/16	16–0502	1" = 100'	1 OF 1

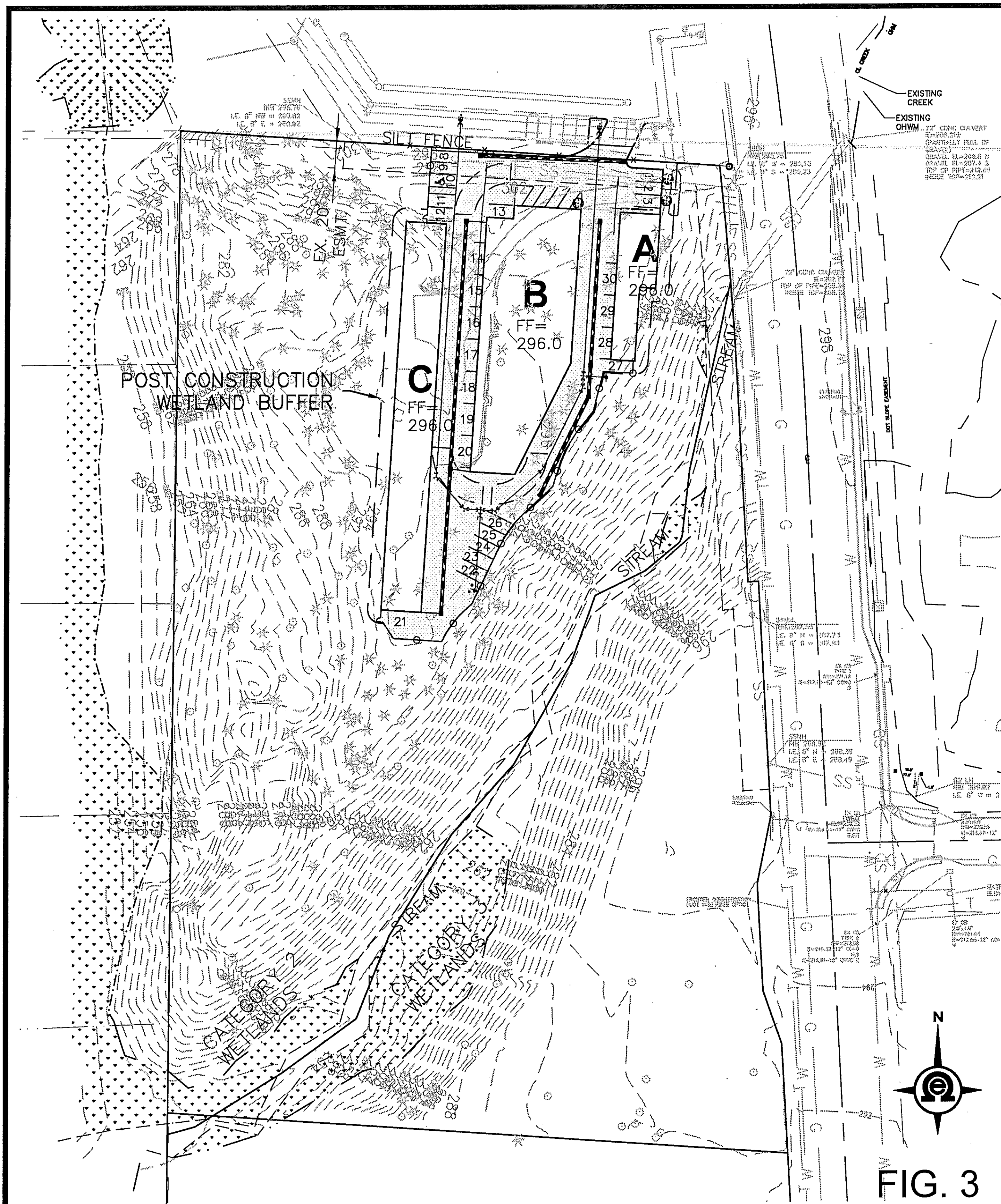


FIG. 3

OMEGA
ENGINEERING, INC.
2707 WETMORE AVE.
Everett, WA 98201
(o)425.387.3820 (f) 425.259.1958

DEVELOPED BASIN MAP
COMMONS PHASE II

DATE	JOB NO.	SCALE	SHEET
6/9/16	16-0502	1" = 100'	1 OF 1

APPENDIX A

STORMWATER CALCS

WWHM2012

PROJECT REPORT

General Model Information

Project Name:	default[15]
Site Name:	Commons II
Site Address:	Bothell-Everett Hwy
City:	Mill Creek
Report Date:	5/26/2016
Gage:	Everett
Data Start:	1948/10/01
Data End:	2009/09/30
Timestep:	15 Minute
Precip Scale:	1.00
Version Date:	2016/02/25
Version:	4.2.12

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

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Mod	1.16
Pervious Total	1.16
Impervious Land Use	acre
Impervious Total	0
Basin Total	1.16

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Roof

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROOF TOPS FLAT	0.54
Impervious Total	0.54
Basin Total	0.54

Element Flows To:

Surface	Interflow	Groundwater
Gravel Trench Bed Roof	Gravel Trench Bed Roof	

Pavement

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
DRIVEWAYS FLAT	0.62
Impervious Total	0.62
Basin Total	0.62

Element Flows To:

Surface	Interflow	Groundwater
Gravel Trench Bed Pavement	Gravel Trench Bed Pavement	

Routing Elements

Predeveloped Routing

Mitigated Routing

Gravel Trench Bed Roof

Bottom Length:	250.00 ft.
Bottom Width:	4.00 ft.
Trench bottom slope 1:	0 To 1
Trench Left side slope 0:	0 To 1
Trench right side slope 2:	0 To 1
Material thickness of first layer:	4
Pour Space of material for first layer:	0.35
Material thickness of second layer:	0
Pour Space of material for second layer:	0
Material thickness of third layer:	0
Pour Space of material for third layer:	0
Infiltration On	
Infiltration rate:	5
Infiltration safety factor:	1
Total Volume Infiltrated (ac-ft.):	83.891
Total Volume Through Riser (ac-ft.):	0.002
Total Volume Through Facility (ac-ft.):	83.893
Percent Infiltrated:	100
Total Precip Applied to Facility:	0
Total Evap From Facility:	0

Discharge Structure

Riser Height: 4 ft.

Riser Diameter: 8 in.

Element Flows To:

Outlet 1 Outlet 2

Channel 1

Gravel Trench Bed Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.023	0.000	0.000	0.000
0.0556	0.023	0.000	0.000	0.115
0.1111	0.023	0.000	0.000	0.115
0.1667	0.023	0.001	0.000	0.115
0.2222	0.023	0.001	0.000	0.115
0.2778	0.023	0.002	0.000	0.115
0.3333	0.023	0.002	0.000	0.115
0.3889	0.023	0.003	0.000	0.115
0.4444	0.023	0.003	0.000	0.115
0.5000	0.023	0.004	0.000	0.115
0.5556	0.023	0.004	0.000	0.115
0.6111	0.023	0.004	0.000	0.115
0.6667	0.023	0.005	0.000	0.115
0.7222	0.023	0.005	0.000	0.115
0.7778	0.023	0.006	0.000	0.115
0.8333	0.023	0.006	0.000	0.115
0.8889	0.023	0.007	0.000	0.115
0.9444	0.023	0.007	0.000	0.115
1.0000	0.023	0.008	0.000	0.115
1.0556	0.023	0.008	0.000	0.115
1.1111	0.023	0.008	0.000	0.115
1.1667	0.023	0.009	0.000	0.115
1.2222	0.023	0.009	0.000	0.115
1.2778	0.023	0.010	0.000	0.115

1.3333	0.023	0.010	0.000	0.115
1.3889	0.023	0.011	0.000	0.115
1.4444	0.023	0.011	0.000	0.115
1.5000	0.023	0.012	0.000	0.115
1.5556	0.023	0.012	0.000	0.115
1.6111	0.023	0.012	0.000	0.115
1.6667	0.023	0.013	0.000	0.115
1.7222	0.023	0.013	0.000	0.115
1.7778	0.023	0.014	0.000	0.115
1.8333	0.023	0.014	0.000	0.115
1.8889	0.023	0.015	0.000	0.115
1.9444	0.023	0.015	0.000	0.115
2.0000	0.023	0.016	0.000	0.115
2.0556	0.023	0.016	0.000	0.115
2.1111	0.023	0.017	0.000	0.115
2.1667	0.023	0.017	0.000	0.115
2.2222	0.023	0.017	0.000	0.115
2.2778	0.023	0.018	0.000	0.115
2.3333	0.023	0.018	0.000	0.115
2.3889	0.023	0.019	0.000	0.115
2.4444	0.023	0.019	0.000	0.115
2.5000	0.023	0.020	0.000	0.115
2.5556	0.023	0.020	0.000	0.115
2.6111	0.023	0.021	0.000	0.115
2.6667	0.023	0.021	0.000	0.115
2.7222	0.023	0.021	0.000	0.115
2.7778	0.023	0.022	0.000	0.115
2.8333	0.023	0.022	0.000	0.115
2.8889	0.023	0.023	0.000	0.115
2.9444	0.023	0.023	0.000	0.115
3.0000	0.023	0.024	0.000	0.115
3.0556	0.023	0.024	0.000	0.115
3.1111	0.023	0.025	0.000	0.115
3.1667	0.023	0.025	0.000	0.115
3.2222	0.023	0.025	0.000	0.115
3.2778	0.023	0.026	0.000	0.115
3.3333	0.023	0.026	0.000	0.115
3.3889	0.023	0.027	0.000	0.115
3.4444	0.023	0.027	0.000	0.115
3.5000	0.023	0.028	0.000	0.115
3.5556	0.023	0.028	0.000	0.115
3.6111	0.023	0.029	0.000	0.115
3.6667	0.023	0.029	0.000	0.115
3.7222	0.023	0.029	0.000	0.115
3.7778	0.023	0.030	0.000	0.115
3.8333	0.023	0.030	0.000	0.115
3.8889	0.023	0.031	0.000	0.115
3.9444	0.023	0.031	0.000	0.115
4.0000	0.023	0.032	0.000	0.115
4.0556	0.023	0.033	0.092	0.115
4.1111	0.023	0.034	0.255	0.115
4.1667	0.023	0.036	0.441	0.115
4.2222	0.023	0.037	0.610	0.115
4.2778	0.023	0.038	0.730	0.115
4.3333	0.023	0.039	0.799	0.115
4.3889	0.023	0.041	0.873	0.115
4.4444	0.023	0.042	0.933	0.115
4.5000	0.023	0.043	0.989	0.115

4.5556	0.023	0.044	1.043	0.115
4.6111	0.023	0.046	1.094	0.115
4.6667	0.023	0.047	1.143	0.115
4.7222	0.023	0.048	1.189	0.115
4.7778	0.023	0.050	1.234	0.115
4.8333	0.023	0.051	1.277	0.115
4.8889	0.023	0.052	1.319	0.115
4.9444	0.023	0.053	1.360	0.115
5.0000	0.023	0.055	1.399	0.115

Channel 1

Bottom Length: 10.00 ft.
Bottom Width: 5.00 ft.
Manning's n: 0.03
Channel bottom slope 1: 0.05 To 1
Channel Left side slope 0: 3 To 1
Channel right side slope 2: 3 To 1
Discharge Structure
Riser Height: 0 ft.
Riser Diameter: 0 in.
Element Flows To:
Outlet 1 Outlet 2

