CITY OF KIRKLAND
Planning & Community Development Department
123 Fifth Avenue, Kirkland, WA 98033
425.587.3225 - www.kirklandwa.gov

MEMORANDUM

To: Eric R. Shields, AICP
Planning Director

From: Susan Lauinger, Project Planner

Date: December 11th, 2015

File: **SEP15-01347**

Subject: ENVIRONMENTAL DETERMINATION FOR THE MACDONALD SHORT PLATS; FILE NO.'S SUB15-01345 AND SUB15-01346; 12704 72nd AVENUE NE (see Enclosure 1).

PROPOSAL

The Blueline Group, on behalf of the applicant, Buchan Homes, has applied for two short plats of 8 lots each, which are directly adjacent to each other. A new city right-of-way will serve the new lots created for both short plats. The properties are in an RSA 4 zone within the Finn Hill Neighborhood, which allows a maximum density of 4 dwelling units per acre with a minimum lot size of 7,600 square feet (see Enclosure 2). The proposal includes two separate parcels, one with an existing home and guest house at 12704 72nd Avenue NE and the other with a barn, several accessory shed structures, and a riding arena. All existing structures are proposed to be removed.

The site lies west of Big Finn Hill Park with direct access to 72nd Avenue NE. A stream runs through the Big Finn Hill Park roughly 400 feet away from the subject property's eastern boundary.

ANALYSIS

SEPA rules require that an environmental and traffic review be completed for subdivision applications involving nine or more new lots. The MacDonald project includes 2 applications proposing 8 lots each, 16 in total. The entirety of these rules can be found in Chapter 197-11 of the Washington Administrative Code (WAC).

SEPA rules provide a mechanism for local jurisdictions to use when their regulations do not provide standards that would mitigate or otherwise reduce the harm to the environment from the proposed action. When a development action is found to have probable significant adverse environmental impacts which cannot be mitigated, it may be given a Determination of Significance (DS). If no probable significant adverse

environmental impacts are found in environmental review, the project is given a Determination of Non-significance (DNS). If the project has environmental impacts which can be mitigated, the City could issue an MDNS, or Mitigated DNS.

The SEPA "threshold determination" is the formal decision as to whether the proposal is likely to cause a significant adverse environmental impact for which mitigation cannot be identified. Where City regulations have been adopted to address an environmental impact, it is presumed that such regulations are adequate to achieve sufficient mitigation (see Washington Administrative Code (WAC) section 197-11-660(1)(e) and (g)). Therefore, when requiring project mitigation based on adverse environmental impacts, the City would first consider whether a regulation has been adopted for the purpose of mitigating the environmental impact in question.

As required, the applicant has submitted an environmental checklist and the City has reviewed that checklist (See Enclosure 3).

In addition to reviewing the environmental checklist, I have visited the site and have reviewed the following documents:

- Geotechnical Reports by Terra Associates (3 in total) dated May 1, 2006; June 26, 2015; and November 10, 2015 (see Enclosure 4).
- Traffic Impact Analysis prepared by TraffEx NW dated June 17, 2015 (see Enclosure 5).
- Sewer lift station noise and smell analysis by Romtec Utilities dated November 13, 2015 (see Enclosure 6).

Several environmental checklist topics are briefly addressed below as they relate to the subject property and applicant's proposal (see Enclosure 3).

Geologic Hazard Area:

The City's sensitive area maps indicate that there is a possible high landslide hazard area on the property. The subject property is basically flat from the street (72nd Avenue NE) for several hundred feet to the east but has a significantly steep drop-off (approximately 150' elevation drop) along the eastern and southern portions of the property. The steep slope extends down to Big Finn Hill Park with a slope of 1.5-2 H: 1V.

The vegetation on the flat portion of the site consists mostly of large grassy areas with some tall fir trees throughout the site and shrubs typical of single family homes near the house. The sloped area is heavily vegetated with a mix of coniferous and deciduous trees, understory forest plants, and some noxious weed cover such as ivy.

The applicant was required to obtain a geotechnical report prepared by a qualified Geotechnical Engineer. The initial report, dated June 26th 2015, contained a previous report from May 1st 2006. There were discrepancies between the two reports pertaining to required slope setbacks (see Enclosure 4). Additionally, public comments were

submitted that describe a landslide occurrence on the MacDonald property approximately 12 years ago (see Enclosure 7, page 10). Therefore, another report was required to address the discrepancy and neighboring property owner's concern.

The new Geotechnical Report dated November 10th 2015 adequately addresses the discrepancy between the first two reports and the neighboring concerns. The report indicates that shallow slides in the area are part of a natural geomorphologic process in Western Washington and is not an indication of instability. Further, past practices of throwing horse waste materials including wood chips and straw near the slope crest caused an eventual slide of that material, not an instability of the slope. The report also explains the differences between the originally submitted reports, and the newest report. This property was previously in King County's jurisdiction and their slope setback criteria are not the same as Kirkland's. The engineer explains that supplemental slope stability analysis performed such as Lidar and further test pits dug to 50' indicate no slope instability, but instead indicate glacial sediments highly consolidated with high shear strength (See Enclosure 4).

Chapter 85 of the Kirkland Zoning Code (KZC) sets forth the regulations for properties that are identified as having geological hazards. These regulations do not require specific slope setbacks, but instead rely upon the expertise of the geotechnical engineer in determining the appropriate setback. In this case, the engineer for Terra Associates is recommending a 10' vegetated buffer and an additional 10' structure setback from the top of the slope (20' in total). If the recommendations in the report are followed, the engineer has indicated that landslide potential is mitigated.

Chapter 85 of the Kirkland Zoning Code contains adequate regulations which authorizes the City to require mitigation for development near steep slopes. Therefore, the analysis of the geotechnical report should be addressed with the staff analysis report for the proposed short plats. In the staff report, staff will recommend that the geotechnical recommendations should be followed.

<u>Erosion Control and Storm Water:</u>

Several public comments expressed concern over erosion and storm water runoff (see Enclosure 7).

Storm water runoff and erosion hazards are regulated both under Chapter 85 of the KZC and Chapter 15.52 of the Kirkland Municipal Code (KMC). Together, these two ordinances require that all precautions necessary to prevent erosion are implemented with development of the MacDonald Short Plats. The City's ordinances to control erosion and storm water are based on the 2009 King County Storm water manual, which is required to be followed within the entire City for all new developments such as the MacDonald Short Plats project. Best management practices will be used during construction to control possible erosion and the City requires that all new impervious

surfaces be drained to an appropriate storm water system that can handle the run off without causing harm to any property or the City right of way.
SEPA rules do not allow a jurisdiction to require mitigations through SEPA that are otherwise covered by that City's ordinances and the City's requirements adequately address erosion and storm water.

New Sewer lift station

The subject property is located within the Northshore Utility District boundary. As part of the development of the new lots, a new sewer lift station is required. Public comments concerning the lift station include concerns about the location of the station combined with smells and noise that may occur when the station is in operation. Staff requested that these issues be addressed by the manufacturer of the equipment used. The applicant submitted a memo by Romtec (see Enclosure 6). The report indicates that the noise would be a similar decibel level to a "dishwasher in the next room"; the pumps will be 12' below grade in a concrete cast structure. Additionally, the times when the pumps would operate are times when people are generally busy in their homes utilizing water. The Romtec letter also explains that is unlikely to smell because the sewer water is moving, and is not static.

Additionally, the applicant submitted a site plan indicating the location of the new station (See Enclosure 8). The final location and design of the lift station must be approved by Northshore Utility District who is responsible for approval of sewer utilities in this part of Kirkland. Northshore Utility District is aware of the proposed design and is working with the applicant on finalizing new lift station.

Public Services

One commenter indicated a concern over the schools in the area and overcrowding due to new development. The City does not have jurisdiction over the Lake Washington School District boundary line policies but the School District does regularly contact the City to determine how projects will affect school's population in the City of Kirkland. School impact fees are collected by the City and passed to the district to be used towards mitigating impacts to schools. With each new home built, $9,623.00 is paid to the Lake Washington School District. The school impact fees may increase each year to correspond with changes to the District's six-year capital facilities plan.

Concerned citizens should contact the Lake Washington School District regarding new residential development and how it may affect local schools.

Traffic:

The applicant submitted a traffic impact analysis report, prepared by TraffEX (see Enclosure 5). The City's traffic engineer has reviewed the project for compliance with traffic impacts including volume and safety and found that no mitigations are needed with the proposed MacDonald project (see Enclosure 9).

Conclusions:

It will be necessary to further analyze certain aspects of the applicant's proposal to determine if the project complies with all applicable City codes. That analysis is most appropriately addressed within the staff advisory report for the short plats and subsequent grading and building permits. I have had an opportunity to visit the site and review the environmental checklist for the project referenced above and all other documents referenced in this memo. Based on my review of all available information and adopted policies of the City, I have not found any probable significant, adverse environmental impacts that cannot be mitigated through existing City regulations found in the Kirkland Municipal Code and Zoning Code. Therefore, I recommend that a Determination of Nonsignificance (DNS) be issued for the proposed action.

Should you have any questions, please contact me.

Enclosures:

1. Vicinity Map
2. Short Plat Plans
3. Environmental Checklist
4. Geotechnical Reports prepared by Terra Associates
5. Traffic Impact Analysis by TraffEX
6. Sewer lift station information from Romtec, Inc
7. Public Comments
8. Site plan for sewer lift station
9. City Traffic Engineer traffic review

Review by Responsible Official:

I concur ☒

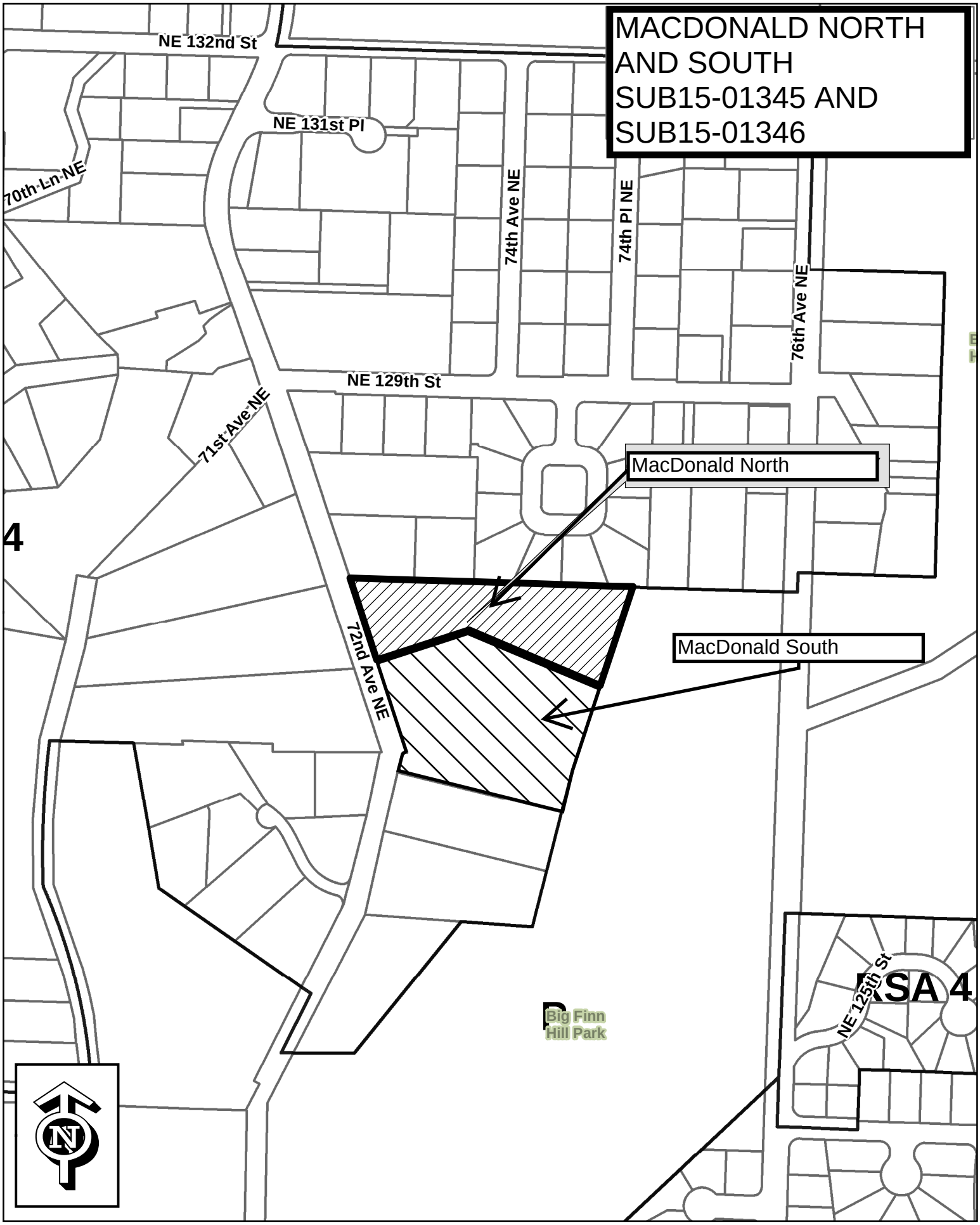
I do not concur ☐

Eric R. Shields, AICP
Planning Director

December 11, 2015

Date

Enclosure 1


MACDONALD NORTH AND SOUTH SUB15-01345 AND SUB15-01346
NE 132nd St
NE 131st Pl
70th Ln NE
74th Ave NE
74th Pl NE
76th Ave NE
NE 129th St
71st Ave NE
MacDonald North
MacDonald South
72nd Ave NE
NE 125th St
Big Finn Hill Park
4
KSA 4

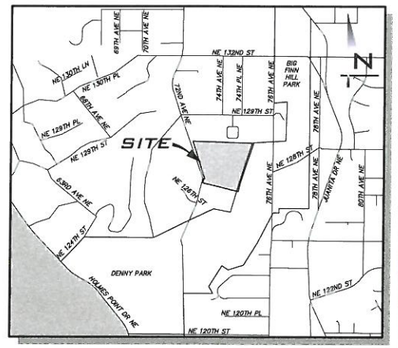
NW 1/4, SEC 25, TWP 26N, RGE 5E, W.M.