Channel Hydraulic Table

Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**Infilt(cfs)**
0.0000	0.001	0.000	0.000	0.000
0.0111	0.001	0.000	0.030	0.000
0.0222	0.001	0.000	0.097	0.000
0.0333	0.001	0.000	0.192	0.000
0.0444	0.001	0.000	0.312	0.000
0.0556	0.001	0.000	0.453	0.000
0.0667	0.001	0.000	0.615	0.000
0.0778	0.001	0.000	0.797	0.000
0.0889	0.001	0.000	0.998	0.000
0.1000	0.001	0.000	1.217	0.000
0.1111	0.001	0.000	1.454	0.000
0.1222	0.001	0.000	1.708	0.000
0.1333	0.001	0.000	1.980	0.000
0.1444	0.001	0.000	2.267	0.000
0.1556	0.001	0.000	2.571	0.000
0.1667	0.001	0.000	2.892	0.000
0.1778	0.001	0.000	3.228	0.000
0.1889	0.001	0.000	3.579	0.000
0.2000	0.001	0.000	3.947	0.000
0.2111	0.001	0.000	4.330	0.000
0.2222	0.001	0.000	4.728	0.000
0.2333	0.001	0.000	5.141	0.000
0.2444	0.001	0.000	5.570	0.000
0.2556	0.001	0.000	6.013	0.000
0.2667	0.001	0.000	6.472	0.000
0.2778	0.001	0.000	6.946	0.000
0.2889	0.001	0.000	7.434	0.000
0.3000	0.001	0.000	7.938	0.000
0.3111	0.001	0.000	8.456	0.000
0.3222	0.001	0.000	8.989	0.000
0.3333	0.001	0.000	9.537	0.000
0.3444	0.001	0.000	10.10	0.000
0.3556	0.001	0.000	10.67	0.000
0.3667	0.001	0.000	11.27	0.000
0.3778	0.001	0.000	11.87	0.000
0.3889	0.001	0.000	12.49	0.000
0.4000	0.001	0.000	13.13	0.000
0.4111	0.001	0.000	13.78	0.000
0.4222	0.001	0.000	14.45	0.000
0.4333	0.001	0.000	15.13	0.000

0.4444	0.001	0.000	15.83	0.000
0.4556	0.001	0.000	16.54	0.000
0.4667	0.001	0.000	17.26	0.000
0.4778	0.001	0.000	18.00	0.000
0.4889	0.001	0.000	18.76	0.000
0.5000	0.001	0.000	19.53	0.000
0.5111	0.001	0.000	20.32	0.000
0.5222	0.001	0.000	21.12	0.000
0.5333	0.001	0.000	21.93	0.000
0.5444	0.001	0.000	22.76	0.000
0.5556	0.001	0.000	23.61	0.000
0.5667	0.001	0.000	24.47	0.000
0.5778	0.002	0.000	25.35	0.000
0.5889	0.002	0.000	26.24	0.000
0.6000	0.002	0.000	27.15	0.000
0.6111	0.002	0.001	28.07	0.000
0.6222	0.002	0.001	29.01	0.000
0.6333	0.002	0.001	29.96	0.000
0.6444	0.002	0.001	30.93	0.000
0.6556	0.002	0.001	31.92	0.000
0.6667	0.002	0.001	32.92	0.000
0.6778	0.002	0.001	33.94	0.000
0.6889	0.002	0.001	34.97	0.000
0.7000	0.002	0.001	36.02	0.000
0.7111	0.002	0.001	37.08	0.000
0.7222	0.002	0.001	38.16	0.000
0.7333	0.002	0.001	39.26	0.000
0.7444	0.002	0.001	40.37	0.000
0.7556	0.002	0.001	41.49	0.000
0.7667	0.002	0.001	42.64	0.000
0.7778	0.002	0.001	43.80	0.000
0.7889	0.002	0.001	44.97	0.000
0.8000	0.002	0.001	46.17	0.000
0.8111	0.002	0.001	47.37	0.000
0.8222	0.002	0.001	48.60	0.000
0.8333	0.002	0.001	49.84	0.000
0.8444	0.002	0.001	51.10	0.000
0.8556	0.002	0.001	52.37	0.000
0.8667	0.002	0.001	53.66	0.000
0.8778	0.002	0.001	54.97	0.000
0.8889	0.002	0.001	56.30	0.000
0.9000	0.002	0.001	57.64	0.000
0.9111	0.002	0.001	58.99	0.000
0.9222	0.002	0.001	60.37	0.000
0.9333	0.002	0.001	61.76	0.000
0.9444	0.002	0.001	63.17	0.000
0.9556	0.002	0.001	64.59	0.000
0.9667	0.002	0.001	66.04	0.000
0.9778	0.002	0.001	67.50	0.000
0.9889	0.002	0.001	68.97	0.000
1.0000	0.002	0.001	70.47	0.000
1.0111	0.002	0.001	71.98	0.000

Gravel Trench Bed Pavement

Bottom Length:	400.00 ft.
Bottom Width:	4.00 ft.
Trench bottom slope 1:	0 To 1
Trench Left side slope 0:	0 To 1
Trench right side slope 2:	0 To 1
Material thickness of first layer:	4
Pour Space of material for first layer:	0.35
Material thickness of second layer:	1
Pour Space of material for second layer:	0.1
Material thickness of third layer:	0
Pour Space of material for third layer:	0
Infiltration On	
Infiltration rate:	2
Infiltration safety factor:	1
Total Volume Infiltrated (ac-ft.):	96.457
Total Volume Through Riser (ac-ft.):	0.019
Total Volume Through Facility (ac-ft.):	96.476
Percent Infiltrated:	99.98
Total Precip Applied to Facility:	0
Total Evap From Facility:	0

Discharge Structure
Riser Height: 5 ft.
Riser Diameter: 8 in.
Element Flows To:
Outlet 1 Outlet 2
Channel 1

Gravel Trench Bed Hydraulic Table

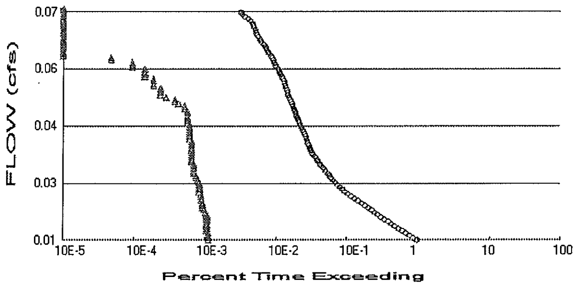
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.036	0.000	0.000	0.000
0.0667	0.036	0.000	0.000	0.074
0.1333	0.036	0.001	0.000	0.074
0.2000	0.036	0.002	0.000	0.074
0.2667	0.036	0.003	0.000	0.074
0.3333	0.036	0.004	0.000	0.074
0.4000	0.036	0.005	0.000	0.074
0.4667	0.036	0.006	0.000	0.074
0.5333	0.036	0.006	0.000	0.074
0.6000	0.036	0.007	0.000	0.074
0.6667	0.036	0.008	0.000	0.074
0.7333	0.036	0.009	0.000	0.074
0.8000	0.036	0.010	0.000	0.074
0.8667	0.036	0.011	0.000	0.074
0.9333	0.036	0.012	0.000	0.074
1.0000	0.036	0.012	0.000	0.074
1.0667	0.036	0.013	0.000	0.074
1.1333	0.036	0.014	0.000	0.074
1.2000	0.036	0.015	0.000	0.074
1.2667	0.036	0.016	0.000	0.074
1.3333	0.036	0.017	0.000	0.074
1.4000	0.036	0.018	0.000	0.074
1.4667	0.036	0.018	0.000	0.074
1.5333	0.036	0.019	0.000	0.074
1.6000	0.036	0.020	0.000	0.074
1.6667	0.036	0.021	0.000	0.074

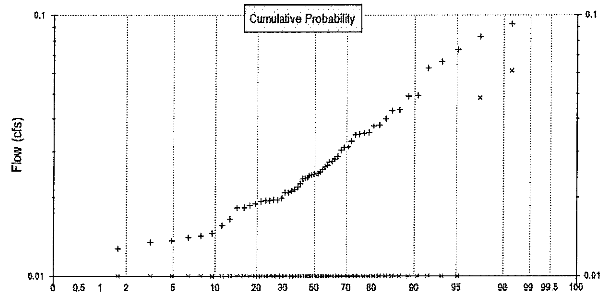
1.7333	0.036	0.022	0.000	0.074
1.8000	0.036	0.023	0.000	0.074
1.8667	0.036	0.024	0.000	0.074
1.9333	0.036	0.024	0.000	0.074
2.0000	0.036	0.025	0.000	0.074
2.0667	0.036	0.026	0.000	0.074
2.1333	0.036	0.027	0.000	0.074
2.2000	0.036	0.028	0.000	0.074
2.2667	0.036	0.029	0.000	0.074
2.3333	0.036	0.030	0.000	0.074
2.4000	0.036	0.030	0.000	0.074
2.4667	0.036	0.031	0.000	0.074
2.5333	0.036	0.032	0.000	0.074
2.6000	0.036	0.033	0.000	0.074
2.6667	0.036	0.034	0.000	0.074
2.7333	0.036	0.035	0.000	0.074
2.8000	0.036	0.036	0.000	0.074
2.8667	0.036	0.036	0.000	0.074
2.9333	0.036	0.037	0.000	0.074
3.0000	0.036	0.038	0.000	0.074
3.0667	0.036	0.039	0.000	0.074
3.1333	0.036	0.040	0.000	0.074
3.2000	0.036	0.041	0.000	0.074
3.2667	0.036	0.042	0.000	0.074
3.3333	0.036	0.042	0.000	0.074
3.4000	0.036	0.043	0.000	0.074
3.4667	0.036	0.044	0.000	0.074
3.5333	0.036	0.045	0.000	0.074
3.6000	0.036	0.046	0.000	0.074
3.6667	0.036	0.047	0.000	0.074
3.7333	0.036	0.048	0.000	0.074
3.8000	0.036	0.048	0.000	0.074
3.8667	0.036	0.049	0.000	0.074
3.9333	0.036	0.050	0.000	0.074
4.0000	0.036	0.050	0.000	0.074
4.0667	0.036	0.051	0.000	0.074
4.1333	0.036	0.051	0.000	0.074
4.2000	0.036	0.051	0.000	0.074
4.2667	0.036	0.051	0.000	0.074
4.3333	0.036	0.052	0.000	0.074
4.4000	0.036	0.052	0.000	0.074
4.4667	0.036	0.052	0.000	0.074
4.5333	0.036	0.052	0.000	0.074
4.6000	0.036	0.053	0.000	0.074
4.6667	0.036	0.053	0.000	0.074
4.7333	0.036	0.053	0.000	0.074
4.8000	0.036	0.053	0.000	0.074
4.8667	0.036	0.054	0.000	0.074
4.9333	0.036	0.054	0.000	0.074
5.0000	0.036	0.056	0.000	0.074
5.0667	0.036	0.059	0.121	0.074
5.1333	0.036	0.061	0.329	0.074
5.2000	0.036	0.064	0.547	0.074
5.2667	0.036	0.066	0.711	0.074
5.3333	0.036	0.068	0.808	0.074
5.4000	0.036	0.071	0.885	0.074
5.4667	0.036	0.073	0.956	0.074
5.5333	0.036	0.076	1.022	0.074

5.6000	0.036	0.078	1.084	0.074
5.6667	0.036	0.081	1.143	0.074
5.7333	0.036	0.083	1.198	0.074
5.8000	0.036	0.086	1.252	0.074
5.8667	0.036	0.088	1.303	0.074
5.9333	0.036	0.091	1.352	0.074
6.0000	0.036	0.093	1.399	0.074

Analysis Results

POC 1





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 1.16
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0
Total Impervious Area: 1.16

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.025843
5 year	0.03956
10 year	0.049421
25 year	0.06266
50 year	0.073043
100 year	0.083843

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1949	0.014	0.000
1950	0.027	0.000
1951	0.025	0.000
1952	0.019	0.000
1953	0.015	0.000
1954	0.074	0.000
1955	0.038	0.000
1956	0.033	0.000
1957	0.038	0.000
1958	0.027	0.000

1959	0.028	0.000
1960	0.024	0.000
1961	0.025	0.048
1962	0.021	0.000
1963	0.031	0.000
1964	0.022	0.000
1965	0.025	0.000
1966	0.013	0.000
1967	0.030	0.000
1968	0.036	0.000
1969	0.035	0.000
1970	0.019	0.000
1971	0.031	0.000
1972	0.024	0.000
1973	0.020	0.000
1974	0.043	0.000
1975	0.020	0.000
1976	0.019	0.000
1977	0.016	0.000
1978	0.020	0.000
1979	0.043	0.000
1980	0.023	0.000
1981	0.018	0.000
1982	0.024	0.000
1983	0.040	0.000
1984	0.024	0.000
1985	0.035	0.000
1986	0.083	0.000
1987	0.035	0.000
1988	0.020	0.000
1989	0.019	0.000
1990	0.026	0.000
1991	0.027	0.000
1992	0.021	0.000
1993	0.014	0.000
1994	0.013	0.000
1995	0.026	0.000
1996	0.049	0.000
1997	0.093	0.000
1998	0.017	0.000
1999	0.024	0.000
2000	0.014	0.000
2001	0.004	0.000
2002	0.025	0.000
2003	0.018	0.000
2004	0.029	0.000
2005	0.021	0.000
2006	0.063	0.000
2007	0.049	0.000
2008	0.067	0.061
2009	0.021	0.000

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0929	0.0613
2	0.0825	0.0482
3	0.0737	0.0000

4	0.0665	0.0000
5	0.0625	0.0000
6	0.0492	0.0000
7	0.0489	0.0000
8	0.0433	0.0000
9	0.0430	0.0000
10	0.0402	0.0000
11	0.0379	0.0000
12	0.0377	0.0000
13	0.0355	0.0000
14	0.0354	0.0000
15	0.0350	0.0000
16	0.0348	0.0000
17	0.0329	0.0000
18	0.0314	0.0000
19	0.0311	0.0000
20	0.0303	0.0000
21	0.0288	0.0000
22	0.0281	0.0000
23	0.0275	0.0000
24	0.0274	0.0000
25	0.0267	0.0000
26	0.0262	0.0000
27	0.0257	0.0000
28	0.0251	0.0000
29	0.0248	0.0000
30	0.0247	0.0000
31	0.0246	0.0000
32	0.0244	0.0000
33	0.0242	0.0000
34	0.0239	0.0000
35	0.0236	0.0000
36	0.0235	0.0000
37	0.0226	0.0000
38	0.0219	0.0000
39	0.0215	0.0000
40	0.0212	0.0000
41	0.0209	0.0000
42	0.0208	0.0000
43	0.0198	0.0000
44	0.0196	0.0000
45	0.0196	0.0000
46	0.0195	0.0000
47	0.0194	0.0000
48	0.0194	0.0000
49	0.0189	0.0000
50	0.0187	0.0000
51	0.0183	0.0000
52	0.0183	0.0000
53	0.0165	0.0000
54	0.0156	0.0000
55	0.0146	0.0000
56	0.0142	0.0000
57	0.0141	0.0000
58	0.0136	0.0000
59	0.0134	0.0000
60	0.0127	0.0000
61	0.0043	0.0000

APPENDIX B

GEOTECHNICAL REPORTS

The Riley Group Inc.

GEOTECHNICAL ENGINEERING REPORT

Seib Property
16824 Bothell-Everett Highway
Mill Creek, Washington

Project No. 2005-038

Prepared By:

The Riley Group, Inc.
17522 Bothell Way NE, Suite A
Bothell, WA 98011

Prepared for:

Mr. David Lee
Mill Creek Commons Phase II, LLC
15921 NE 8th Street, Suite 202
Bellevue, WA 98008

April 8, 2005

April 8, 2005

Mr. David Lee
Mill Creek Commons Phase II, LLC
15921 NE 8th Street, Suite 202
Bellevue, WA 98008

Subject: **Geotechnical Engineering Report**
Seib Property
16824 Bothell-Everett Highway
Mill Creek, Washington
Project No. 2005-038

Dear Mr. Lee:

As requested, The Riley Group, Inc. (Riley) has performed a geotechnical engineering study for the above referenced subject site. Riley understands that you are planning to develop a parcel of land on Bothell-Everett Highway in Mill Creek, Washington. The attached report presents our findings and recommendations for the geotechnical aspects anticipated for the project design and construction.

The site has been divided into two portions by Nickel Creek: the north lot and the south lot. Our field exploration indicates that the north lot is generally underlain by 4 to 5 feet of loose to medium dense silty sandy gravel with trace cobbles over medium dense to dense fine sand with some silt. The south lot is underlain by up to 2.5 feet of fill over native soil. The fill consists of loose to medium dense silty sand with gravel. The native soil consists 3 to 5 feet of medium dense to dense silty sandy gravel over stiff to very stiff silt with interbedded fine sand layers. Groundwater seepage was not encountered in any of the test pits during the field exploration. Based on the soil conditions observed, infiltration is suitable for the north lot. Since impervious soil layer was encountered in the south lot, infiltration is not recommended for the south lot. We recommend supporting the proposed buildings on conventional spread footing foundations bearing on the medium dense to dense native soil or structural fill if needed. Slab-on-grade and pavements can be similarly supported.

Riley recommends that the building setbacks should be at least 15 feet from the top of the steep slopes along Nickel Creek. The proposed development will not adversely affect slope stability if the geotechnical recommendations have been incorporated into final design and construction.

We trust the information presented is sufficient for your current needs. If you have any questions or require additional information, please call.

Sincerely yours,
THE RILEY GROUP, INC.

Chien-Lin (Johnny) Chen, P.E.
Project Engineer

Ricky R. Wang, Ph.D., P.E.
Principal Engineer

JC/RW

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1.0 PROJECT DESCRIPTION

The project site is located at 16824 Bothell-Everett Highway in Mill Creek, Washington. The approximate location of the site is shown on the Site Vicinity Map, Figure 1. The site is located to the south of a recently developed storage site. Nickel Creek divided the site into two portions: the north lot and the south lot. The north lot is currently occupied by a vacant single-family residence and the south lot is vacant.

Riley understands that the residence on the north lot will be demolished and four single story commercial buildings will be constructed on the north lot. The parking lot will connect the developed property to the north. A two-story office building and related parking lot will be built on the south lot. At the time of preparing this report, site grading and building plans were not available for our review. Based on our experience with similar construction, we anticipate that site grading will require approximately 5 to 8 feet of cut in the north lot to match the existing grade north of the site. We expect that less than 5 feet of cut/fill will be needed in the south lot. The proposed buildings will be wood-framed structures supported on perimeter walls with a bearing load of 1 to 2 kips per linear foot, and a series of columns with a maximum load of up to 75 kips. The building will be supported on slab-on-grade foundation with a uniform load of less than 200 psf.

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

2.0 SCOPE OF WORK

On March 8, 2005, Riley observed excavation of 9 test pits to a maximum depth of 10 feet below ground surface (bgs). Test pits were excavated with a rubber-tired backhoe. Test pits TP-1 through TP-3 was excavated in the north lot and test pits TP-4 through TP-9 were excavated in the south lot. The approximate test pit locations are shown on Figure 2.

Using the information obtained from our subsurface exploration and laboratory testing, we performed analyses to develop geotechnical recommendations for project design and construction on the following:

- Soil and groundwater conditions
- Seismic considerations
- Site preparation and grading
- Excavations and slopes
- Foundations
- Retaining walls
- Slab-on-grade
- Drainage
- Utilities
- Pavements

3.0 SITE CONDITIONS

3.1 Surface

The subject site is an irregular-shaped area bisected by Nickel Creek. The site is bound to the north by a developed commercial property, to the east by Bothell-Everett Highway, and to the south and west by undeveloped properties.

The north lot is occupied by a vacant single-family residence with a driveway and the south lot is vacant. The north lot is 6 to 8 feet higher in elevation than the developed property to the north. The south lot is covered with bushes and is relatively flat in the proposed development area.

Nickel Creek runs though the middle of the property and has created steep slopes on both sides, with gradients of approximately 30% to 35%. The west portion of north lot slopes down to the creek with a gradient of approximately 30%. The north portion of the south lot slopes down to the creek with a slope gradient of 35%.

3.2 Soils

Our field exploration indicates that the north lot is generally underlain by 4 to 5 feet of loose to medium dense silty sandy gravel with trace cobbles over medium dense to dense fine sand with some silt. The south lot is underlain by up to 2.5 feet of fill over native soil. The fill consists of loose to medium dense silty sand with gravel. The native soil consists 3 to 5 feet of medium dense to dense silty sandy gravel over stiff to very stiff silt with interbedded fine sand layers. A boulder approximately two feet in diameter was encountered in test pit TP-5.

Riley reviewed the *Geologic Map of Surficial Deposits in Seattle 30' by 60' Quadrangle, Washington (James C. Yount, etc., 1993).* The review indicates that the soil in the project vicinity is mapped as Vashon advanced outwash deposits (Map Unit Qva), which consist of light-red brown gravel and sand and light brown to gray silt and clay, moderately- to well-sorted. These descriptions are generally similar to the findings in our field explorations except we did not encounter clay.

More detailed descriptions of the subsurface conditions encountered are presented in the Test Pit Logs included as Figures A-2 through A-4 in Appendix A. Sieve analysis was performed on selected soil samples. Grain size distribution curves are included in Figures A-5 and A-6.

3.3 Groundwater

Groundwater was not encountered during our subsurface investigation, which reached a maximum depth of 10 feet bgs. During the previously conducted field exploration of the property to the north of the site, ground water was encountered approximately 10 feet below the finish grade along Bothell-Everett Highway. Therefore, we expect that perched groundwater may be encountered on-site over the silt layers during wet season.

Fluctuations in groundwater level should be expected on a seasonal and annual basis. The level will be highest during the extended periods of heavy seepage in the wet winter months. Given the time of the year that the field exploration was performed, Riley believes that the groundwater should be below the bottom of the excavation.

3.4 Geologic Hazards

Steep Slopes

Based on our field observations, the site and the adjacent slopes seem to be in generally stable condition. We did not find any obvious features suggesting past or recent deep-seated landslides in this area. Riley recommends that a building setback of 15 feet be used for the proposed building layout. In our opinion, the proposed development will not adversely affect slope stability if the geotechnical recommendations have been incorporated into final design and construction.

Seismic Considerations

Based on the 2003 International Building Code (IBC), the site soil is Class D (Table 1615.1.1). The earthquake spectral response acceleration at short periods (S_s) is 126%g and at 1-second period (S_l) is 43%g.

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

We reviewed the results of the field and laboratory testing and assessed the potential for liquefaction of the site's soil during an earthquake. Since the groundwater level is low and the native soil is relatively dense, Riley concludes that the possibility of liquefaction during an earthquake is low.

4.0 DISCUSSION AND RECOMMENDATIONS

4.1 General

Based on our study, the site is suitable for the proposed construction from a geotechnical standpoint. Foundations for the proposed buildings can be supported on conventional spread footings bearing on medium dense to dense native soil or structural fill. However, the loose fill encountered in the south lot is not suitable for supporting the building foundations. If the loose fill is encountered below the proposed footing subgrade, it should be overexcavated and backfilled with structural fill. Slab-on-grade and pavements can be similarly supported.

Riley recommends that the building setbacks should be at least 15 feet from the top of the steep slopes. Infiltration is suitable for disposal of storm water in the north lot. Riley does not recommend onsite infiltration to be used in the south lot.

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

4.2 Site Preparation and Grading

To prepare the site for construction, the existing residential building in the north lot should be demolished and stripped. Surface stripping depths of up to 6 inches should be expected to remove the topsoil for the entire site. All remnants related to previous site construction should also be cleared and removed from the site.

Once stripping, clearing and other preparations are complete, cuts and fills can be made to establish desired building grades. We anticipate that site grading will require approximately 5 to 8 feet of cut in the north lot to match the existing grade north of the site. Prior to placing fill, we recommend proof-rolling all exposed surfaces to determine if any isolated soft and yielding areas are present. Proof-rolling should be performed in cut areas that will provide direct support for new construction.