MACDONALD NORTH SHORT PLAT

Enclosure 2

SCALE: 1" = 40'

0 20 40 80



VICINITY MAP

NOT TO SCALE

PROJECT TEAM

APPLICANT

WILLIAM E. BUCHAN, INC
2630 116TH AVE NE, SUITE 100
BELLEVUE WA 98004
(425) 828-6424
CONTACT: GREG NELSON

CIVIL ENGINEER

THE BLUELINE GROUP
25 CENTRAL WAY, SUITE 400
KIRKLAND, WA 98033
(425) 216-4051 x224
CONTACT: TODD A. OBERG, PE

SURVEYOR

MEAD GILMAN & ASSOCIATES
17625 130TH AVE NE, SUITE 104
WOODINVILLE, WA 98072
(425) 486-1252
CONTACT: ED ANDERSON, PLS

SITE DATA

SITE ADDRESS:	12704 72ND AVE NE
PARCEL NUMBER:	4055700826
ZONING:	RSA 4
GROSS SITE AREA:	100,365 SF (2.30 AC)
NUMBER OF LOTS PROPOSED:	8
PROPOSED USE:	SINGLE FAMILY RESIDENTIAL
MINIMUM LOT SIZE ALLOWED:	7,200 SF
SETBACKS:	FRONT 20', REAR 10', SIDE 5'
MAXIMUM LOT COVERAGE:	3,300 SF PLUS 10% OF THE LOT AREA OVER 9,000 SF
HEIGHT:	30' ABOVE ABE
SEWAGE DISPOSAL:	NORTHSHORE UTILITY DISTRICT
WATER SYSTEM:	NORTHSHORE UTILITY DISTRICT

LEGAL DESCRIPTION

(PER CHICAGO TITLE INSURANCE COMPANY TITLE COMMITMENT NO. 0021553-06 DATED JULY 30, 2014)

THE PORTION OF LOTS 1 AND 2 OF KING COUNTY TESTAMENTARY DIVISION NO. L10M0004, RECORDED UNDER RECORDING NUMBER 20100405900009, IN KING COUNTY, WASHINGTON, DESCRIBED BY LOT B PER CITY OF KIRKLAND LOT LINE ALTERATION NO. LLA15-00982.

VERTICAL DATUM

NAVD 88 (USED FAST STATIC GPS OBSERVATIONS WITH OPUS SOLUTION)

CONTOUR INTERVAL = 2'

MERIDIAN

WASHINGTON STATE PLANE COORDINATE SYSTEM – NORTH ZONE (NADB3/91)

(PER WASHINGTON GEODETIC SURVEY CONTROL POINTS 182 (ID NO. 42444) AND 202 (ID NO. 43466)

BENCHMARKS

TBM – A: 1-3/4" BRASS DISC W/PUNCH 0.8' BELOW GRADE IN CASE AT CL AP OF 72ND AVE NE 49.5' N'LY OF SW PROPERTY COR. EL 384.42

TBM – B: 1-3/4" BRASS DISC W/PUNCH 0.9' BELOW GRADE IN CASE AT CL INTX. OF 72ND AVE NE AND NE 126TH ST. EL 362.12

EQUIPMENT & PROCEDURES

A 5" ELECTRONIC TOTAL STATION WAS USED FOR THIS FIELD TRAVERSE SURVEY. ACCURACY MEETS OR EXCEEDS W.A.C. 332-130-090.

REFERENCES

RECORD OF SURVEY AS RECORDED UNDER RECORDING NO. 20070424900013 IN BOOK 223 OF SURVEYS, PG 96 IN KING COUNTY, WA.

SHEET INDEX

LOT COVERAGE CALCULATIONS

LOT 1 AREA:	11,635 SF
MAX LOT COVERAGE 50%:	5,817 SF
MAXIMUM IMPERVIOUS COVERAGE PER HOLMES POINT OVERLAY:	3,563 SF
LOT 2 AREA:	11,168 SF
MAX LOT COVERAGE 50%:	5,584 SF
MAXIMUM IMPERVIOUS COVERAGE PER HOLMES POINT OVERLAY:	3516 SF
LOT 3 AREA:	10,291 SF
MAX LOT COVERAGE 50%:	5,145 SF
MAXIMUM IMPERVIOUS COVERAGE PER HOLMES POINT OVERLAY:	3,429 SF
LOT 4 AREA:	10,664 SF
MAX LOT COVERAGE 50%:	5,332 SF
MAXIMUM IMPERVIOUS COVERAGE PER HOLMES POINT OVERLAY:	3,466 SF
LOT 5 AREA:	10,069 SF
MAX LOT COVERAGE 50%:	5,034 SF
MAXIMUM IMPERVIOUS COVERAGE PER HOLMES POINT OVERLAY:	3,406 SF
LOT 6 AREA:	15,272 SF
MAX LOT COVERAGE 50%:	7,636 SF
MAXIMUM IMPERVIOUS COVERAGE PER HOLMES POINT OVERLAY:	3,927 SF
LOT 7 AREA:	14,161 SF
MAX LOT COVERAGE 50%:	7,080 SF
MAXIMUM IMPERVIOUS COVERAGE PER HOLMES POINT OVERLAY:	3,816 SF
LOT 8 AREA:	14,126 SF
MAX LOT COVERAGE 50%:	7,063 SF
MAXIMUM IMPERVIOUS COVERAGE PER HOLMES POINT OVERLAY:	3,812 SF

PNA CALCULATIONS

LOT 1 AREA:	11,635 SF		LOT 5 AREA:	10,069 SF	
PNA AREA REQUIRED:	(25%) 2,909 SF		PNA AREA REQUIRED::	(25%) 2,517 SF	
PNA AREA PROVIDED:	2,916 SF		PNA AREA PROVIDED:	2,550 SF	
LOT 2 AREA:	11,168 SF		LOT 6 AREA:	15,272 SF	
PNA AREA REQUIRED::	(25%) 2,792 SF		PNA AREA REQUIRED::	(25%) 3,818 SF	
PNA AREA PROVIDED:	2,794 SF		PNA AREA PROVIDED:	4,126 SF	
LOT 3 AREA:	10,291 SF		LOT 7 AREA:	14,161 SF	
PNA AREA REQUIRED::	(25%) 2,573 SF		PNA AREA REQUIRED::	(25%) 3,540 SF	
PNA AREA PROVIDED:	2,574 SF		PNA AREA PROVIDED:	3,646 SF	
LOT 4 AREA:	10,664 SF		LOT 8 AREA:	14,126 SF	
PNA AREA REQUIRED::	(25%) 2,666 SF		PNA AREA REQUIRED::	(25%) 3,532 SF	
PNA AREA PROVIDED:	2,668 SF		PNA AREA PROVIDED:	3,761 SF	

FLOOR AREA RATIO CALCULATION

LOT 1 AREA:	11,635 SF	LOT 5 AREA:	10,069 SF
MAX FLOOR AREA RATIO:	50%	MAX FLOOR AREA RATIO:	50%
MAX LIVING AREA:	5,817 SF	MAX LIVING AREA:	5,034 SF
LOT 2 AREA:	11,168 SF	LOT 6 AREA:	15,272 SF
MAX FLOOR AREA RATIO:	50%	MAX FLOOR AREA RATIO:	50%
MAX LIVING AREA::	5,584 SF	MAX LIVING AREA:	7,636 SF
LOT 3 AREA:	10,291 SF	LOT 7 AREA:	14,161 SF
MAX FLOOR AREA RATIO:	50%	MAX FLOOR AREA RATIO:	50%
MAX LIVING AREA:	5,145 SF	MAX LIVING AREA:	7,080 SF
LOT 4 AREA:	10,664 SF	LOT 8 AREA:	14,126 SF
MAX FLOOR AREA RATIO:	50%	MAX LOT COVERAGE 50%:	50%
MAX LIVING AREA::	5,332 SF	MAX LIVING AREA:	7,063 SF

U. S. POSTAL SERVICE
APPROVED FOR MAILBOX LOCATION(S)

UNDERGROUND UTILITY NOTE

UNDERGROUND UTILITIES ARE SHOWN IN THE APPROXIMATE LOCATION. THERE IS NO GUARANTEE THAT ALL UTILITY LINES ARE SHOWN, OR THAT THE LOCATION, SIZE AND MATERIAL IS ACCURATE. THE CONTRACTOR SHALL UNCOVER ALL INDICATED PIPING WHERE CROSSING, INTERFERENCES, OR CONNECTIONS OCCUR PRIOR TO TRENCHING OR EXCAVATION FOR ANY PIPE OR STRUCTURES, TO DETERMINE ACTUAL LOCATIONS, SIZE AND MATERIAL. THE CONTRACTOR SHALL MAKE THE APPROPRIATE PROVISION FOR PROTECTION OF SAID FACILITIES. THE CONTRACTOR SHALL NOTIFY ONE CALL AT 8-1-1 (WASHINGTON811.COM) AND ARRANGE FOR FIELD LOCATION OF EXISTING FACILITIES BEFORE CONSTRUCTION.

22x34
Aug 20, 2015 – 10:41am – User Jacob
E:\Projects\14-024 ONG Temp\Short Plat\North\14024CV.dwg

BLUELINE
25 CENTRAL WAY, SUITE 400 KIRKLAND, WA 98033
P 425.216.4051 F 425.216.4052
WWW.THEBLUELINEGROUP.COM

SCALE: AS NOTED
PROJECT MANAGER: TODD A. OBERG, PE
PROJECT ENGINEER: TODD A. OBERG
DESIGNER: JUSTIN H. RODDA
ISSUE DATE: 8/20/2015

NO	DATE	BY	REVISIONS
1	8/20/15	JAR	REVISED PER MEETING WITH CITY ARBORIST

COVER SHEET

MACDONALD ESTATES
SHORT PLAT
PARCEL #4055700826
CITY OF KIRKLAND WASHINGTON

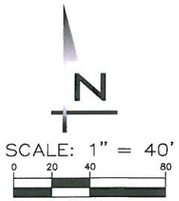
TODD A. OBERG
STATE OF WASHINGTON
17408
REGISTERED PROFESSIONAL ENGINEER

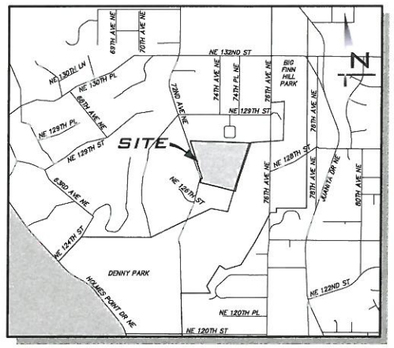
8/20/15

JOB NUMBER: 14-024
SHEET NAME: CV-01
SHT 1 OF 2

NW 1/4, SEC 25, TWP 26N, RGE 5E, W.M.