The on-site excavated soils without organics are generally suitable for use as structural fill. However, the silt encountered on the south lot is not suitable for use as structural fill. If the site grading requires additional structural fill, we recommend importing a material that meets the grading requirements listed in Table 1.

Table 1. Structural Fill

U.S. Sieve Size	Percent Passing
Maximum aggregate size 3 inches	100
Maximum passing the No. 4 sieve	75 percent
Maximum passing the No. 200 sieve	5 percent *

*Based on minus 3/4 inch fraction.

Prior to placement, a geotechnical engineer should examine and test all materials imported to the site for use as structural fill. Structural fill materials should be placed in uniform loose layers not exceeding 12 inches and compacted to a minimum of 95 percent of the soil's maximum density, as determined by ASTM Test Designation D-1557 (Modified

Proctor). The moisture content of the soil at the time of compaction should be within about two percent of its optimum, as determined by this ASTM method.

4.3 Excavations and Fill Slopes

Excavations at the site with confined spaces, such as footings, utility vaults, and trenches, etc., must be completed in accordance with local, state, or federal requirements. Based on Occupational Safety and Health Administration (OSHA) regulations, the native soils are classified as Group C soils.

Accordingly, for excavations more than four feet but less than 20 feet in depth, the temporary side slopes should be laid back with a minimum slope inclination of 1½:1 (Horizontal: Vertical). If there is insufficient room to complete the excavations in this manner, or excavations greater than 20 feet in depth are planned, temporary shoring should be considered to support the excavations.

The permanent cut and fill slopes should be graded with a finished inclination no greater than 2:1 (Horizontal:Vertical). Upon completion of construction, the slope face should be trackwalked, compacted and vegetated, or provided with other physical means to guard against erosion. Final grades at the top of the existing slope must promote surface drainage away from the existing slope crest. Water must not be allowed to flow in an uncontrolled fashion over the slope face. If it is necessary to direct surface runoff towards the slope, it should be controlled at the top of the slope, piped in a closed conduit installed on the slope face, and taken to an appropriate point of discharge beyond the toe of the slope.

4.4 Foundations

Following site preparation and grading, the proposed building foundation can be supported on conventional spread footings bearing on medium dense to dense native soil or structural fill. The loose fill encountered in the south lot of the proposed building area is not suitable for supporting the building foundations. It should be overexcavated and backfilled with structural fill. Perimeter foundations exposed to the weather should be at a minimum depth of 18 inches below final exterior grades. Interior foundations can be constructed at any convenient depth below the floor slab.

We recommend designing foundations for a net allowable bearing capacity of 2,500 pounds per square foot (psf) for native soil and structural fill. For short-term loads, such as wind and seismic, a 1/3 increase in this allowable capacity can be used.

For designing foundations to resist lateral loads, a base friction coefficient of 0.4 can be used. Passive earth pressures acting on the side of the footing and buried portion of the foundation stem wall can also be considered for resisting lateral loads. We recommend calculating this lateral resistance using an equivalent fluid weight of 250 pounds per cubic foot (pcf). At perimeter locations, we recommend not including the upper 12 inches of soil in this computation because they can be affected by weather or disturbed by future grading activity. This value assumes the foundation will be constructed neat against competent native soil or backfilled with structural fill as described in the Site Preparation and Grading section. The recommended passive resistance value includes a safety factor of 1.5.

With spread footing foundations as recommended in this section, maximum total and differential post-construction settlements of one inch and ½ inch, respectively, should be expected.

4.5 Retaining Walls

Based on the site topography, Riley expects that retaining walls may be required to reach the proposed final grade elevation. Riley recommends that Ultrablock walls be used in cut areas and Keystone block walls be used in fill areas for non-building walls to protect the slopes and retaining fills. As an alternative, rockeries may be used in some areas with heights less than 8 feet.

Ultrablock Walls

For protecting cuts and retaining fills, Riley recommends using an Ultrablock wall system. An Ultrablock is a precast concrete block, approximately 2.5 feet by 2.5 feet by 5 feet in size, which weighs approximately 2 tons. The Ultrablock has keys on both top and bottom to interlock each other as a stable uniform wall face. The foundation pad should consist of at least 6 inches of crushed rock on firm soil subgrade. Drainage should also be installed behind the wall face. Riley recommends a maximum wall height of 12.5 feet with a 1:8 (Horizontal: Vertical) batter. The Ultrablock wall installation should follow the manufacturer's recommendations and specifications, which can be found at www.ultrablock.com.

Keystone Block Wall

A Keystone wall, which is a proprietary retaining wall system, can be used to resist lateral earth pressures either as a gravity wall or combined with Geogrid reinforced fill. The system includes manufactured segmental block units designed to be connected to each other by fiberglass pins. We recommend installing Geogrid reinforcement in the structural fill behind the Geogrid. The Geogrid length should not be less than the height of the retaining wall face. We also recommend using granular structural fills compacted to 95 percent of the soil's maximum dry density according to ASTM D-1557. General design details for this construction are shown on Figure 3.

Rockeries

Unlike retaining walls, rockeries are not intended to function as engineered structures to resist lateral earth pressures. The primary function of rockeries is to cover exposed excavated surfaces and thereby retard the erosion process. Individual rockery heights should be limited to 8 feet against cut in dense native soil. The cut slope above the rockery should be graded with a maximum gradient of 2:1 (Horizontal: Vertical). A rockery detail is shown on the attached Figure 4.

The rockery should be constructed by an experienced rockery contractor following guidelines as published by Associated Rockery Contractors (ARC). Rockery backfill should be compacted as structural fill as recommended in the Site Preparation and Grading section. Should rockeries be selected for use on the site, Riley recommends that a geotechnical engineer be present on the site to monitor site work.

4.6 Slab-on-Grade Construction

Once site preparation has been completed as described in the Site Preparation and Grading section, suitable support for slab-on-grade construction should be provided. Riley recommends that the concrete slab be set on top of medium dense native soil or structural fill. Immediately below the floor slab, we recommend placing a four-inch thick capillary break layer of clean, free-draining sand or gravel that has less than five percent passing the No. 200 sieve. This material will reduce the potential for upward capillary movement of water through the underlying soil and subsequent wetting of the floor slab.

Where moisture by vapor transmission is undesirable, an 8 to 10-mil thick plastic membrane should be placed on a 4-inch thick layer of clean gravel. The membrane should be covered with 1 to 2 inches of clean, moist sand to guard against damage during construction and to aid in curing of the concrete.

For the anticipated floor slab loading, we estimate post-construction floor settlements of ¼- to ½-inch. For thickness design of the slab subjected to point loading from storage racks and fork lift vehicle traffic, we recommend using a subgrade modulus (Ks) of 150 pounds per square inch per inch of deflection (pci).

4.7 Drainage

Surface

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

Subsurface

We recommend installing perimeter foundation drains. A typical recommended drain detail is shown on Figure 5. The foundation drains and roof downspouts should be tightlined separately to an approved discharge facility. Subsurface drains must be laid with a gradient sufficient to promote positive flow to a controlled point of approved discharge.

Infiltration

Riley understands that an infiltration system is being considered for the on-site disposal of storm water run-off. Based on the native soil and groundwater conditions, Riley recommends that the proposed infiltration system be installed on the north lot. The infiltration surface should consist of clean gravels and sands with no silt layers. The minimum infiltration depth is 6 feet below finished grade. For preliminary design, an allowable infiltration rate of 2 to 3 inches per hour can be used for system design. This rate must be verified by performing an actual infiltration test before construction.

An impervious soil layer was encountered in the south lot during field exploration; therefore, onsite infiltration on the south lot will be difficult if not impossible. Riley does not recommend infiltration in the south lot.

A geotechnical engineer should observe the infiltration system installation. The infiltration surface should consist of clean sand and gravel. If isolated silt lenses or other unsuitable soils (such as cemented soil layers) are encountered, they should be overexcavated and replaced with gravel.

4.8 Utilities

Utility pipes should be bedded and backfilled in accordance with American Public Works Association (APWA) specifications. For site utilities located within the Snohomish County or City of Mill Creek right-of-ways, bedding and backfill should be completed in accordance with Snohomish County or City of Mill Creek specifications. At a minimum, trench backfill should be placed and compacted as structural fill, as described in the Site Preparation and Grading section. Where utilities occur below unimproved areas, the degree of compaction can be reduced to a minimum of 90 percent of the soil's maximum density as determined by the referenced ASTM standard. As noted, soils excavated on-site will generally be suitable for use as backfill material if the soil's moisture can be properly controlled. A boulder up to 2 feet in diameter was encountered during exploration in test pit TP-5. The contractor should be prepared to break builders if encountered.

4.9 Pavements

Pavement subgrades should be prepared as described in the Site Preparation and Grading section of this report and as discussed below. Regardless of the relative compaction achieved, the subgrade must be firm and relatively unyielding before paving. The subgrade should be proof-rolled with heavy construction equipment to verify this condition.

With the pavement subgrade prepared as described above, we recommend that the general parking area be paved with flexible pavement surface. The following pavement sections are recommended:

- **For heavy truck traffic areas**: 3 inches of asphalt concrete (AC) over 6 inches of crushed rock base (CRB); and

- **For general parking areas**: 2 inches of AC over 4 inches of CRB.

The asphalt paving materials used should conform to the Washington State Department of Transportation (WSDOT) specifications for Class B asphalt concrete and CRB surfacing.

Long-term pavement performance will depend on surface drainage. A poorly-drained pavement section will be subject to premature failure as a result of surface water infiltrating into the subgrade soils, reducing their supporting capability.

For optimum pavement performance, surface drainage gradients of no less than two percent are recommended. Also, some degree of longitudinal and transverse cracking of the pavement surface should be expected over time. Regular maintenance should be planned to seal cracks when they occur.

5.0 ADDITIONAL SERVICES

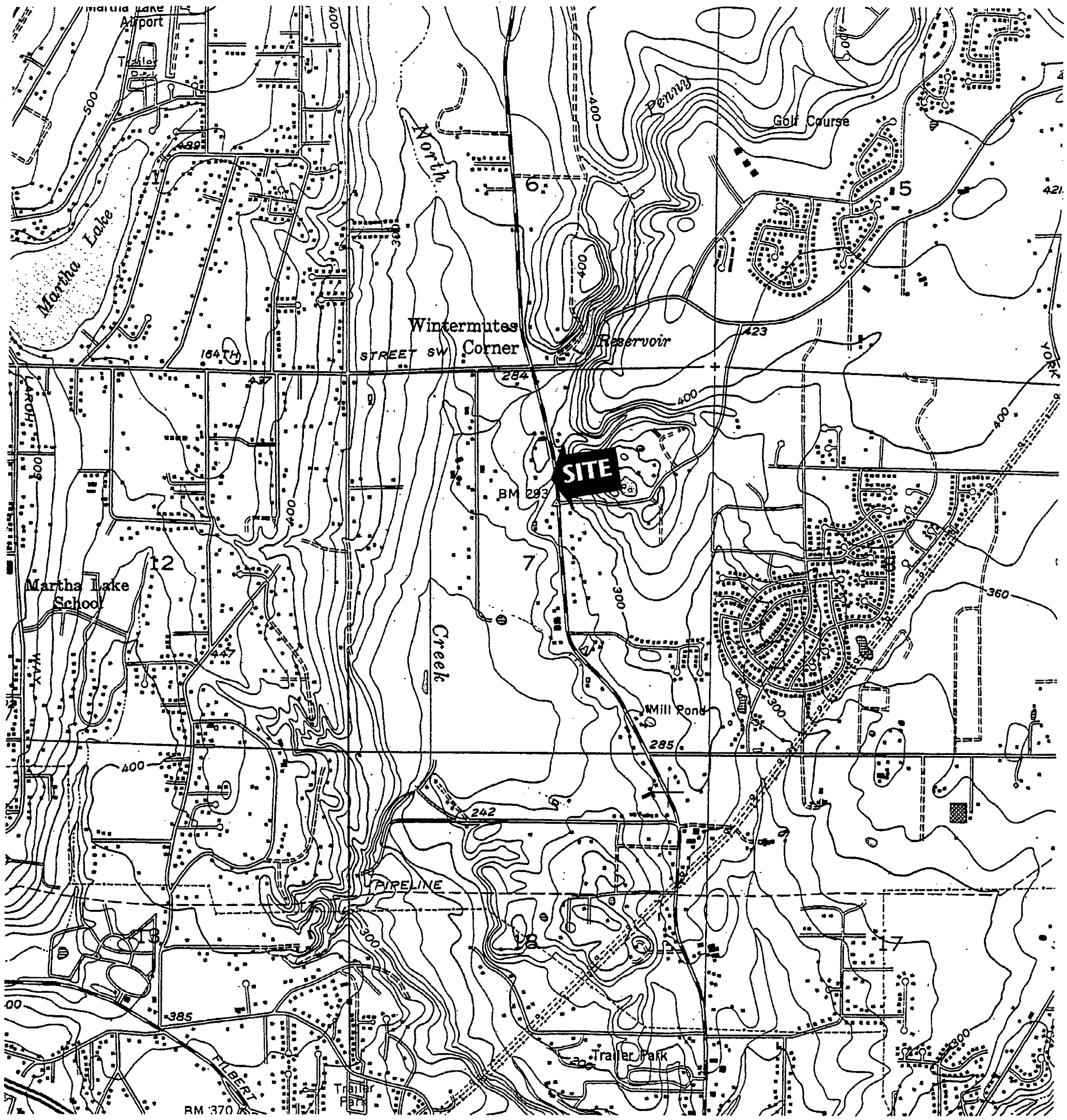
Riley is available to provide further geotechnical consultation as the project design develops. We should review the final design and specifications in order to verify that earthwork and foundation recommendations have been properly interpreted and incorporated into project design and construction.