MACDONALD SOUTH SHORT PLAT





VICINITY MAP

NOT TO SCALE

PROJECT TEAM

APPLICANT

WILLIAM E. BUCHAN, INC
2630 116TH AVE NE, SUITE 100
BELLEVUE WA 98004
(425) 828-6424
CONTACT: GREG NELSON

CIVIL ENGINEER

THE BLUELINE GROUP
25 CENTRAL WAY, SUITE 400
KIRKLAND, WA 98033
(425) 216-4051 x224
CONTACT: TODD A. OBERG, PE

SURVEYOR

MEAD GILMAN & ASSOCIATES
17625 130TH AVE NE, SUITE 104
WOODINVILLE, WA 98072
(425) 486-1252
CONTACT: ED ANDERSON, PLS

SITE DATA

SITE ADDRESS:	12704 72ND AVE NE
PARCEL NUMBER:	4055700825
ZONING:	RSA 4
GROSS SITE AREA:	176,298 SF (4.04 AC)
NUMBER OF LOTS PROPOSED:	8
PROPOSED USE:	SINGLE FAMILY RESIDENTIAL
MINIMUM LOT SIZE ALLOWED:	7,200 SF
SETBACKS:	FRONT 20', REAR 10', SIDE 5'
MAXIMUM LOT COVERAGE:	3,300 SF PLUS 10% OF THE LOT AREA OVER 9,000 SF
HEIGHT:	30' ABOVE ABE
SEWAGE DISPOSAL:	NORTHSHORE UTILITY DISTRICT
WATER SYSTEM:	NORTHSHORE UTILITY DISTRICT

LEGAL DESCRIPTION

(PER CHICAGO TITLE INSURANCE COMPANY TITLE COMMITMENT NO. 0021553-06 DATED JULY 30, 2014)

THE PORTION OF LOTS 1 AND 2 OF KING COUNTY TESTAMENTARY DIVISION NO. L10M0004, RECORDED UNDER RECORDING NUMBER 20100405900009, IN KING COUNTY, WASHINGTON, DESCRIBED BY LOT A PER CITY OF KIRKLAND LOT LINE ALTERATION NO. LLA15-00982.

VERTICAL DATUM

NAVD 88 (USED FAST STATIC GPS OBSERVATIONS WITH OPUS SOLUTION)

CONTOUR INTERVAL = 2'

MERIDIAN

WASHINGTON STATE PLANE COORDINATE SYSTEM - NORTH ZONE (NAD83/91)

(PER WASHINGTON GEODETIC SURVEY CONTROL POINTS 182 (ID NO. 42444) AND 202 (ID NO. 43466)

BENCHMARKS

TBM - A: 1-3/4" BRASS DISC W/PUNCH 0.8' BELOW GRADE IN CASE AT CL AP OF 72ND AVE NE 49.5' N'LY OF SW PROPERTY COR. EL. 384.42

TBM - B: 1-3/4" BRASS DISC W/PUNCH 0.9' BELOW GRADE IN CASE AT CL INTX. OF 72ND AVE NE AND NE 126TH ST. EL 362.12

EQUIPMENT & PROCEDURES

A 5" ELECTRONIC TOTAL STATION WAS USED FOR THIS FIELD TRAVERSE SURVEY. ACCURACY MEETS OR EXCEEDS W.A.C. 332-130-090.

REFERENCES

RECORD OF SURVEY AS RECORDED UNDER RECORDING NO. 20070424900013 IN BOOK 223 OF SURVEYS, PG 96 IN KING COUNTY, WA.

SHEET INDEX

LOT COVERAGE CALCULATIONS

LOT 1 AREA:	16,104 SF
MAX LOT COVERAGE 50%:	8,052 SF
MAXIMUM IMPERVIOUS COVERAGE PER HOLMES POINT OVERLAY:	4,010 SF
LOT 2 AREA:	13,797 SF
MAX LOT COVERAGE 50%:	6,898 SF
MAXIMUM IMPERVIOUS COVERAGE PER HOLMES POINT OVERLAY:	3,779 SF
LOT 3 AREA:	32,413 SF
MAX LOT COVERAGE 50%:	16,206 SF
MAXIMUM IMPERVIOUS COVERAGE PER HOLMES POINT OVERLAY:	5,641 SF
LOT 4 AREA:	13,262 SF
MAX LOT COVERAGE 50%:	6,631 SF
MAXIMUM IMPERVIOUS COVERAGE PER HOLMES POINT OVERLAY:	3,726 SF
LOT 5 AREA:	18,370 SF
MAX LOT COVERAGE 50%:	9,185 SF
MAXIMUM IMPERVIOUS COVERAGE PER HOLMES POINT OVERLAY:	4,237 SF
LOT 6 AREA:	10,851 SF
MAX LOT COVERAGE 50%:	5,425 SF
MAXIMUM IMPERVIOUS COVERAGE PER HOLMES POINT OVERLAY:	3,485 SF
LOT 7 AREA:	10,931 SF
MAX LOT COVERAGE 50%:	5,465 SF
MAXIMUM IMPERVIOUS COVERAGE PER HOLMES POINT OVERLAY:	3,493 SF
LOT 8 AREA:	10,995 SF
MAX LOT COVERAGE 50%:	5,497 SF
MAXIMUM IMPERVIOUS COVERAGE PER HOLMES POINT OVERLAY:	3,499 SF

PNA CALCULATIONS

LOT 1 AREA:	16,104 SF	LOT 5 AREA:	18,370 SF
PNA AREA REQUIRED::	(25%) 4,026 SF	PNA AREA REQUIRED::	(25%) 4,593 SF
PNA AREA PROVIDED:	4,315 SF	PNA AREA PROVIDED:	4,695 SF
LOT 2 AREA:	13,797 SF	LOT 6 AREA:	10,851 SF
PNA AREA REQUIRED::	(25%) 3,449 SF	PNA AREA REQUIRED::	(25%) 2,713 SF
PNA AREA PROVIDED:	3,499 SF	PNA AREA PROVIDED:	2,761 SF
LOT 3 AREA:	32,413 SF	LOT 7 AREA:	10,931 SF
PNA AREA REQUIRED::	(25%) 8,103 SF	PNA AREA REQUIRED::	(25%) 2,733 SF
PNA AREA PROVIDED:	8,310 SF	PNA AREA PROVIDED:	2,792 SF
LOT 4 AREA:	13,262 SF	LOT 8 AREA:	10,995 SF
PNA AREA REQUIRED::	(25%) 3,316 SF	PNA AREA REQUIRED::	(25%) 2,749 SF
PNA AREA PROVIDED:	3,316 SF	PNA AREA PROVIDED:	2,773 SF

FLOOR AREA RATIO CALCULATION

LOT 1 AREA:	16,104 SF	LOT 5 AREA:	18,370 SF
MAX FLOOR AREA RATIO:	50%	MAX FLOOR AREA RATIO:	50%
MAX LIVING AREA:	8,052 SF	MAX LIVING AREA:	9,185 SF
LOT 2 AREA:	13,797 SF	LOT 6 AREA:	10,851 SF
MAX FLOOR AREA RATIO:	50%	MAX FLOOR AREA RATIO:	50%
MAX LIVING AREA::	6,898 SF	MAX LIVING AREA:	5,425 SF
LOT 3 AREA:	32,413 SF	LOT 7 AREA:	10,931 SF
MAX FLOOR AREA RATIO:	50%	MAX FLOOR AREA RATIO:	50%
MAX LIVING AREA:	16,206 SF	MAX LIVING AREA:	5,465 SF
LOT 4 AREA:	13,262 SF	LOT 8 AREA:	10,995 SF
MAX FLOOR AREA RATIO:	50%	MAX LOT COVERAGE 50%:	50%
MAX LIVING AREA::	6,631 SF	MAX LIVING AREA:	5,497 SF

U. S. POSTAL SERVICE
APPROVED FOR MAILBOX LOCATION(S)

UNDERGROUND UTILITY NOTE

UNDERGROUND UTILITIES ARE SHOWN IN THE APPROXIMATE LOCATION. THERE IS NO GUARANTEE THAT ALL UTILITY LINES ARE SHOWN, OR THAT THE LOCATION, SIZE AND MATERIAL IS ACCURATE. THE CONTRACTOR SHALL UNCOVER ALL INDICATED PIPING WHERE CROSSING, INTERFERENCES, OR CONNECTIONS OCCUR PRIOR TO TRENCHING OR EXCAVATION FOR ANY PIPE OR STRUCTURES, TO DETERMINE ACTUAL LOCATIONS, SIZE AND MATERIAL. THE CONTRACTOR SHALL MAKE THE APPROPRIATE PROVISION FOR PROTECTION OF SAID FACILITIES. THE CONTRACTOR SHALL NOTIFY ONE CALL AT 8-1-1 (WASHINGTON811.COM) AND ARRANGE FOR FIELD LOCATION OF EXISTING FACILITIES BEFORE CONSTRUCTION.

BLUELINE
25 CENTRAL WAY, SUITE 400, KIRKLAND, WA 98033
P: 425.216.4051 F: 425.216.4052
WWW.THEBLUELINEGROUP.COM

SCALE: AS NOTED
PROJECT MANAGER: TODD A. OBERG, PE
PROJECT ENGINEER: TODD A. OBERG
DESIGNER: JUSTIN H. RODDA
ISSUE DATE: 11/11/2015

NO	DATE	BY	REVISIONS
1	8/20/15	JAR	REVISED PER MEETING WITH CITY ARBORIST

COVER SHEET
MACDONALD ESTATES
SHORT PLAT
PARCEL #4055700825
CITY OF KIRKLAND WASHINGTON

TODD A. OBERG
STATE OF WASHINGTON
21606
REGISTERED PROFESSIONAL ENGINEER

11/11/15

JOB NUMBER: 14-024
SHEET NAME: CV-01
SHT 1 OF 3

2x24
16 / 11, 2015 - 3:57pm - User JRodda
E:\Projects\14124 CMG Preliminary\Short Plat\South\14024CV.dwg

CITY OF KIRKLAND
Planning and Community Development Department
123 Fifth Avenue, Kirkland, WA 98033
425.587.3225 - www.kirklandwa.gov

SEPA ENVIRONMENTAL CHECKLIST

UPDATED MAY 2015

Purpose of checklist:

Governmental agencies use this checklist to help determine whether the environmental impacts of your proposal are significant. This information is also helpful to determine if available avoidance, minimization or compensatory mitigation measures will address the probable significant impacts or if an environmental impact statement will be prepared to further analyze the proposal.

Instructions for applicants:

This environmental checklist asks you to describe some basic information about your proposal. Please answer each question accurately and carefully, to the best of your knowledge. You may need to consult with an agency specialist or private consultant for some questions. You may use "not applicable" or "does not apply" only when you can explain why it does not apply and not when the answer is unknown. You may also attach or incorporate by reference additional studies reports. Complete and accurate answers to these questions often avoid delays with the SEPA process as well as later in the decision-making process.

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.

Instructions for Lead Agencies:

Please adjust the format of this template as needed. Additional information may be necessary to evaluate the existing environment, all interrelated aspects of the proposal and an analysis of adverse impacts. The checklist is considered the first but not necessarily the only source of information needed to make an adequate threshold determination. Once a threshold determination is made, the lead agency is responsible for the completeness and accuracy of the checklist and other supporting documents.

Use of checklist for nonproject proposals: [help]

For nonproject proposals (such as ordinances, regulations, plans and programs), complete the applicable parts of sections A and B plus the SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS (part D). Please completely answer all questions that apply and note that the words "project," "applicant," and "property or site" should be read as "proposal," "proponent," and "affected geographic area," respectively. The lead agency may exclude (for non-projects) questions in Part B - Environmental Elements –that do not contribute meaningfully to the analysis of the proposal.

A. Background [help]

1. Name of proposed project, if applicable: [help]
MacDonald North and South Short Plats

2. Name of applicant: [help]
William E Buchan, Inc.

3. Address and phone number of applicant and contact person: [help]
2630 116th Ave NE, Suite 100
Bellevue, WA 98004
425.828.6424
Greg Nelson

4. Date checklist prepared: [help]
6/25/2015

5. Agency requesting checklist: [help]
City of Kirkland

6. Proposed timing or schedule (including phasing, if applicable): [help]
The applicant will begin construction upon receiving all necessary approvals and permits. Conceptual start date is Spring/Summer of 2016.

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

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal. [help]
Survey, prepared by Mead Gilman. Arborist Report, prepared by Favero Greenforest. Critical Area Report, prepared by Altman Oliver Assocaites, LLC. Storm Drainage Report/Road-Utility Plans, prepared by The Blueline Group. Geotech Report, prepared by Terra Associates/S&EE, Inc., Traffic Memo, prepared by Traffex.

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. [help]
LLA15-00985 is pending approval with City of Kirkland.

10. List any government approvals or permits that will be needed for your proposal, if known. [help]
City of Kirkland-Lot Line Adjustment Approval. City of Kirkland - Subdivision Approval, SEPA Approval, Construction Drawing Approval, and Building Permit Approval. DOE-NOI. DNR-FPA (if necessary). Water and Sewer District Approval-Northshore Utility District.

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.) [help]

This proposal is to subdivide two parcels of land into two-8 lots short plats, all detached homes, within the RSA 4 zone. All lots will be served by a public road with direct access to 72nd Ave NE. The project will be served by public water and sewer and will include installation of the infrastructure needed to accommodate the site grading, frontage improvements to 72nd Ave NE, installation of utilities and construction of 16 single family residences.

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. [help]

The subject site is located within City of Kirkland in Section 25, Township 26 N, Range E E WM. The project is situated on two parcels, MacDonald North Short Plat parcel is approximately 2.3 acres and MacDonald South Short Plat parcel is approximately 4.04 acres (Pending the approval of LLA15-00982). Parcel numbers are 4055700826 (North) and 4055700825 (South), with a physical address of 12702 72nd Ave NE (North) and 12704 72nd Ave NE (South), Kirkland, WA 98034.

B. ENVIRONMENTAL ELEMENTS [help]

1. Earth [help]

a. General description of the site: [help]

(circle one): Flat, **rolling**, hilly, **steep slopes**, mountainous, other _____

b. What is the steepest slope on the site (approximate percent slope)? [help]

Generally the steepest slope on-site is approximately 85%, along the east potion of the site adjacent to the steep slope system.

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 agricultural land of long-term commercial significance and whether the proposal results in removing any of these soils. [help]

According to the Geotechnical Report prepared byTerra and Associates/ S&EE the onsite soils consists of top soil, silty sand, sand and gravel. See report for additional information.

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe. [help]

No.

e. Describe the purpose, type, total area, and approximate quantities and total affected area of any filling, excavation, and grading proposed. Indicate source of fill. [help]

Grading for the application will be limited to those areas identified for development of residential lots, roads, storm drainage and utility infrastructure in addition to home construction. Approximately, 13,000 CY of excavation and 4,000 CY of fill is proposed. Source of fill will be located during time of construction.

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe. [help]

Limited erosion could occur as a result of the initial construction, however erosion control measures will be utilized during construction phase to minimize potential erosion impacts.

Temporary erosion and sedimentation control plans will be submitted and approved by City of Kirkland.

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

The site will not exceed the maximum impervious surface area as allowed by City of Kirkland.

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any: [help]

A temporary erosion and sediment control plan designed in accordance with City of Kirkland standards will be employed during construction phase of the project.

2. Air [help]

a. What types of emissions to the air would result from the proposal during construction, operation, and maintenance when the project is completed? If any, generally describe and give approximate quantities if known. [help]

Heavy equipment operation and worker's vehicles would generate exhaust emissions into the local air. Construction activity on-site could also stir up exposed soils and generate dust in the local air. The completed project would result in a minor increase in the amount of exhaust related pollutants in the local air from project related traffic.

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe. [help]

No.

c. Proposed measures to reduce or control emissions or other impacts to air, if any: [help]

Watering on-site as necessary during construction phase of the project will help control dust and other particulates.

Watering on-site as necessary during construction phase of the project will help control dust and other particulates.

3. **Water** [help]

a. Surface Water:

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. [help]
Denny Creek is located approximately 450' east of the subject 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. [help]
No, there will be no work over, in, or adjacent to the offsite stream.

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. [help]
N/A

4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known. [help]
No.

5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan. [help]
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. [help]
No.

b. Ground Water:

1) Will groundwater be withdrawn from a well for drinking water or other purposes? If so, give a general description of the well, proposed uses and approximate quantities withdrawn from the well. Will water be discharged to groundwater? Give general description, purpose, and approximate quantities if known. [help]
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. [help]
There are two septic systems located onsite that will be abandon per King County Health Department Regulations.

c. Water runoff (including stormwater):

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. [help]

Runoff will be collected via tightline conveyance system and directed to on-site detention pond, discharge from this pond will be to the City of Kirkland storm system located in 72nd Ave NE. Refer to the Storm Drainage Report for additional information.

2) Could waste materials enter ground or surface waters? If so, generally describe. [help]
In accordance with City of Kirkland codes, TESC and BMP measures will be implemented to prevent waste materials from entering ground or surface waters during construction.

3) Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site? If so, describe. [help]

No.

d. Proposed measures to reduce or control surface, ground, and runoff water, and drainage pattern impacts, if any: [help]

Approved TESC BMP's will be provided in accordance with City of Kirkland codes to reduce and/or control runoff water impacts. Refer to the Storm Drainage Report for additional information.

4. **Plants** [help]

a. Check the types of vegetation found on the site: [help]

_X_ deciduous tree: alder, maple, aspen, other
_X_ evergreen tree: fir, cedar, pine, other
_X_ shrubs
_X_ grass
_X_ pasture
____ crop or grain
____ Orchards, vineyards or other permanent crops.
____ 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? [help]
To generate the site grade appropriate for the proposed buildings, all vegetation within the building pad and roadways will be removed with the exception of protected areas associated with the trees that are required to be retained in accordance with Kirkland zoning code.

c. List threatened and endangered species known to be on or near the site. [help]
There are no known threatened or endangered species known to be on or near the site.

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any: [help]
The ultimate development of new single family residences will provide new landscaping including such features as retained trees, new lawns, shrubs and ornamental trees.

e. List all noxious weeds and invasive species known to be on or near the site. [help]
There are no known noxious weeds or invasive species known to be on or near the site.

5. **Animals** [help]

a. List any birds and other animals which have been observed on or near the site or are known to be on or near the site. [help]

Examples include:

birds: hawk, heron, eagle, **songbirds**, other:
mammals: deer, bear, elk, beaver, **other: Deer, rodents, squirls and raccoons**
fish: bass, salmon, trout, herring, shellfish, other _____

b. List any threatened and endangered species known to be on or near the site. [help]
There are no known threatened or endangered species that have been observed on or near the site.

c. Is the site part of a migration route? If so, explain. [help]
The applicant is unaware if this site is part of a migration route.

d. Proposed measures to preserve or enhance wildlife, if any: [help]
The Steep Slope system onsite, will allow wildlife to continue to use these areas as habitate.

e. List any invasive animal species known to be on or near the site. [help]
There are no known invasive animal species known to be on or near the site.

6. **Energy and Natural Resources** [help]

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. [help]

Electrical and/or natural gas will be used to meet the energy needs of the new homes.

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe. [help]

The proposal will not affect the potential use of solar energy on adjacent properties.

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: [help]

The buildings will be constructed to meet or exceed applicable local, state and/or federal building code to ensure compliance with energy conservation standards.

7. **Environmental Health** [help]

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. [help]

State regulations regarding safety and the handling of hazardous material would be enforced during construction process.

1) Describe any known or possible contamination at the site from present or past uses. [help]

No known.

2) Describe existing hazardous chemicals/conditions that might affect project development and design. This includes underground hazardous liquid and gas transmission pipelines located within the project area and in the vicinity. [help]

Fuels associated with automobiles and construction machinery as well as typical household products (cleaners, adhesives, etc) may be present at the site. Natural gas may be utilized to fuel household appliances.

3) Describe any toxic or hazardous chemicals that might be stored, used, or produced during the project's development or construction, or at any time during the operating life of the project. [help]

State regulations regarding safety and the handling of hazardous material would be enforced during construction process.

4) Describe special emergency services that might be required. [help]

The construction of 16 dwelling units will likely increase the the need for emergency services. Necessary impact fees are in place with City of Kirkland to address the increased need of these services.

5) Proposed measures to reduce or control environmental health hazards, if any: [help]

Construction activity would be limited to hours as specified by City of Kirkland, which will mitigate the impact of potential construction noise.

b. Noise [help]

1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)? [help]

The dominant source of noise would be from traffic along 72nd Ave NE.

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. [help]

Construction activities on-site would temporarily increase the peak on-site noise levels. All construction will follow City of Kirkland approved hours of operation. The complete project would result in slight increase in ambient noise.

3) Proposed measures to reduce or control noise impacts, if any: [help]

Construction activity would be limited to hours as specified by City of Kirkland, which will mitigate the impact of potential construction noise.

8. **Land and Shoreline Use** [help]

a. What is the current use of the site and adjacent properties? Will the proposal affect current land uses on nearby or adjacent properties? If so, describe. [help]

The parcels currently have one single family residence, stable, guest house and pool. Adjacent properties are developed with single family residential homes.

b. Has the project site been used as working farmlands or working forest lands? If so, describe. How much agricultural or forest land of long-term commercial significance will be converted to other uses as a result of the proposal, if any? If resource lands have not been designated, how many acres in farmland or forest land tax status will be converted to nonfarm or nonforest use? [help]

No.

1) Will the proposal affect or be affected by surrounding working farm or forest land normal business operations, such as oversize equipment access, the application of pesticides, tilling, and harvesting? If so, how: [help]

No.

c. Describe any structures on the site. [help]

The parcels currently have one single family residence, stable, guest house and pool.

d. Will any structures be demolished? If so, what? [help]

All structures will be removed.

e. What is the current zoning classification of the site? [help]

RSA 4.

f. What is the current comprehensive plan designation of the site? [help]

Low density residential.

g. If applicable, what is the current shoreline master program designation of the site? [help]
N/A

h. Has any part of the site been classified as a critical area by the city or county? If so, specify. [help]
Yes, there is steep slope and associated buffer located on the subject site.

i. Approximately how many people would reside or work in the completed project? [help]
Assuming approximately 2.5 people would live in each of the new single family homes, it is estimated that a 40 people would reside in the completed project.

j. Approximately how many people would the completed project displace? [help]
Assuming approximately 2.5 people home onsite, the completed project would displace approximately 2.5 people.

k. Proposed measures to avoid or reduce displacement impacts, if any: [help]
The proposal includes the construction of 16 new dwelling units.

L. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any: [help]
The project will be developed in accordance with applicable City of Kirkland codes to ensure the project is consistent with the goals and policies of the Comprehensive Plan in place at the time of this application.

m. Proposed measures to ensure the proposal is compatible with nearby agricultural and forest lands of long-term commercial significance, if any: [help]
N/A

9. **Housing** [help]

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing. [help]
16 market rate homes will be provided.

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing. [help]
1 single family home will be removed, middle income home.

c. Proposed measures to reduce or control housing impacts, if any: [help]
Cosntruction of 16 new single family residence replacing the one existing residence.

10. **Aesthetics** [help]

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed? [help]

Final architectural plans have not been developed to date. However, the proposed development will be governed by height restrictions dictated by City of Kirkland Code.

b. What views in the immediate vicinity would be altered or obstructed? [help]

No view in the immediate vicinity would be altered. The street scape from the street will change with the new development.

b. Proposed measures to reduce or control aesthetic impacts, if any: [help]

The site plan has been developed to be consistent with the development regulations for an RSA 4, zoning district and short subdivision regulations.

11. **Light and Glare** [help]

a. What type of light or glare will the proposal produce? What time of day would it mainly occur? [help]

The completed project will generate limited light and glare as typically associates with residential development.

b. Could light or glare from the finished project be a safety hazard or interfere with views? [help]

Under normal circumstances it is not anticipated that light or glare from the finished project will present a safety hazard or block views.

c. What existing off-site sources of light or glare may affect your proposal? [help]

None known.

d. Proposed measures to reduce or control light and glare impacts, if any: [help]

No.

12. **Recreation** [help]

a. What designated and informal recreational opportunities are in the immediate vicinity? [help]

Denny Park is located east of the east property line.

Big Fin Park is located 500' to the east of the east property line.

b. Would the proposed project displace any existing recreational uses? If so, describe. [help]

No.

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any: [help]

The proposal will not impact any existing recreation use. Park Impact fees will be paid as required by City of Kirkland.

13. **Historic and cultural preservation** [help]

a. Are there any buildings, structures, or sites, located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers located on or near the site? If so, specifically describe. [help]

No.

b. Are there any landmarks, features, or other evidence of Indian or historic use or occupation? This may include human burials or old cemeteries. Are there any material evidence, artifacts, or areas of cultural importance on or near the site? Please list any professional studies conducted at the site to identify such resources. [help]

There are no landmarks or evidence of any significant historical, archaeological, scientific or cultural resources known to be on or next to the site.

c. Describe the methods used to assess the potential impacts to cultural and historic resources on or near the project site. Examples include consultation with tribes and the department of archeology and historic preservation, archaeological surveys, historic maps, GIS data, etc. [help]

If any cultural evidence was encountered during construction or installation of improvements, work would be halted in the area and a state approved archaeologist/historian would be engaged to investigate, evaluate and/or move or curate such resource as appropriate.

d. Proposed measures to avoid, minimize, or compensate for loss, changes to, and disturbance to resources. Please include plans for the above and any permits that may be required. [help]

If any cultural evidence was encountered during construction or installation of improvements, work would be halted in the area and a state approved archaeologist/historian would be engaged to investigate, evaluate and/or move or curate such resource as appropriate.

14. **Transportation** [help]

a. Identify public streets and highways serving the site or affected geographic area and describe proposed access to the existing street system. Show on site plans, if any. [help]

Primary access to the development will be from 72nd Ave NE.

b. Is the site or affected geographic area currently served by public transit? If so, generally describe. If not, what is the approximate distance to the nearest transit stop? [help]

No, closest transit service is approximate 2 miles to NE 132nd Street and 86th Place NE.

c. How many additional parking spaces would the completed project or non-project proposal have? How many would the project or proposal eliminate?

Approximately 2 parking spaces will be eliminated. Provided parking spaces will meet or exceed the minimum required per City of Kirkland standards.

d. Will the proposal require any new or improvements to existing roads, streets, pedestrian, bicycle or state transportation facilities, not including driveways? If so, generally describe (indicate whether public or private). [help]

The proposal will install a new public road with cul-de-sac.

e. Will the project or proposal use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe. [help]

No.

f. How many vehicular trips per day would be generated by the completed project or proposal? If known, indicate when peak volumes would occur and what percentage of the volume would be trucks (such as commercial and nonpassenger vehicles). What data or transportation models were used to make these estimates? [help]

The proposal will generate approximately 183 daily trips. There will be approximately 20 AM Peak Trips, and 19 PM Peak Trip. Construction traffic for these homes development may be temporarily greater than these numbers at times.

g. Will the proposal interfere with, affect or be affected by the movement of agricultural and forest products on roads or streets in the area? If so, generally describe. [help]

No.

h. Proposed measures to reduce or control transportation impacts, if any: [help]

The applicant will comply with City of Kirkland's Transportation Code and pay any required impact fees.