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

6.0 LIMITATIONS

This report is the property of The Riley Group, Inc., Mill Creek Commons Phase II, LLC, and its designated agents and was prepared in accordance with generally accepted geotechnical engineering practices. This report is intended for specific application to the Seib Property in Mill Creek, Washington, and for the exclusive use of Mill Creek Commons Phase II, LLC and its authorized representatives. No other warranty, expressed or implied, is made.

The analyses and recommendations presented in this report are based upon data obtained from the test pits excavated on-site. Variations in soil conditions can occur, the nature and extent of which may not become evident until construction. If variations appear evident, The Riley Group, Inc. should be requested to reevaluate the recommendations in this report prior to proceeding with construction.



0 1/2 1 mile

approximate graphical scale

SCALE 1: 24 000
CONTOUR INTERVAL 20 FEET

USGS 7.5 MINUTE QUADRANGLE
BOTHELL, WA - PHOTOREVISED 1981

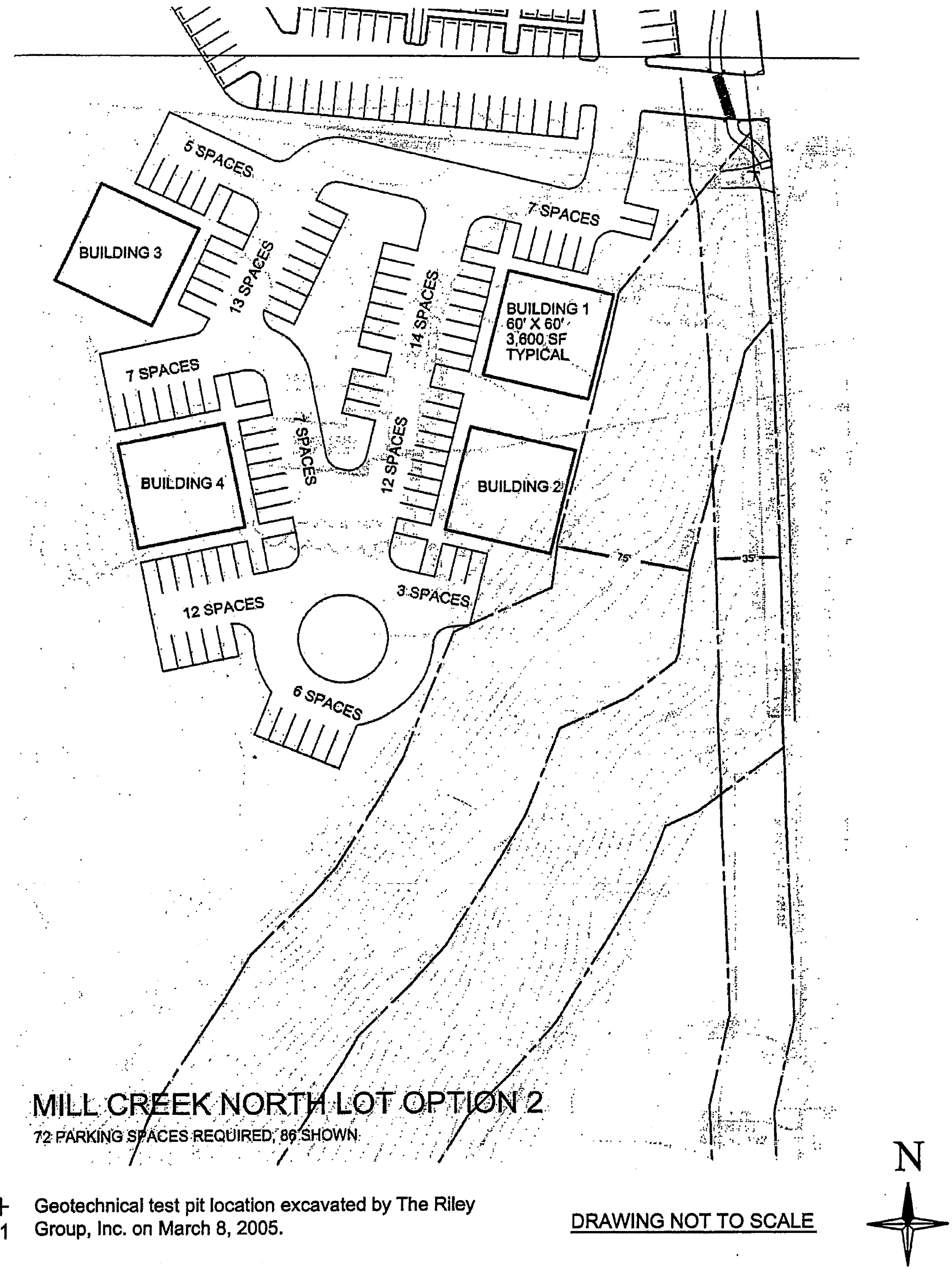
N

The Riley Group, Inc.
17522 BOTHELL WAY NE, SUITE A
BOTHELL, WASHINGTON 98011

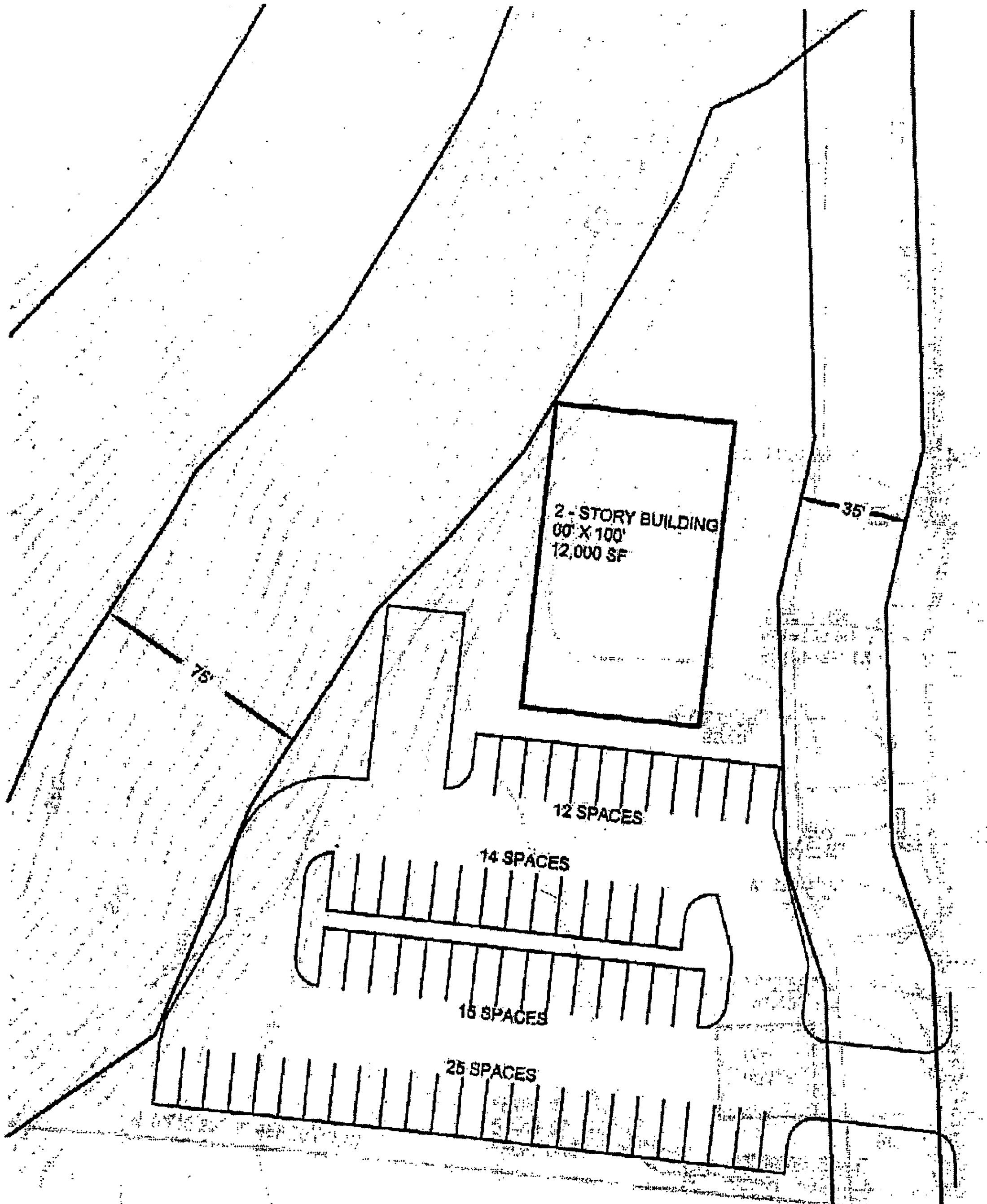
Seib Property

Site Vicinity Map	*Figure 1*

Site Address: 16824 Bothell-Everett Hwy, Mill Creek, WA



The Riley Group, Inc. 17522 BOTHELL WAY NE, SUITE A BOTHELL, WASHINGTON 98011	*Seib Property - North Lot*	
	Geotechnical Exploration Plan	*Figure 2-1*
	Site Address: 16824 Bothell-Everett Hwy, Mill Creek, WA	



MILL CREEK SOUTH LOT OPTION 3

60 PARKING SPACES REQUIRED, 66 SHOWN

TP-5 Geotechnical test pit location excavated by The Riley Group, Inc. on March 8, 2005.