15. **Public Services** [help]

a. Would the project result in an increased need for public services (for example: fire protection, police protection, public transit, health care, schools, other)? If so, generally describe. [help]

There will be an increase in public service with the construction of 16 new single family homes.

b. Proposed measures to reduce or control direct impacts on public services, if any. [help]

The appropriate impact fees as required by City of Kirkland will assist with any direct impacts to public service.

16. **Utilities** [help]

a. Circle utilities currently available at the site: [help]
electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other **cable**

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. [help]

C. Signature [help]

The above answers 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: [signature]

Name of signee MOIRA HAUGHIAN

Position and Agency/Organization Planning Coordinator

Date Submitted: 6/30/2015

Reviewed 11/19/15
Planner: Susan Lauinger 425.587.3252

D. supplemental sheet for nonproject actions [help]

(**IT IS NOT NECESSARY** to use this sheet for project actions)

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment.

When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

1. How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?

Proposed measures to avoid or reduce such increases are:

2. How would the proposal be likely to affect plants, animals, fish, or marine life?

Proposed measures to protect or conserve plants, animals, fish, or marine life are:

3. How would the proposal be likely to deplete energy or natural resources?

Proposed measures to protect or conserve energy and natural resources are:

4. How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection; such as parks,

wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?

Proposed measures to protect such resources or to avoid or reduce impacts are:

5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?

Proposed measures to avoid or reduce shoreline and land use impacts are:

6. How would the proposal be likely to increase demands on transportation or public services and utilities?

Proposed measures to reduce or respond to such demand(s) are:

7. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.

TERRA ASSOCIATES, Inc.
Consultants in Geotechnical Engineering, Geology
and
Environmental Earth Sciences

November 10, 2015
Project No. T-7248

Mr. Greg Nelson
William Buchan Homes
2630 – 116th Avenue NE, #100
Bellevue, Washington 98004

Subject: Slope Stability
MacDonald Plat
12702 and 12704 – 72nd Avenue NE
Kirkland, Washington

References:
1. Geotechnical Slope Evaluation, MacDonald Plat, 12702 and 12704 – 72nd Avenue NE, Kirkland, Washington, prepared by Terra Associates, dated June 26, 2015
2. Report of Geotechnical Investigation, Proposed Subdivision Joan MacDonald Estates, King County, Washington, Project No. 538, prepared by S&EE, dated May 1, 2006

Dear Mr. Nelson:

As requested, we have reviewed public comments received by the City of Kirkland regarding slope stability concerns for the subject project. Two comments were received. The following outlines the comments and our response.

The first comment was from George Ploudre who resides at 7171 NE 126th Street. Mr. Ploudre indicated that two historic landslides occurred that affected the property that were not discussed in our referenced June 26 report. One slide impacted the Denny Creek channel which is located at the toe of the slope east of the MacDonald property. The second slide occurred in 1991 and was caused by runoff. Mr. Ploudre indicated this slide affected some of his property and a large portion of the county road and parkland.

During our reconnaissance of the property and slopes, we saw no evidence of sliding that has affected the subject property. We observed indications of numerous shallow ground movements on the steep ravine slopes throughout the Denny Creek drainage corridor, including areas adjacent to the eastern and southern sides of the MacDonald property. However, this is a natural geomorphologic process that typically occurs on steep slopes in Western Washington, and is not an indication of mass instability.

Based on information provided by the current land owner, the 1991 landslide Mr. Ploudre discussed occurred at the very end of 72nd Avenue NE approximately 400 feet south of the subject property. As indicated by Mr. Ploudre that slide was caused by runoff from a failed county storm drain. This was a manmade erosional event as opposed to being caused by unstable geology. Development of the site with properly designed, constructed and maintained storm drainage facilities will actually improve this condition and reduce the risk of future erosion impacts.

The second comment was from Kathleen Redmond who resides at 12805 Holiday Drive NE. Ms. Redmond mentioned a small but significant slide occurred approximately 12 years ago behind the existing pool house on the MacDonald property. Based on information from the current property owner this slide occurred sometime before 1997. The slide debris was composed waste material from horses including wet straw and manure that was placed in a pile near the slope crest. This pile eventually slid down the ravine slope and impacted the native vegetation and trees on the ravine slope face.

We observed remnant conditions of these surficial ground movements within a natural drainage/erosional feature on the slope located east-southeast of the existing barn in the northeastern portion of the site. These include indications of soil and/or other materials being pushed over the crest of the slope, deposits of loose, organic-rich soils containing scattered wood debris and brush, and minor amounts of residential debris in the upper to mid portions of the natural drainage/erosional feature, and an accumulation of soil, wood debris, and minor residential debris, including an automobile tire, at the toe of the slope. The lobe of material at the base of the slope appears to have extended into the Denny Creek channel altering its course of flow to the east by several feet. The conditions we observed on the slope are consistent with the current property owners description of the slide discussed above.

We did not observe any indications of deep seated instability, persistent wet soil conditions, or groundwater seepage on the slope. Additionally, we did not observe indications of any recent ground movements within the natural drainage/erosional feature, where the vast majority of the native forest and understory appears to have has recovered completely. The lobe extension into Denny Creek is currently stable and there are no indications of additional erosion. Based on our observations, it is our opinion that this occurrence resulted from ill-advised human activity at the top of the steep slope, and is not related to unstable geologic conditions.

In our referenced June 26, 2015 letter, based on our geologic reconnaissance of the property and information contained in the referenced May 1, 2006 report by S&EE, we recommended maintaining a minimum buffer distance of 10 feet from the steep slope crests to mitigate potential impacts to the steep slope stability from development activity. In their review, the City of Kirkland noted the previous S&EE report recommended a 25-foot buffer setback. Also in her comment letter to the city, Ms. Redmond noted that prior to annexation King County required a 100-foot buffer from the crest of the steep slopes. We would note that in the King County Code the required buffer from a landslide hazard area or steep slope hazard area is a minimum of 50 feet if a critical area report supporting a reduced buffer is not submitted (KCC 21A.24.280 and 21A.24.310). The 100-foot distance is for the building setback that the county may impose if the landslide hazard area has a vertical rise of 200 feet.

As requested by the city, the following provides additional information and analysis supporting our recommended buffer and building setback.

Supplemental Slope Stability Evaluation

In our June 26, 2015 letter, we referenced the USGS Geologic Map of the Kirkland Quadrangle which maps the area geology and provides an indication of soil conditions underlying the property and slopes. Equally important on these map publications is evidence or signs of unstable geology with mapped landslides. Figure 1 is a portion of this referenced USGS map showing the area geology with the approximate limits of the subject site. The mapped geology on the property was confirmed by the previous soil test pits and our recent subsurface explorations to consist of glacial sediments composed primarily of dense to very dense till and till-like silty sand with gravel (Qvt) overlying advance glacial outwash (Qva). The vast majority of the soils observed in our hand-excavated test holes on the mid to lower portions of the slope face are sand consistent with Qva.

These glacial sediments originated from melt water streams and were deposited in advance of the glacier and were subsequently over-ridden by the glacial ice sheet. Consequently they are highly consolidated and exhibit high shear strength characteristics. Note that the geologic mapping shows no areas of unstable ground or evidence of historic landslide events pre 1983 the year the map was published.

Recent advances in Lidar imagery also provide valuable data in identifying unstable slope areas. Attached figure 2 is a Lidar image of the site and surrounding properties. The imagery clearly shows the ravine slopes. Lacking are morphologic characteristics used to map landslides such as head scarps, hummocky topography, convex and concave slope areas, and midslope terraces. Our visual reconnaissance of the slopes confirms the absence of these landslide features. This is also consistent with our review of historic stereographic aerial photographs of the slope areas adjacent to the site.

To confirm the deeper subsurface soil/geologic conditions we investigated subsurface conditions on the steep slopes by drilling two 50-foot deep test borings at the top of the slope in the northeastern and southeastern portions of the site using a track-mounted drill rig and by hand excavating several shallow test holes on the slope face. The boring locations are shown on Figures 3 and 4. The soils observed in the borings are glacial deposits consisting of about 13 feet of medium dense to dense, till-like silty sand with gravel overlying dense to very dense silt and fine sand and very dense fine to medium sand. The very dense fine to medium sand observed below a depth of about 28 feet in both borings is interpreted to be Vashon advance outwash. The overlying soils in Boring B-1 are interpreted to be till or till-like deposits intermediate between till and outwash. The upper approximately 18 feet in Boring B-2 are interpreted to be ice contact deposits. We did not observe soil conditions in the borings that would be indicative of instability.

We observed wet soils in Boring B-1 between depths of about 30 feet and 40.5 feet; however, we did not observe groundwater seepage or indications of persistently wet soils on the slope face below Boring B-1. We did not observe groundwater or wet soils in Boring B-2.

Detailed descriptions of the soil conditions observed in the borings are presented on the attached Boring Logs.

Stability Analysis

We performed stability analyses of the steep slope areas bordering the proposed building areas using the computer program WinStabl. The soil parameters used for our analyses are based on field data and our past experience with similar soils. These parameters are shown on the attached WinStabl output text. Analyses were performed on section lines identified as Section A-A' and Section B-B' on Figures 3 and 4, respectively, for both static and pseudostatic (seismic) conditions for the existing slope conditions.

The pseudostatic analysis used a horizontal earthquake coefficient value of 0.2g to model ground motions expected from a severe earthquake. The USGS seismic hazard maps for a seismic event having a 10 percent probability of exceedance in a 50-year period indicates the subject site is located within an area where the peak horizontal ground acceleration for this return period is expected to range between 0.25g and 0.3g. Our analysis considered a horizontal acceleration exceeding one-half the maximum value of this range. The lowest safety factors determined by our analyses are given below:

Section Analyzed	Minimum Safety Factors	
	Static	Pseudostatic
A-A'	2.24	1.37
A-A' Upper Slope	1.88	1.26
B-B'	1.74	1.17
B-B' Upper Slope	1.73	1.20

The results of the stability analyses indicate that the slope areas are stable with respect to deep-seated failure under static and pseudostatic conditions. The safety factors listed above are all higher than the minimum safety factors considered acceptable for stable slopes by local geotechnical engineering practice.

Conclusions

Based on our supplemental study and analysis the eastern and southern slopes are comprised of stable geologic conditions and only fall into a high landslide hazard category as defined by the Kirkland Municipal Code because the slope inclination is 40 percent or greater. As indicated in our referenced letter current impacts to the slope areas are due to erosion from uncontrolled runoff. In our opinion, development of the property will largely mitigate this process with design and construction of stormwater facilities that will collect, detain, and direct discharge to approved points of controlled discharge.

Based on our supplemental study, it is our opinion that along with these improved site drainage measures, a native vegetated buffer zone of ten feet from the slope crest, along with a building setback distance of ten feet from this buffer, would adequately mitigate the steep slope hazard. Vegetation in the buffer zone and on the slopes themselves should remain undisturbed.

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

Sincerely yours,
TERRA ASSOCIATES, INC.

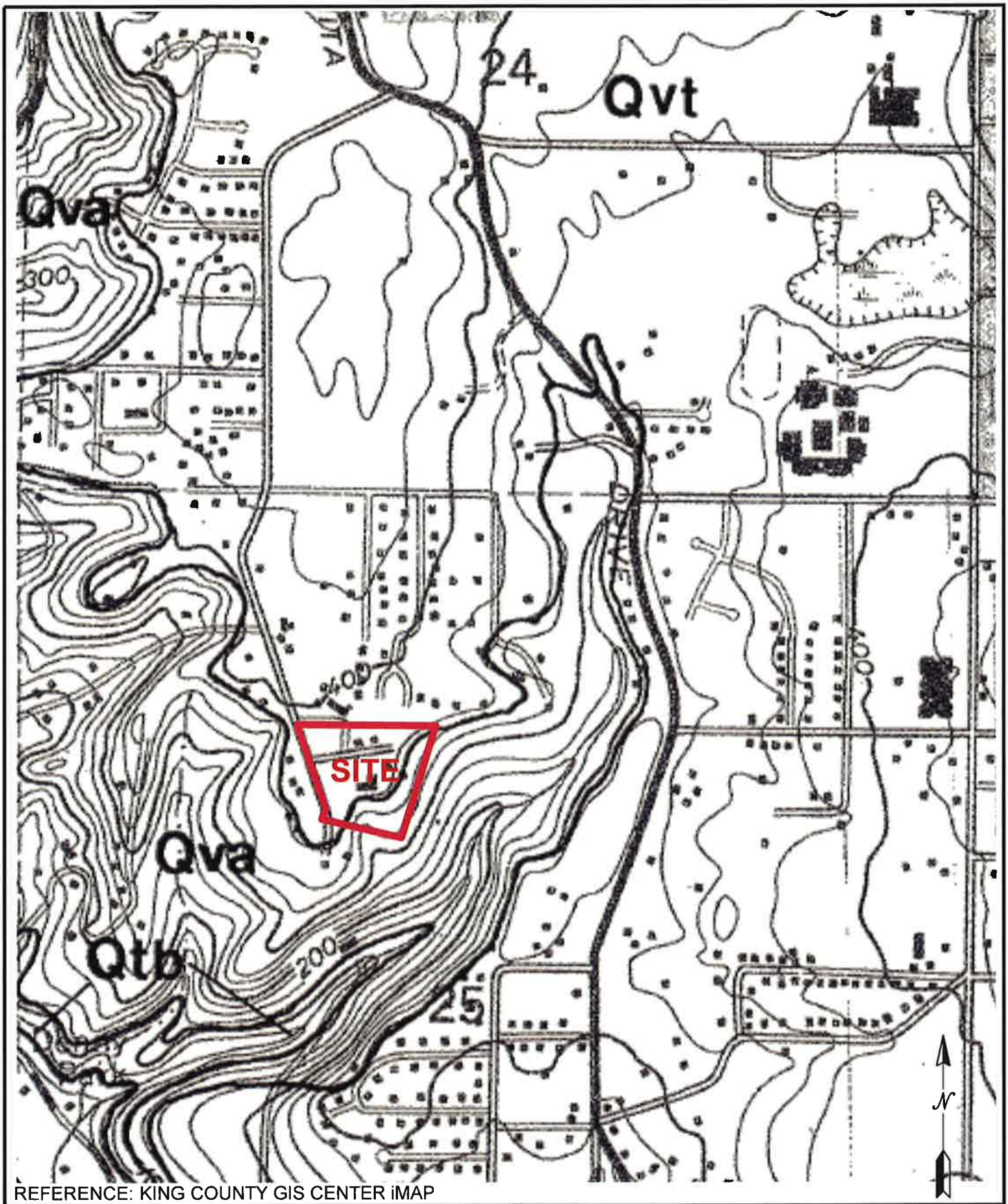
John C. Sadler, L.E.G., L.H.G.
Engineering Geologist

11-10-15

Theodore Schepper, P.E.
President

Attachments: Figure 1 – Geologic Map
Figure 2 – Site Map with Lidar Imagery
Figures 3 and 4 – Geologic Sections A-A' and B-B'
Figure 5 – Unified Soils Classification System
Figures 6 and 7 – Boring Logs
WinStabl Output Data

cc: Moira Haughian, Blueline Group

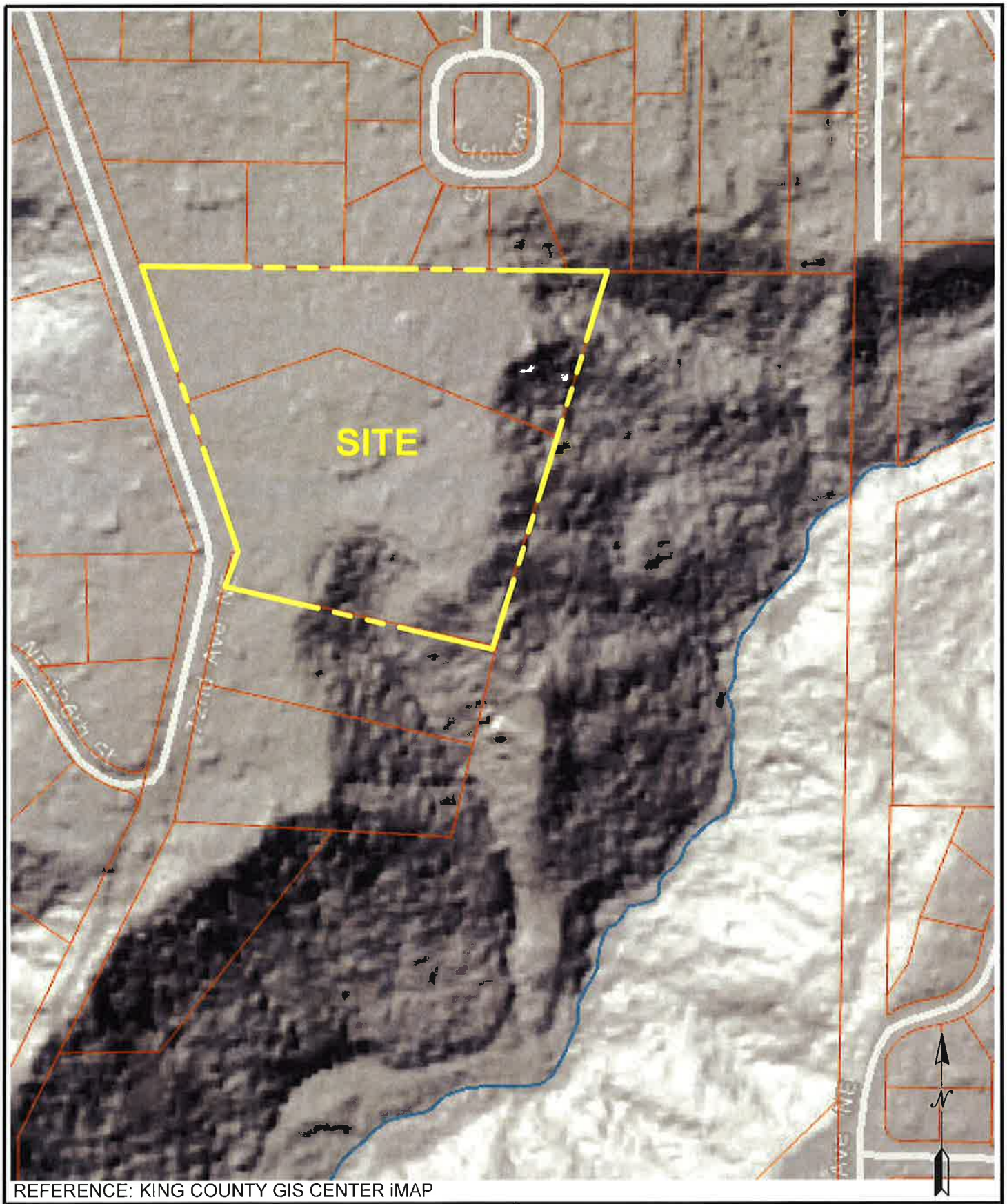


REFERENCE: KING COUNTY GIS CENTER iMAP

Terra Associates, Inc.
Consultants in Geotechnical Engineering
Geology and
Environmental Earth Sciences

GEOLOGIC MAP
MACDONALD PLAT
KIRKLAND, WASHINGTON

Proj. No.T-7248	Date NOV 2015	Figure 1



REFERENCE: KING COUNTY GIS CENTER iMAP

Terra Associates, Inc.
Consultants in Geotechnical Engineering
Geology and
Environmental Earth Sciences

LIDAR IMAGERY
MACDONALD PLAT
KIRKLAND, WASHINGTON

Proj. No.T-7248	Date NOV 2015	Figure 2

BARN

A'

B-1

GARAGE

POOL HOUSE

SITE

HOUSE

DENNY CREEK

A

NOTE:

THIS SITE PLAN IS SCHEMATIC. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE. IT IS INTENDED FOR REFERENCE ONLY AND SHOULD NOT BE USED FOR DESIGN OR CONSTRUCTION PURPOSES.

REFERENCE:

KING COUNTY iMAP

LEGEND:

APPROXIMATE BORING LOCATION

0 60 120

APPROXIMATE SCALE IN FEET

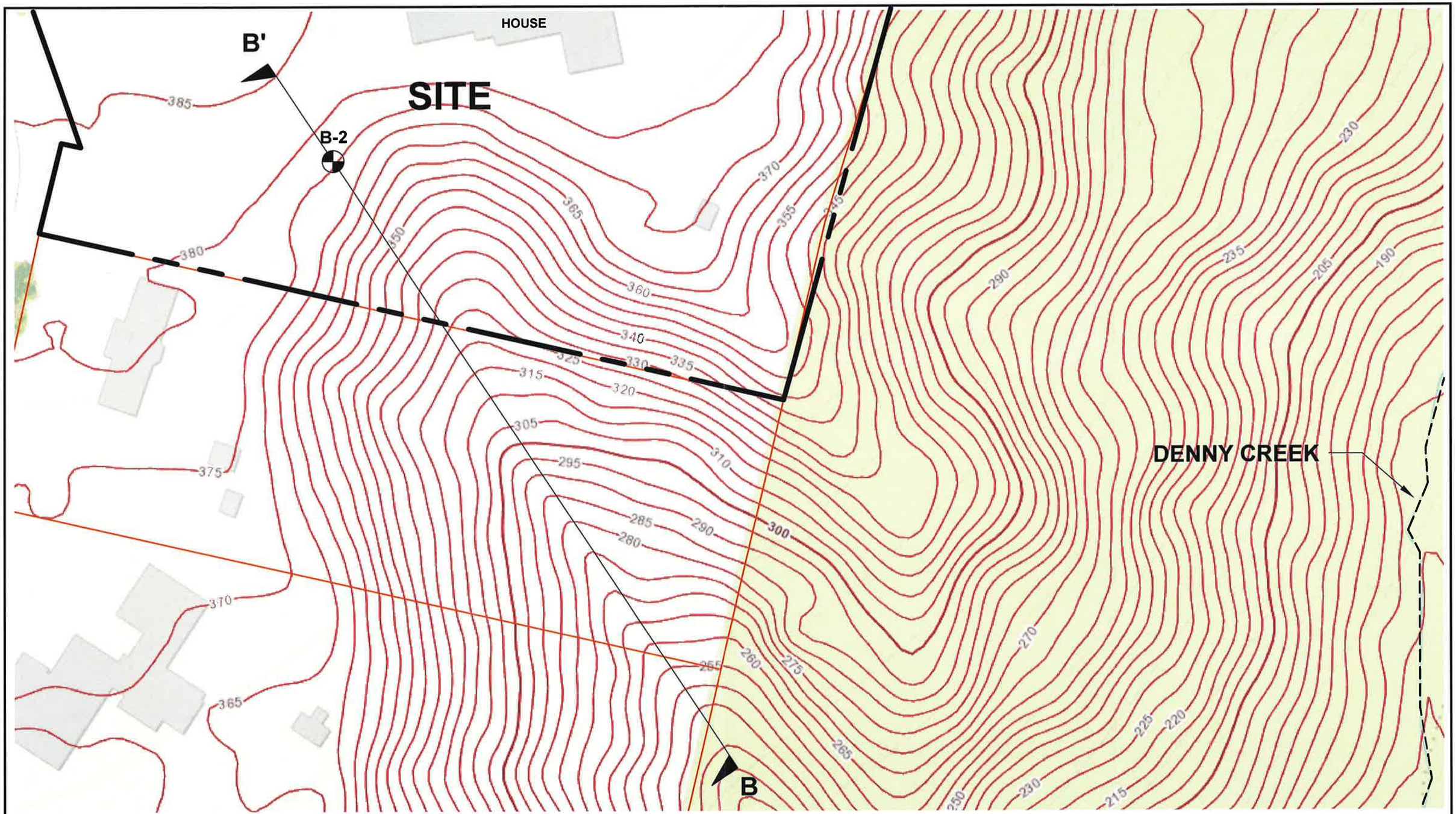
N

Terra Associates, Inc.

Consultants in Geotechnical Engineering
Geology and
Environmental Earth Sciences

GEOLOGIC SECTION A-A'
MACDONALD PLAT
KIRKLAND, WASHINGTON

Proj. No.T-7248	Date NOV 2015	Figure 3



NOTE:

THIS SITE PLAN IS SCHEMATIC. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE. IT IS INTENDED FOR REFERENCE ONLY AND SHOULD NOT BE USED FOR DESIGN OR CONSTRUCTION PURPOSES.

REFERENCE:

KING COUNTY iMAP

LEGEND:

APPROXIMATE BORING LOCATION

0 50 100

APPROXIMATE SCALE IN FEET

N

Terra Associates, Inc.

Consultants in Geotechnical Engineering
Geology and
Environmental Earth Sciences

GEOLOGIC SECTION B-B'
MACDONALD PLAT
KIRKLAND, WASHINGTON

Proj. No. T-7248	Date NOV 2015	Figure 4

MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTION
COARSE GRAINED SOILS More than 50% material larger than No. 200 sieve size	**GRAVELS** More than 50% of coarse fraction is larger than No. 4 sieve	Clean Gravels (less than 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 (less than 5% fines)	SW	Well-graded sands, sands with gravel, little or no fines.
			SP	Poorly-graded sands, sands with gravel, 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 size	**SILTS AND CLAYS** Liquid Limit is 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 Limit is greater than 50%		MH	Inorganic silts, elastic.
			CH	Inorganic clays of high plasticity. (Fat clay)
			OH	Organic clays of high plasticity.
HIGHLY ORGANIC SOILS			PT	Peat.