DRAWING NOT TO SCALE

N

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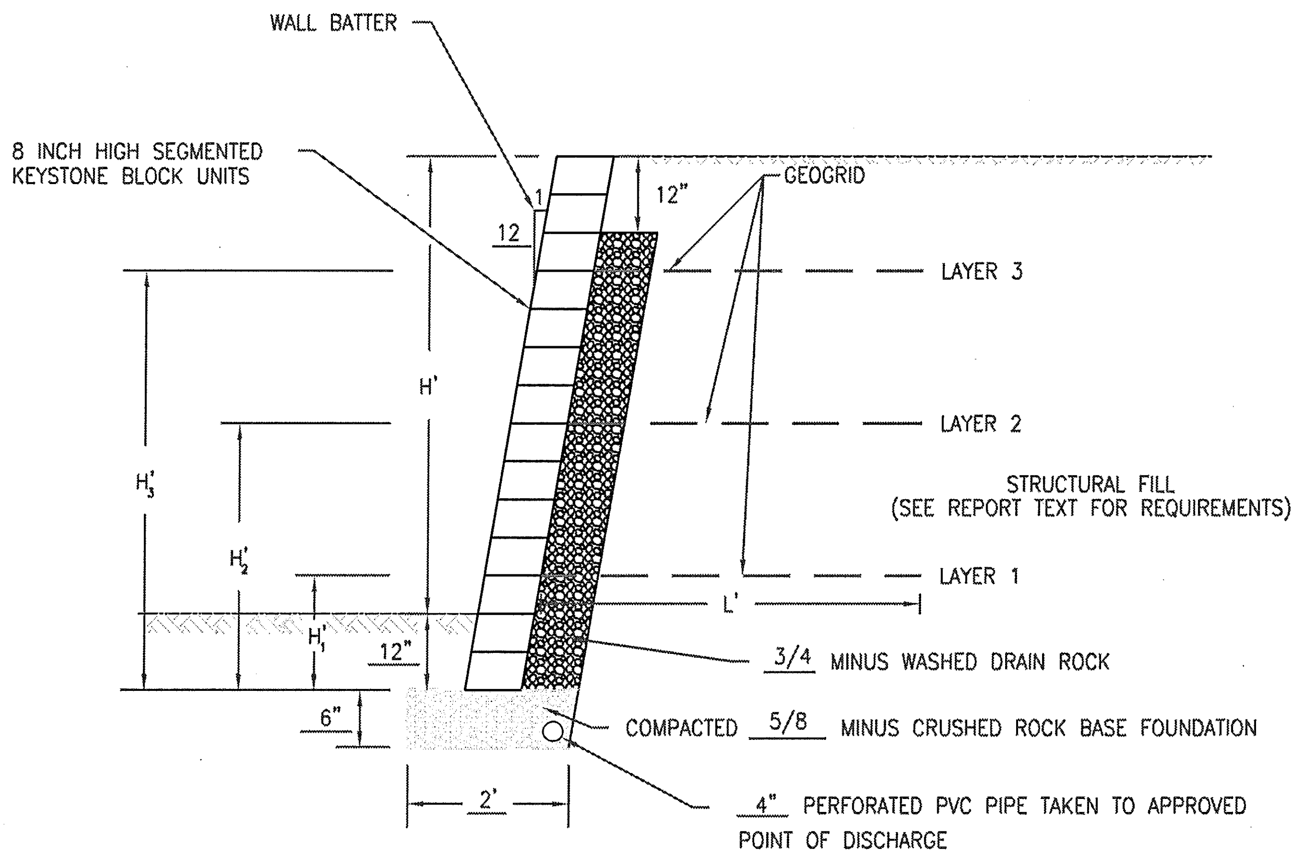
Seib Property - South Lot	
Geotechnical Exploration Plan	*Figure 2-2*
Site Address: 16824 Bothell-Everett Hwy, Mill Creek, WA	



NOT TO SCALE

NOTES:

1. ALL GEOGRID LAYER HEIGHTS ARE MEASURED FROM TOP OF CRUSHED ROCK BASE FOUNDATION.
2. KEYSTONE™ BLOCK CONSTRUCTION AND CONNECTION OF GEOGRID TO WALL TO BE COMPLETED PER MANUFACTURERS SPECIFICATIONS.

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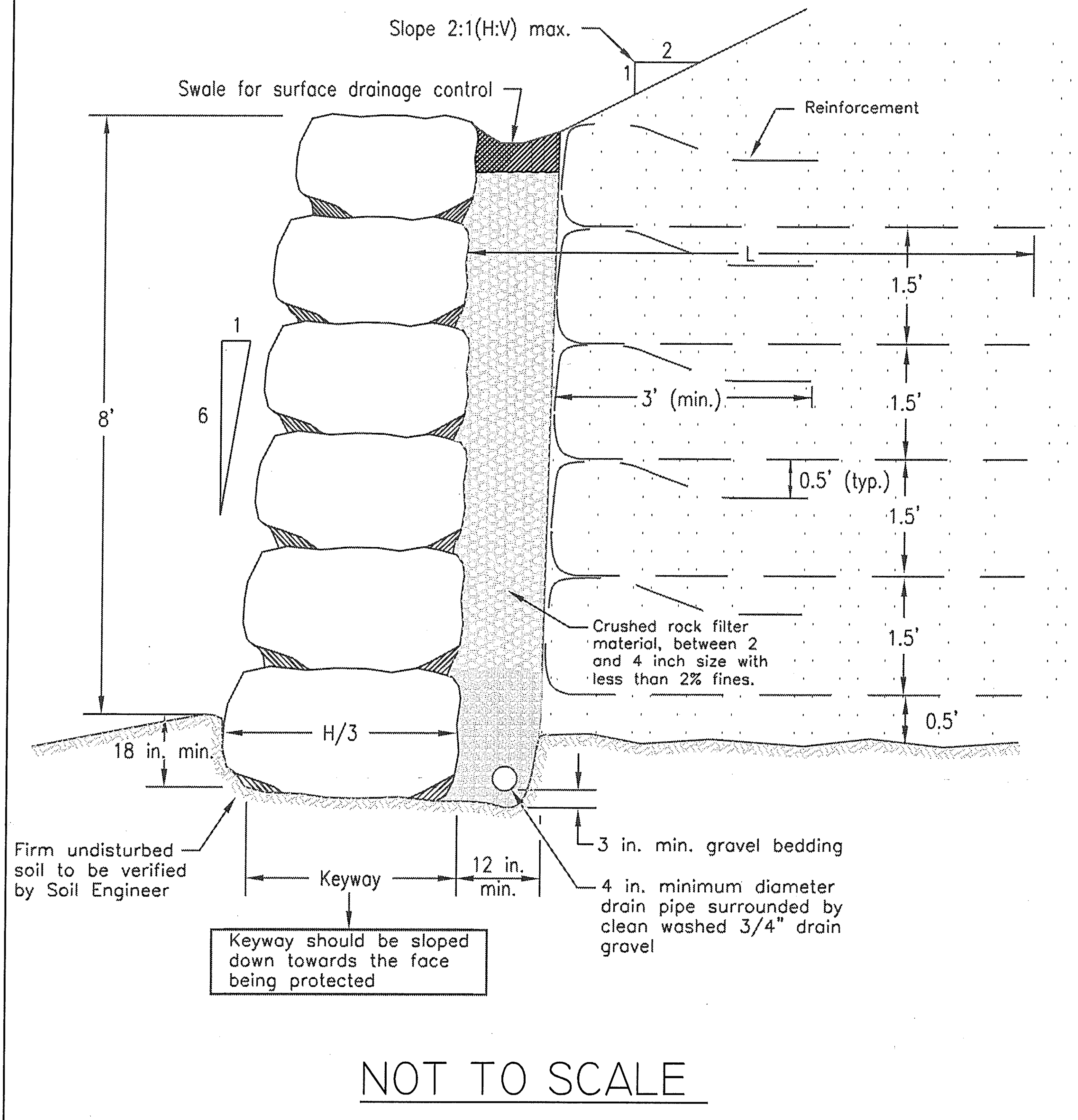
Seib Property	
Keystone Wall Section	*Figure 3*
Site Address: 16824 Bothell-Everett Hwy, Mill Creek, WA	



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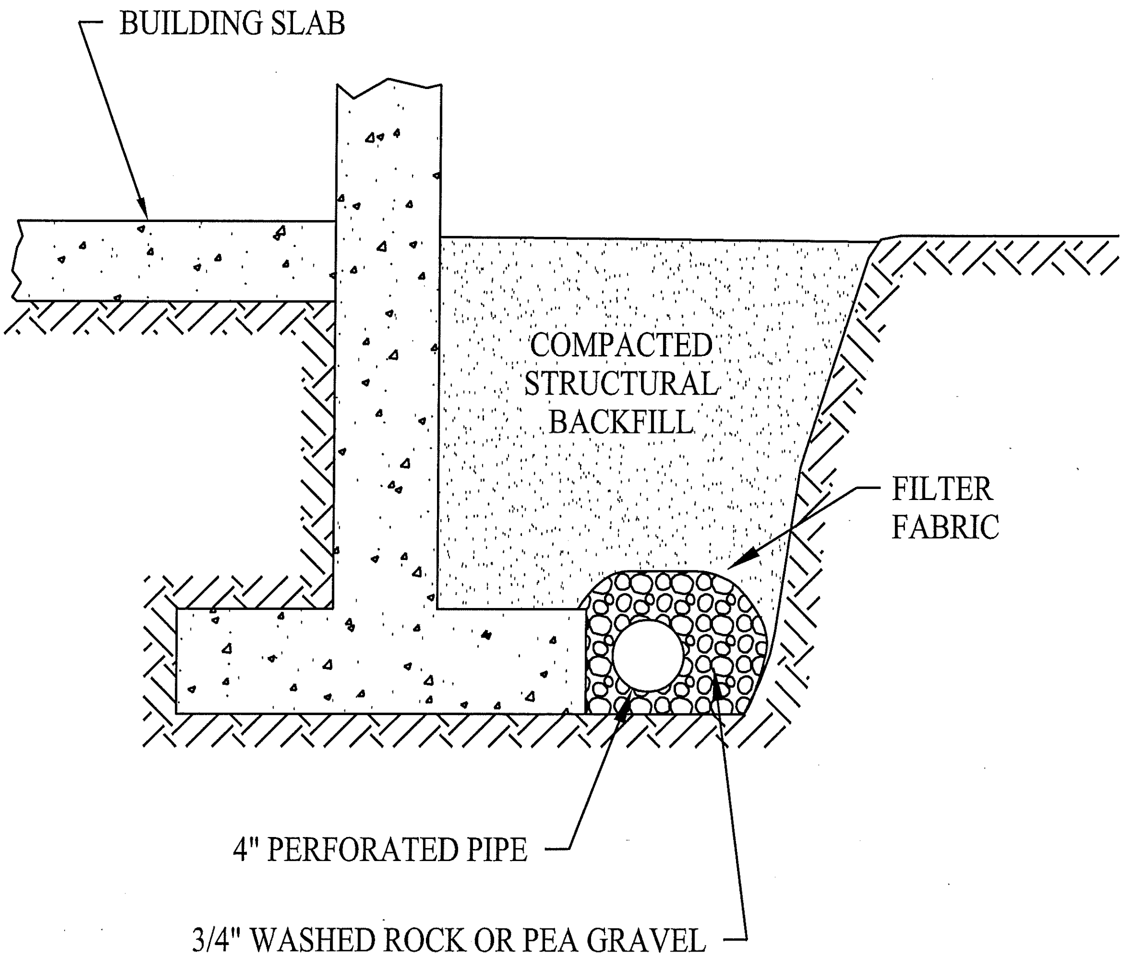
BOTHELL, WASHINGTON 98011

Seib Property

Typical Rockery Section Detail

Figure 4

Site Address: 16824 Bothell-Everett Hwy, Mill Creek, WA



NOT TO SCALE

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Seib Property

Typical Footing Drain Detail | *Figure 5*

Site Address: 16824 Bothell-Everett Hwy, Mill Creek, WA

APPENDIX A
FIELD EXPLORATION AND LABORATORY TESTING

Seib Property
16824 Bothell-Everett Highway
Mill Creek, Washington

On March 8, 2005, we performed our field exploration using a rubber-tired backhoe. We explored subsurface soil conditions at the site by excavating 9 test pits to a maximum depth of 10 feet below existing grade. The test pit locations are shown on Figure 2. The test pit locations were approximately determined by measurements from existing property lines and paved roads. The Test Pit Logs are presented on Figures A-2 through A-4.

A geologist/engineer from our office conducted the field exploration and classified the soil conditions encountered, maintained a log of each test pit, obtained representative soil samples, and observed pertinent site features. All soil samples were visually classified in accordance with the Unified Soil Classification System (USCS) described on Figure A-1.

Representative soil samples obtained from the test pits were placed in closed containers and taken to our laboratory for further examination and testing. The moisture content of typical sample was measured and is reported on the Test Pit Logs. Grain size analyses were performed on four of the samples, the results of which are shown on Figure A-5 and A-6.

MAJOR DIVISIONS				LETTER SYMBOL	TYPICAL DESCRIPTION
COARSE GRAINED SOILS	More than 50% material larger than No. 200 sieve	GRAVELS More than 50% of coarse fraction is larger than No. 4 sieve	CLEAN GRAVELS <5% fines	GW	Well-graded gravels, gravel-sand mixtures, little or no fines.
				GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines.
			GRAVELS with fines	GM	Silty gravels, gravel-sand-silt mixtures, non-plastic fines.
				GC	Clayey gravels, gravel-sand-clay mixtures, plastic fines.
		SANDS More than 50% of coarse fraction is smaller than No. 4 sieve	CLEAN SANDS <5% fines	SW	Well-graded sands, gravelly sands, little or no fines.
				SP	Poorly-graded sands or gravelly sands, little or no fines.
			SANDS with fines	SM	Silty sands, sand-silt mixtures, non-plastic fines.
				SC	Clayey sands, sand-clay mixtures, plastic fines.
FINE GRAINED SOILS	More than 50% material smaller than No. 200 sieve	SILTS AND CLAYS Liquid limits less than 50%		ML	Inorganic silts, rock flour, clayey silts with slight plasticity.
				CL	Inorganic clays of low to medium plasticity, (lean clay).
				OL	Organic silts and organic clays of low plasticity.
		SILTS AND CLAYS Liquid limits greater than 50%		MH	Inorganic silts, elastic.
				CH	Inorganic clays of high plasticity, (fat clays).
				OH	Organic clays of high plasticity.
HIGHLY ORGANIC SOILS				PT	Peat.

DEFINITION OF TERMS AND SYMBOLS

SAND or GRAVEL	Density	SPT (Blows/Foot)
	Very loose	0-4
	Loose	4-10
	Medium dense	10-30
	Dense	30-50
	Very dense	>50

SILT or CLAY	Consistency	SPT (Blows/Foot)
	Very soft	0-2
	Soft	2-4
	Medium stiff	4-8
	Stiff	8-15
	Very stiff	15-30
	Hard	>30

Symbol	Definition
I	2" Outside diameter split spoon sampler
I	2.4" Inside diameter ring sampler or Shelby tube
▼	Water level (date)
Tr	Torvane reading, tsf
Pp	Penetrometer reading, tsf
DD	Dry density, pcf
LL	Liquid limit, percent
PI	Plasticity index
N	Standard penetration, blows per foot

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Seib Property

Unified Soil Classification System — *Figure A-1*

Site Address: 16824 Bothell-Everett Hwy, Mill Creek, WA

Logged By: JC

Date: 3/8/05

Test Pit No.	Depth (ft)	Soil Description	Sample
TP-1	Surface	6" tree duff, 6" topsoil.	Depth (moisture)
	0.5 - 4	Red brown to gray brown silty sandy GRAVEL, moist, loose to medium dense, (GM).	2.5 ft (6.6%)
	4 - 10	Gray fine SAND with some silt, moist, medium dense to dense, (SM).	5 ft (6.0%) 10 ft (9.8%)
		Bottom of test pit at 10 feet. No groundwater seepage encountered.	
TP-2	Surface	12" tree duff, 8" topsoil.	
	0.5 - 4	Red brown to gray brown sandy GRAVEL with some silt and trace cobbles, moist, loose to medium dense, (GM)	2.5 ft (3.4%)
	4 - 10	Gray fine SAND with some silt, moist, medium dense to dense, (SM).	5 ft (6.3%) 10 ft (8.2%)
		Bottom of test pit at 10 feet. No groundwater seepage encountered.	
TP-3	Surface	2" thick crushed rock cover.	
	0 - 5	Brown silty sandy GRAVEL with some cobbles, moist, loose to medium dense, (GM).	2.5 ft (9.7%)
	5 - 8	Gray SAND with some gravel, silt, and cobbles, moist, medium dense, (SM).	6 ft (5.0%)
	8 - 10	Gray fine SAND with some silt, moist, medium dense, (SM).	10 ft (8.4%)
		Bottom of test pit at 10 feet. No groundwater seepage encountered.	

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Seib Property

Test Pit Logs | *Figure A-2*

Site Address: 16824 Bothell-Everett Highway, Mill Creek, WA

Logged By: JC

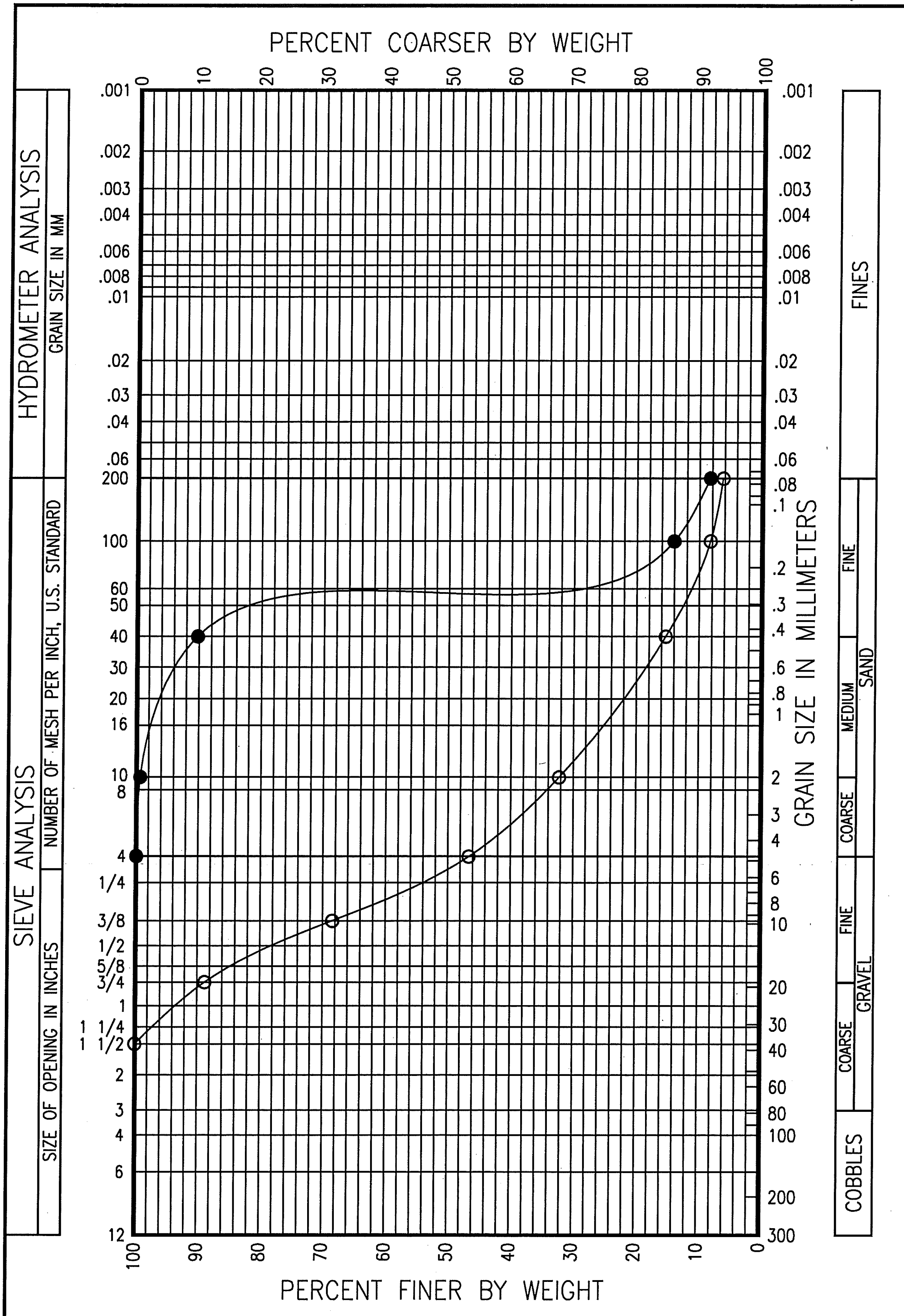
Date: 3/8/05

Test Pit No.	Depth (ft)	Soil Description	Sample
TP-4	Surface	Tree and grass covered, 4" topsoil.	Depth (moisture)
	0.5 - 4	Brown silty sandy GRAVEL, moist, loose to medium dense, (GM).	
	4 - 7	Gray fine SAND with some silt, moist, medium dense, (SM).	6 ft (6.5%)
		Bottom of test pit at 7 feet. No groundwater seepage encountered.	
TP-5	Surface	Black berry covered, 8" topsoil.	
	0.5 - 5	Brown silty sandy GRAVEL with some cobbles, one 2' diameter boulder at 2', moist, loose to medium dense, (GM)	2.5 ft (11.5%)
	5 - 7	Gray SILT with trace sand, low plasticity, moist, stiff, (ML).	6 ft (21.7%)
		Bottom of test pit at 7 feet. No groundwater seepage encountered.	
TP-6	Surface	Black berry covered, some garbage on ground.	
	0 - 2.5	Dark gray silty SAND with some gravel, moist, loose to medium dense, (Fill)	2.5 ft (11.8%)
	2.5 - 7	Brown silty sandy GRAVEL with some cobbles, trace boulders, moist, medium dense to dense, (GM).	5 ft (12.0%)
	7 - 10	Gray SILT with trace sand, low plasticity, moist, stiff to very stiff, (ML).	10 ft (28.7%)
		Bottom of test pit at 10 feet. No groundwater seepage encountered.	

Logged By: JC

Date: 3/8/05

Test Pit No.	Depth (ft)	Soil Description	Sample
TP-7	Surface	Grass and black berry covered.	Depth (moisture)
	0 - 1.5	Dark brown silty SAND with some gravel, moist, loose, (Fill).	
	1.5 - 5	Brown sandy GRAVEL with some silt and cobbles, moist, medium dense to dense, (GM).	2.5 ft (3.2%) 5 ft (5.0%)
	5 - 10	Gray SILT with interbedded silty fine sand layers, low plasticity, moist, stiff to very stiff, (ML).	7.5 ft (23.9%) 10 ft (26.3%)
		Bottom of test pit at 10 feet. Caving at 3 feet. No groundwater seepage encountered.	
TP-8	Surface	Black berry covered, 8" topsoil.	
	0.5 - 5.5	Brown silty sandy GRAVEL with trace cobbles, moist, medium dense to dense, (GM).	2.5 ft (3.6%)
	5.5 - 7	Gray fine SAND with some silt, moist, medium dense, (SM).	
	7 - 10	Gray SILT with some sand, low plasticity, moist, stiff, (ML).	7.5 ft (20.2%)
		Bottom of test pit at 10 feet. No groundwater seepage encountered.	
TP-9	Surface	Tree and gravel covered.	
	0 - 3	Brown silty sandy GRAVEL, moist, loose to medium dense, (GM).	2.5 ft (2.6%)
	3 - 7	Gray fine SAND with some silt, moist, medium dense, (SM).	5 ft (6.7%)
		Bottom of test pit at 7 feet. No groundwater seepage encountered.	