DEFINITION OF TERMS AND SYMBOLS

COHESIONLESS

Density	Standard Penetration Resistance in Blows/Foot
Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	>50

COHESIVE

Consistancy	Standard Penetration Resistance in Blows/Foot
Very Soft	0-2
Soft	2-4
Medium Stiff	4-8
Stiff	8-16
Very Stiff	16-32
Hard	>32

I	2" OUTSIDE DIAMETER SPILT SPOON SAMPLER
II	2.4" INSIDE DIAMETER RING SAMPLER OR SHELBY TUBE SAMPLER
▼	WATER LEVEL (Date)
Tr	TORVANE READINGS, tsf
Pp	PENETROMETER READING, tsf
DD	DRY DENSITY, pounds per cubic foot
LL	LIQUID LIMIT, percent
PI	PLASTIC INDEX
N	STANDARD PENETRATION, blows per foot

Terra Associates, Inc.
Consultants in Geotechnical Engineering Geology and Environmental Earth Sciences

UNIFIED SOIL CLASSIFICATION SYSTEM
MACDONALD PLAT
KIRKLAND, WASHINGTON

Proj. No.T-7248	Date NOV 2015	Figure 5

LOG OF BORING NO. 1

Figure No. 6

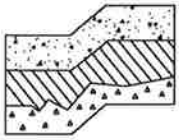
Project: MacDonald Plat **Project No:** T-7248 **Date Drilled:** October 30, 2015

Client: William Buchan Homes **Driller:** BORETEC **Logged By:** JCS

Location: Kirkland, Washington **Approx. Elev:** 389 Feet

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	Pocket Penetrometer TSF / SPT (N) Blows/ft	Moisture Content % Wp |-----x-----| Wl
1–4		Gray silty SAND with gravel, moist, trace of mottling. (SM) (Weathered till)	Medium Dense	23	
5–6					
7–8					
9–10		Gray silty SAND with gravel, moist. (SM) (Till-like)	Dense	47	
11–13					
14–15		Gray-brown fine sandy SILT to silty fine SAND, moist, scattered to numerous stratified gray silt and fine sand partings and seams. (ML/SM)	Very Dense	69	
16–20					
21		- Scattered coarse sand between 21 and 21.4 feet.		84/11"	
22–25					
26–28				80/10"	
29–30		Gray-brown fine to medium SAND with gravel, wet, trace to scattered silty fine sand partings, seams, and layers. (SP) *Continued on Next Page		69	

Note: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpeted as being indicative of other areas of the site.



Terra Associates, Inc.
Consultants in Geotechnical Engineering, Geology and Environmental Earth Sciences

LOG OF BORING NO. 1

Figure No. 6

Project: MacDonald Plat **Project No:** T-7248 **Date Drilled:** October 30, 2015

Client: William Buchan Homes **Driller:** BORETEC **Logged By:** JCS

Location: Kirkland, Washington **Approx. Elev:** 389 Feet

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	Pocket Penetrometer △ TSF △ 1 2 3 4 / SPT (N) • Blows/ft • 10 20 30 40	Moisture Content % Wp |-----x-----| Wl 10 20 30 40
31–39		Gray-brown fine to medium SAND with gravel, wet, trace to scattered silty fine sand partings, seams, and layers. (SP)	Very Dense	69; 50/4"; 50/5"	
40–50		Gray-brown fine to medium SAND to fine to medium SAND with gravel, moist to wet. (SP)		74; 50/6"	
51		Boring terminated at 51 feet. Wet soils encountered below about 30 feet.			

Note: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpeted as being indicative of other areas of the site.

Terra Associates, Inc.
Consultants in Geotechnical Engineering, Geology and Environmental Earth Sciences

LOG OF BORING NO. 2

Figure No. 7

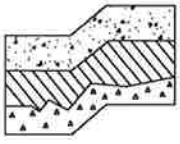
Project: MacDonald Plat **Project No:** T-7248 **Date Drilled:** October 30, 2015

Client: William Buchan Homes **Driller:** Boretec **Logged By:** JCS

Location: Kirkland, Washington **Approx. Elev:** 380

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	Pocket Penetrometer △ TSF △ 1 2 3 4 / SPT (N) • Blows/ft • 10 20 30 40	Moisture Content % Wp |-----x-----| Wl 10 20 30 40
1–4					
4			Very Dense		
5				50/6"	
6		Gray-brown to gray silty SAND with gravel, moist. (SM)			
7–9					
10				37	
10–11		- Mottled. Appears reworked.			
12			Dense		
13					
14				34	
15–16		Gray-brown SILT to fine sandy SILT, moist, scattered fine sand seams and light gray silt partings, significant iron-oxide staining, appears reworked. (ML)			
17–18					
19					
20		Gray to gray-brown silty GRAVEL with sand, moist, subrounded to subangular gravel. (GM)		50/6"	
21–23					
24			Very Dense		
25		Gray-brown silty fine to medium SAND to fine to medium SAND with silt, trace of gravel, moist, grading cleaner with depth. (SM/SP-SM)		63	
26–28					
29		Gray-brown fine to medium SAND to fine to medium SAND with silt, trace to scattered gravel, moist. (SP/SP-SM)			
30		*Continued on Next Page		50/6"	

Note: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpeted as being indicative of other areas of the site.



Terra Associates, Inc.
Consultants in Geotechnical Engineering, Geology and Environmental Earth Sciences

LOG OF BORING NO. 2

Figure No. 7

Project: MacDonald Plat **Project No:** T-7248 **Date Drilled:** October 30, 2015

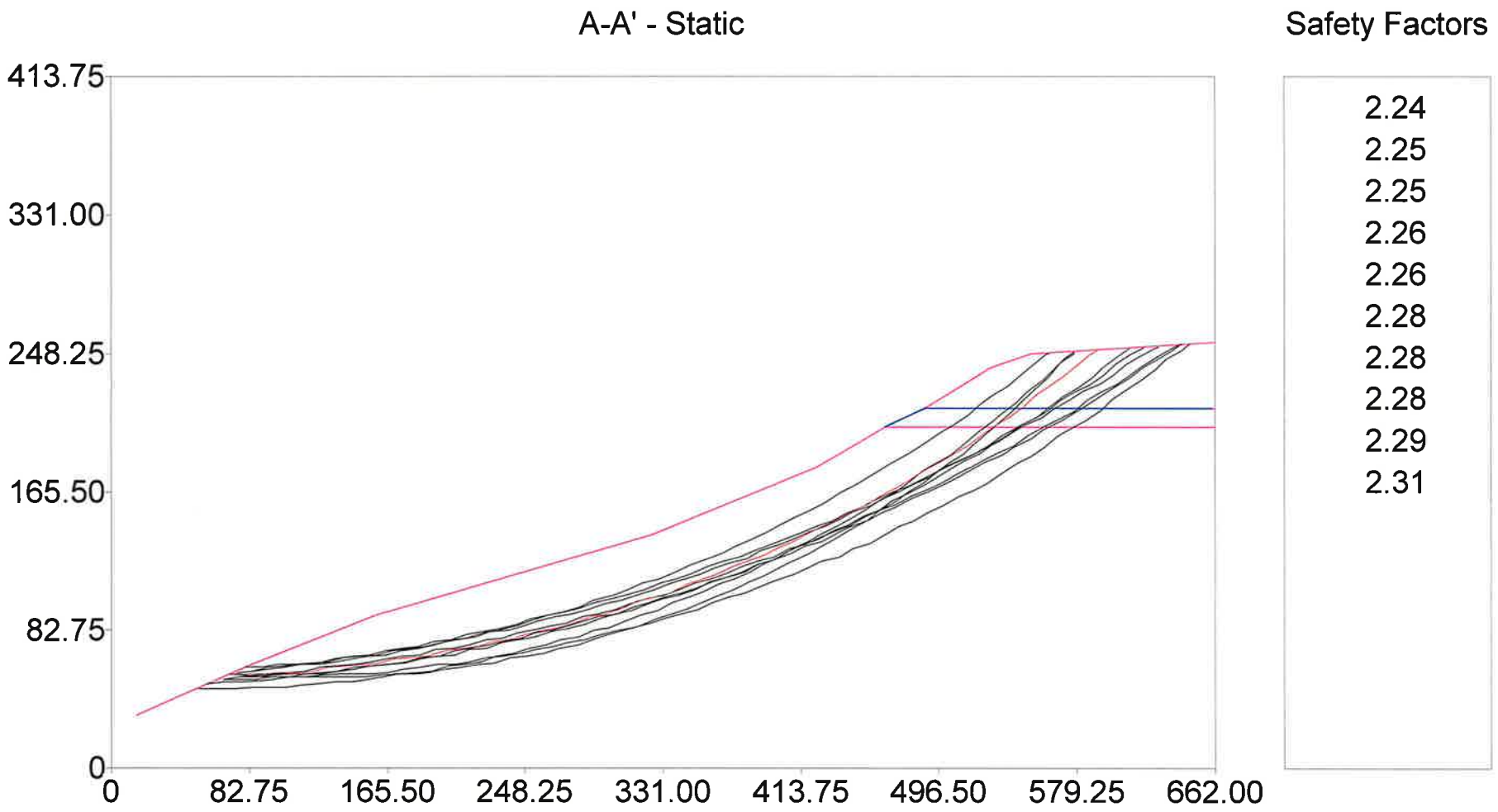
Client: William Buchan Homes **Driller:** Boretec **Logged By:** JCS

Location: Kirkland, Washington **Approx. Elev:** 380

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	Pocket Penetrometer △ TSF △ 1 2 3 4 / SPT (N) • Blows/ft • 10 20 30 40	Moisture Content % Wp |-----x-----| Wl 10 20 30 40
31–48		Gray-brown fine to medium SAND to fine to medium SAND with silt, trace to scattered gravel, moist. (SP/SP-SM)	Very Dense	50/6" at 31; 50/4" Bouncing at 35; 90 at 40	
48–51		Gray-brown fine to coarse SAND, trace of fine gravel, moist. (SP)		50/5" at 45; 88 at 50	
52–60		Boring terminated at 51.5 feet. No groundwater or wet soils observed.			

Note: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpeted as being indicative of other areas of the site.

Terra Associates, Inc.
Consultants in Geotechnical Engineering, Geology and Environmental Earth Sciences


A-A' - Static
Safety Factors
413.75
331.00
248.25
165.50
82.75
0
0
82.75
165.50
248.25
331.00
413.75
496.50
579.25
662.00
2.24
2.25
2.25
2.26
2.26
2.28
2.28
2.28
2.29
2.31

** PCSTABL6 **

by
Purdue University

modified by
Peter J. Bosscher
University of Wisconsin-Madison

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

PROBLEM DESCRIPTION **MacDonald Plat A-A' - Static**

BOUNDARY COORDINATES

9 Top Boundaries
11 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	16.00	32.00	80.00	60.00	3
2	80.00	60.00	160.00	92.00	3
3	160.00	92.00	324.00	140.00	3
4	324.00	140.00	424.00	180.00	3
5	424.00	180.00	464.00	204.00	3
6	464.00	204.00	488.00	216.00	2
7	488.00	216.00	528.00	240.00	1
8	528.00	240.00	552.00	248.00	1
9	552.00	248.00	662.00	256.00	1
10	488.00	216.00	662.00	216.00	2
11	464.00	204.00	662.00	204.00	3

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	125.0	125.0	500.0	40.0	0.00	0.0	0
2	125.0	135.0	100.0	38.0	0.00	0.0	1
3	125.0	125.0	100.0	38.0	0.00	0.0	0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 3 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	464.00	204.00
2	488.00	216.00
3	660.00	216.00

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between X = 40.00 ft.
and X = 80.00 ft.

Each Surface Terminates Between X = 552.00 ft.
and X = 660.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 2.00 ft.