Key	Boring or Test Pit	Depth (ft.)	USCS	Description	Moisture Content (%)	LL	PL
○	TP-3	10	SM	SAND with some silt	8.4		
●	TP-3	2.5	GM	Sandy GRAVEL with some silt	9.7		

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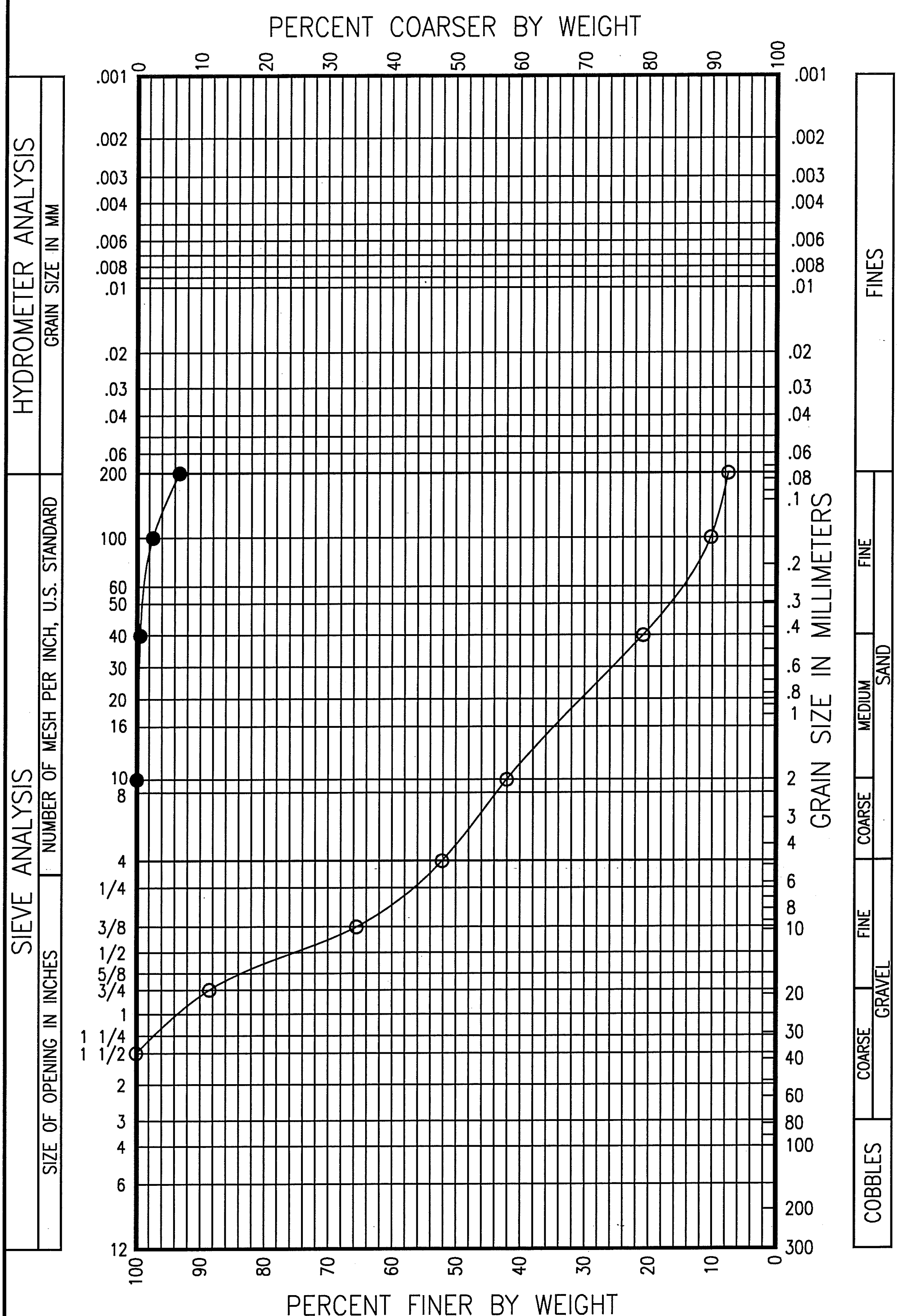
BOTHELL, WASHINGTON 98011

Seib Property

Grain Size Analysis | *Figure A-5*

Site Address: 16824 Bothell-Everett Hwy, Mill Creek, WA



Key	Boring or Test Pit	Depth (ft.)	USCS	Description	Moisture Content (%)	LL	PL
○	TP-6	2.5	GM	Sandy GRAVEL with some silt	11.8		
●	TP-6	10	ML	SILT with trace sand	28.7		

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BOTHELL, WASHINGTON 98011

Seib Property

Grain Size Analysis | *Figure A-6*

Site Address: 16824 Bothell-Everett Hwy, Mill Creek, WA

The Riley Group Inc.

September 26, 2006

Mr. David Lee
Mill Creek Commons Phase II, LLC
15921 NE 8th Street, Suite 202
Bellevue, WA 98008

Subject: **Onsite Infiltration Study**
Mill Creek Commons Phase II
16824 Bothell-Everett Highway
Mill Creek, Washington
Project 2005-038

References: **1. Volume III – Hydrologic Analysis and Flow Control BMPs, Stormwater Management in Western Washington, Department of Ecology, February 2005.**

2. Volume V – Runoff Treatment BMPs, Stormwater Management Manual for Western Washington, Department of Ecology, February 2005.

Dear Mr. Lee:

As requested, The Riley Group, Inc. (Riley) has performed an infiltration test at the above referenced site. This letter summarizes our findings and recommendations for the infiltration system design.

Riley visited the site on September 19, 2006 and discussed with Mr. Scott Smith, City Engineer of Mill Creek, regarding the site condition and test method. Based on the discussion, a modified pilot test method was used to determine the field infiltration rate.

Based on the site plan prepared by Peak Engineering, Inc. dated June 15, 2006, Riley understands that the proposed infiltration facility will be located in the middle portion of the site below the proposed parking lot. The bottom of the infiltration facility is approximately 4 to 8 feet below ground surface (bgs). Figure 1 shows the approximate location of the onsite infiltration tests.

On September 21, 2006, Riley excavated three test pits and performed infiltration tests in the test pits at depth of 7 feet bgs. The soil encountered at depths of 7 feet bgs was medium dense gravelly SAND with some silt. Groundwater seepage was not encountered during our test pit exploration. The field tests were modified from pilot infiltration test and the dimension is approximately 3 feet by 3 feet. The following table summarizes our infiltration test results:

Test Pit No.	TP-1	TP-2	TP-3
Measured Rate (Inches/Hour)	5*	72	30

* encountered dense silty sand layer

The measured field infiltration rate was from 5 to 72 inches per hour. Test pit TP-1 encountered a dense silty sand layer at the bottom of test pit. Generally, the soil at the proposed infiltration facility depth is very permeable. Riley believes that the proposed infiltration system should be efficient. The field rate cannot be used directly for system design. A proper factor should be considered to use the field rate for system design. Based on experience with similar projects, Riley recommends that an allowable infiltration rate of 5 inches per hour be used for system design. The infiltration layer should consist of sandy or gravelly soils. If silt layer is encountered, they should be overexcavated and replaced with gravel. A geotechnical engineer/or geologist should observe the infiltration facility construction.

We trust the information presented is sufficient for your current needs. If you have any questions regarding this letter report or require additional information, please call us at (425) 415-0551.

Sincerely yours,

The Riley Group, Inc.

CHIEN-LIN CHEN
STATE OF WASHINGTON
41353
REGISTERED
PROFESSIONAL ENGINEER
EXPIRES SEPT. 12, 2007

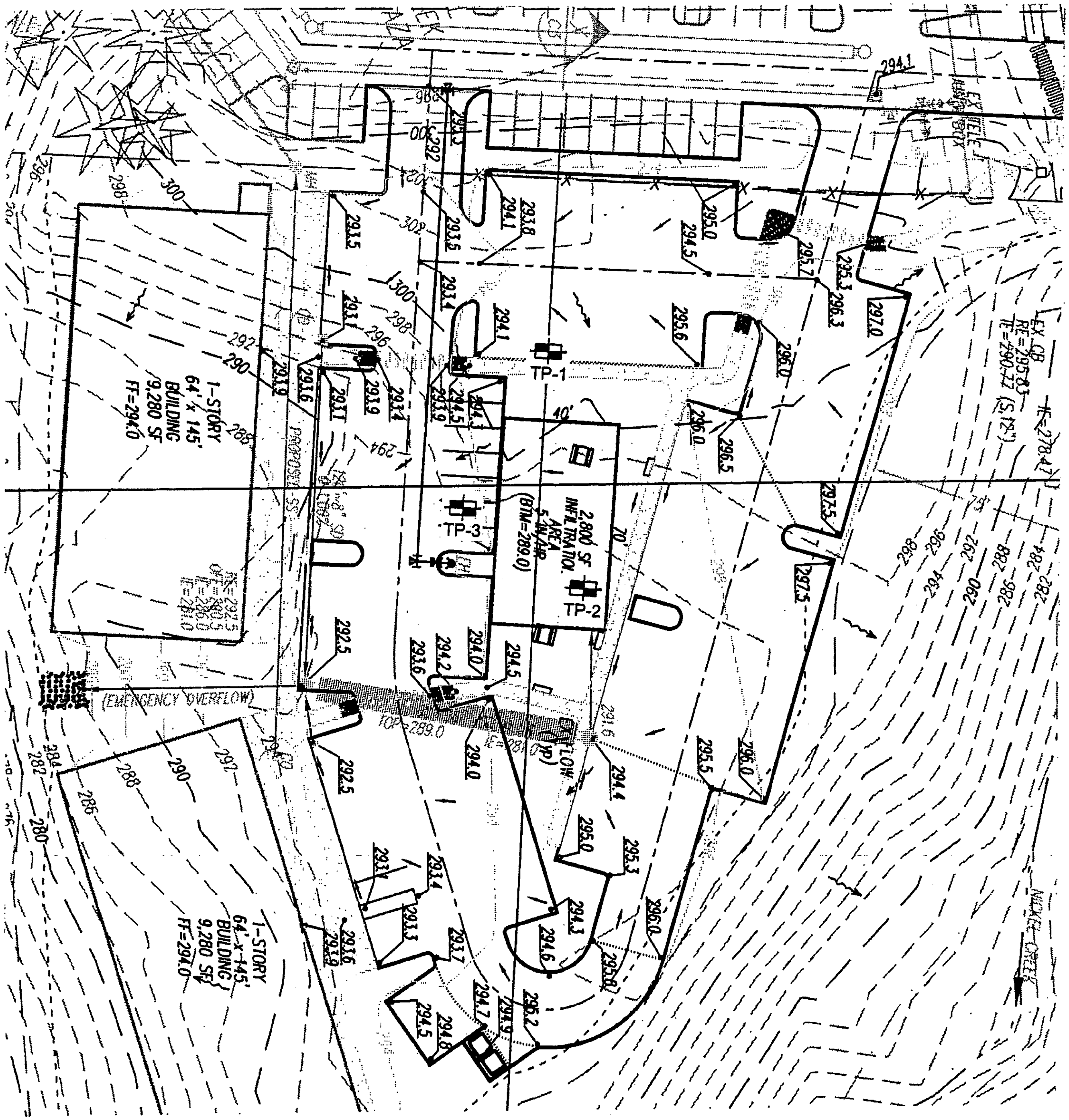
9/26/06

Chien-Lin (Johnny) Chen, P.E.
Project Engineer

Ricky R. Wang, Ph.D., P.E.
Principal Engineer

Attachment *Figure 1. Infiltration Test Location Map*

Cc: Mr. Scott Smith, City of Mill Creek, Inc., Fax: (425) 745-9650
Mr. Greg Reed, Peak Engineering, Inc., Fax: (360) 658-7826



Reference:
Figure modified from Site Plan prepared by Peak Engineering, Inc. dated June 15, 2006.

TP-1 — Infiltration test location excavated by The Riley Group, Inc. on September 21, 2006.

DRAWING NOT TO SCALE

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The Riley Group, Inc.
17522 BOTHELL WAY NE
BOTHELL, WASHINGTON 98011

Mill Creek Commons Phase II

Infiltration Test Location Map — *Figure 1*

Site Address: 16824 Bothell-Everett Highway, Mill Creek, Washington