10.00 ft. Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method *
*

Failure Surface Specified By 58 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	71.11	56.11
2	81.10	56.49
3	91.09	56.98
4	101.07	57.59
5	111.05	58.31
6	121.01	59.15
7	130.97	60.10
8	140.91	61.17
9	150.84	62.35
10	160.76	63.64
11	170.66	65.06
12	180.54	66.58
13	190.40	68.22
14	200.25	69.97
15	210.07	71.84
16	219.88	73.82
17	229.65	75.91

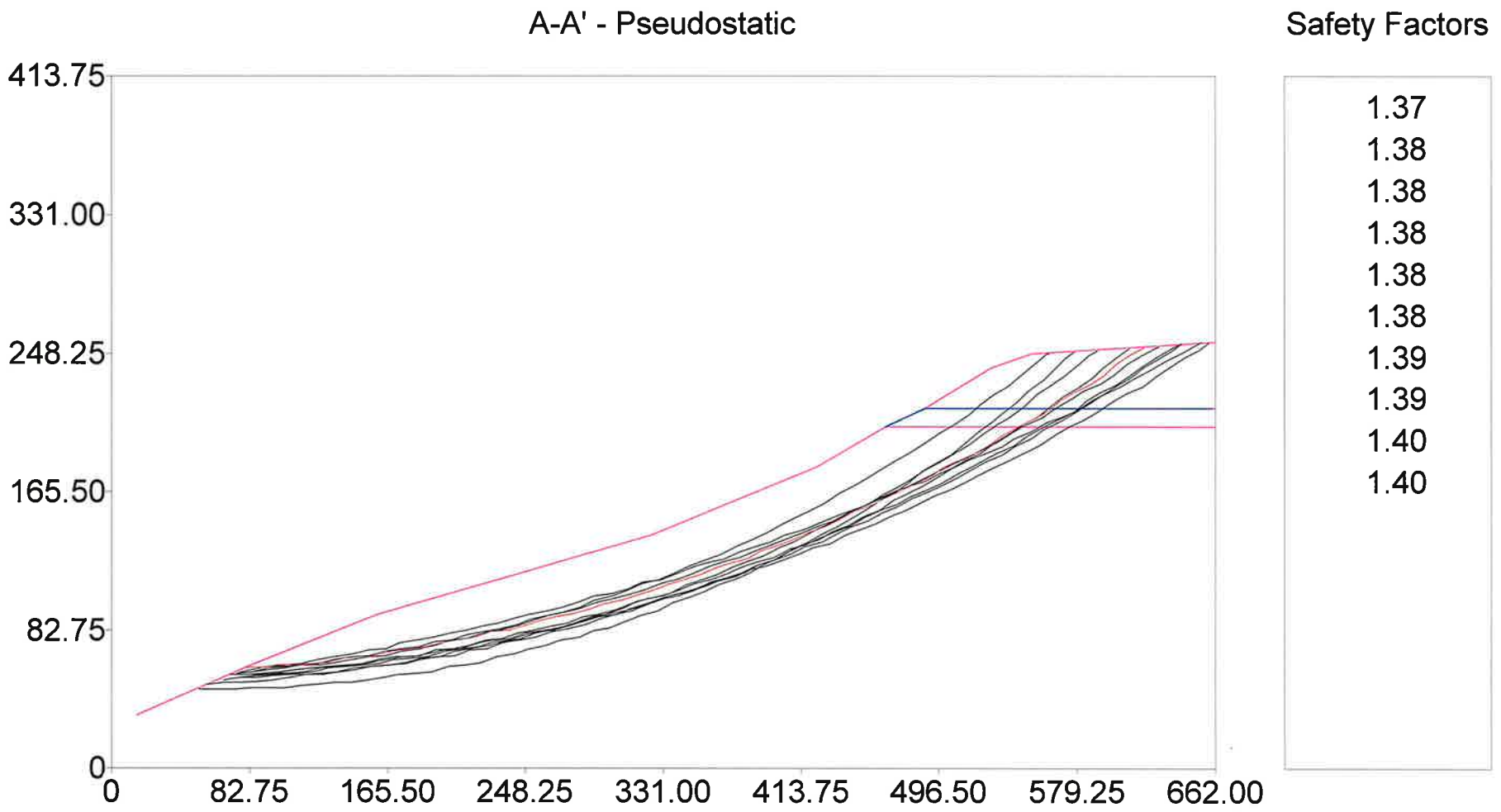
18	239.41	78.11
19	249.14	80.43
20	258.84	82.86
21	268.51	85.40
22	278.15	88.05
23	287.76	90.81
24	297.34	93.69
25	306.88	96.67
26	316.39	99.77
27	325.87	102.97
28	335.30	106.28
29	344.70	109.71
30	354.05	113.24
31	363.37	116.87
32	372.64	120.62
33	381.87	124.47
34	391.05	128.43
35	400.19	132.49
36	409.28	136.66
37	418.32	140.93
38	427.31	145.31
39	436.25	149.79
40	445.14	154.37
41	453.97	159.06
42	462.75	163.84
43	471.48	168.73
44	480.15	173.72
45	488.75	178.81
46	497.30	184.00
47	505.79	189.28
48	514.22	194.66
49	522.59	200.14
50	530.89	205.72
51	539.12	211.39
52	547.29	217.16
53	555.40	223.02
54	563.43	228.97
55	571.40	235.02
56	579.29	241.15
57	587.12	247.38
58	591.39	250.86

Circle Center At X = 43.5 ; Y = 922.4 and Radius, 866.7

*** 2.236 ***

Failure Surface Specified By 60 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	66.67	54.17
2	76.66	54.53


A-A' - Pseudostatic
Safety Factors
413.75
331.00
248.25
165.50
82.75
0
0
82.75
165.50
248.25
331.00
413.75
496.50
579.25
662.00
1.37
1.38
1.38
1.38
1.38
1.38
1.39
1.39
1.40
1.40

** PCSTABL6 **

by
Purdue University

modified by
Peter J. Bosscher
University of Wisconsin-Madison

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

PROBLEM DESCRIPTION **MacDonald Plat A-A' - Pseudostatic**

BOUNDARY COORDINATES

9 Top Boundaries
11 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	16.00	32.00	80.00	60.00	3
2	80.00	60.00	160.00	92.00	3
3	160.00	92.00	324.00	140.00	3
4	324.00	140.00	424.00	180.00	3
5	424.00	180.00	464.00	204.00	3
6	464.00	204.00	488.00	216.00	2
7	488.00	216.00	528.00	240.00	1
8	528.00	240.00	552.00	248.00	1
9	552.00	248.00	662.00	256.00	1
10	488.00	216.00	662.00	216.00	2
11	464.00	204.00	662.00	204.00	3

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	125.0	125.0	500.0	40.0	0.00	0.0	0
2	125.0	135.0	100.0	38.0	0.00	0.0	1
3	125.0	125.0	100.0	38.0	0.00	0.0	0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 3 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	464.00	204.00
2	488.00	216.00
3	660.00	216.00

A Horizontal Earthquake Loading Coefficient
Of0.200 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0 psf

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between X = 40.00 ft.
and X = 80.00 ft.

Each Surface Terminates Between X = 552.00 ft.
and X = 660.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 2.00 ft.

10.00 ft. Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

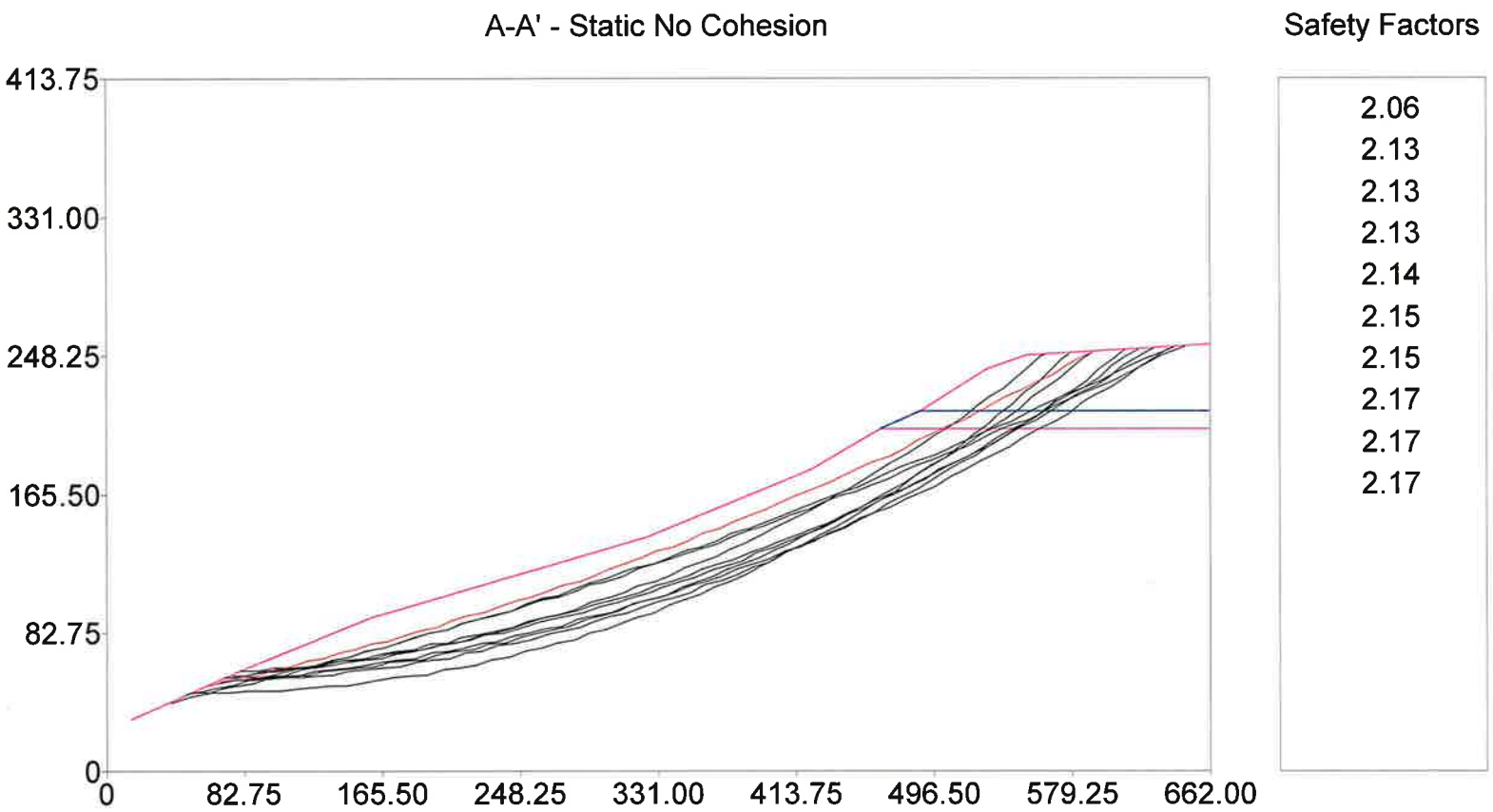
Failure Surface Specified By 60 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	80.00	60.00
2	89.97	60.79
3	99.93	61.68
4	109.88	62.66
5	119.82	63.73
6	129.76	64.89
7	139.68	66.14
8	149.59	67.48
9	159.48	68.92
10	169.37	70.45
11	179.23	72.07

12	189.09	73.78
13	198.92	75.58
14	208.74	77.47
15	218.54	79.46
16	228.33	81.53
17	238.09	83.70
18	247.83	85.95
19	257.55	88.29
20	267.25	90.73
21	276.93	93.25
22	286.58	95.87
23	296.21	98.57
24	305.81	101.36
25	315.39	104.24
26	324.94	107.21
27	334.46	110.27
28	343.95	113.41
29	353.41	116.65
30	362.85	119.97
31	372.25	123.37
32	381.62	126.87
33	390.95	130.45
34	400.26	134.12
35	409.53	137.87
36	418.76	141.71
37	427.96	145.63
38	437.12	149.64
39	446.24	153.73
40	455.33	157.91
41	464.37	162.17
42	473.38	166.52
43	482.35	170.95
44	491.27	175.46
45	500.16	180.05
46	508.99	184.73
47	517.79	189.48
48	526.54	194.32
49	535.25	199.24
50	543.91	204.24
51	552.52	209.32
52	561.09	214.48
53	569.61	219.71
54	578.08	225.03
55	586.50	230.43
56	594.87	235.90
57	603.19	241.45
58	611.46	247.07
59	619.67	252.78
60	619.90	252.94

Circle Center At X = -0.7 ; Y = 1137.8 and Radius, 1080.8

*** 1.374 ***


A-A' - Static No Cohesion
Safety Factors
413.75
331.00
248.25
165.50
82.75
0
0
82.75
165.50
248.25
331.00
413.75
496.50
579.25
662.00
2.06
2.13
2.13
2.13
2.14
2.15
2.15
2.17
2.17
2.17

** PCSTABL6 **

by
Purdue University

modified by
Peter J. Bosscher
University of Wisconsin-Madison

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

PROBLEM DESCRIPTION **MacDonald Plat**
A-A' - Static No Cohesion

BOUNDARY COORDINATES

9 Top Boundaries
11 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	16.00	32.00	80.00	60.00	3
2	80.00	60.00	160.00	92.00	3
3	160.00	92.00	324.00	140.00	3
4	324.00	140.00	424.00	180.00	3
5	424.00	180.00	464.00	204.00	3
6	464.00	204.00	488.00	216.00	2
7	488.00	216.00	528.00	240.00	1
8	528.00	240.00	552.00	248.00	1
9	552.00	248.00	662.00	256.00	1
10	488.00	216.00	662.00	216.00	2
11	464.00	204.00	662.00	204.00	3

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	125.0	125.0	0.0	40.0	0.00	0.0	0
2	125.0	135.0	0.0	38.0	0.00	0.0	1
3	125.0	125.0	0.0	38.0	0.00	0.0	0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 3 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	464.00	204.00
2	488.00	216.00
3	660.00	216.00

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between X = 40.00 ft.
and X = 80.00 ft.

Each Surface Terminates Between X = 552.00 ft.
and X = 660.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 2.00 ft.

10.00 ft. Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

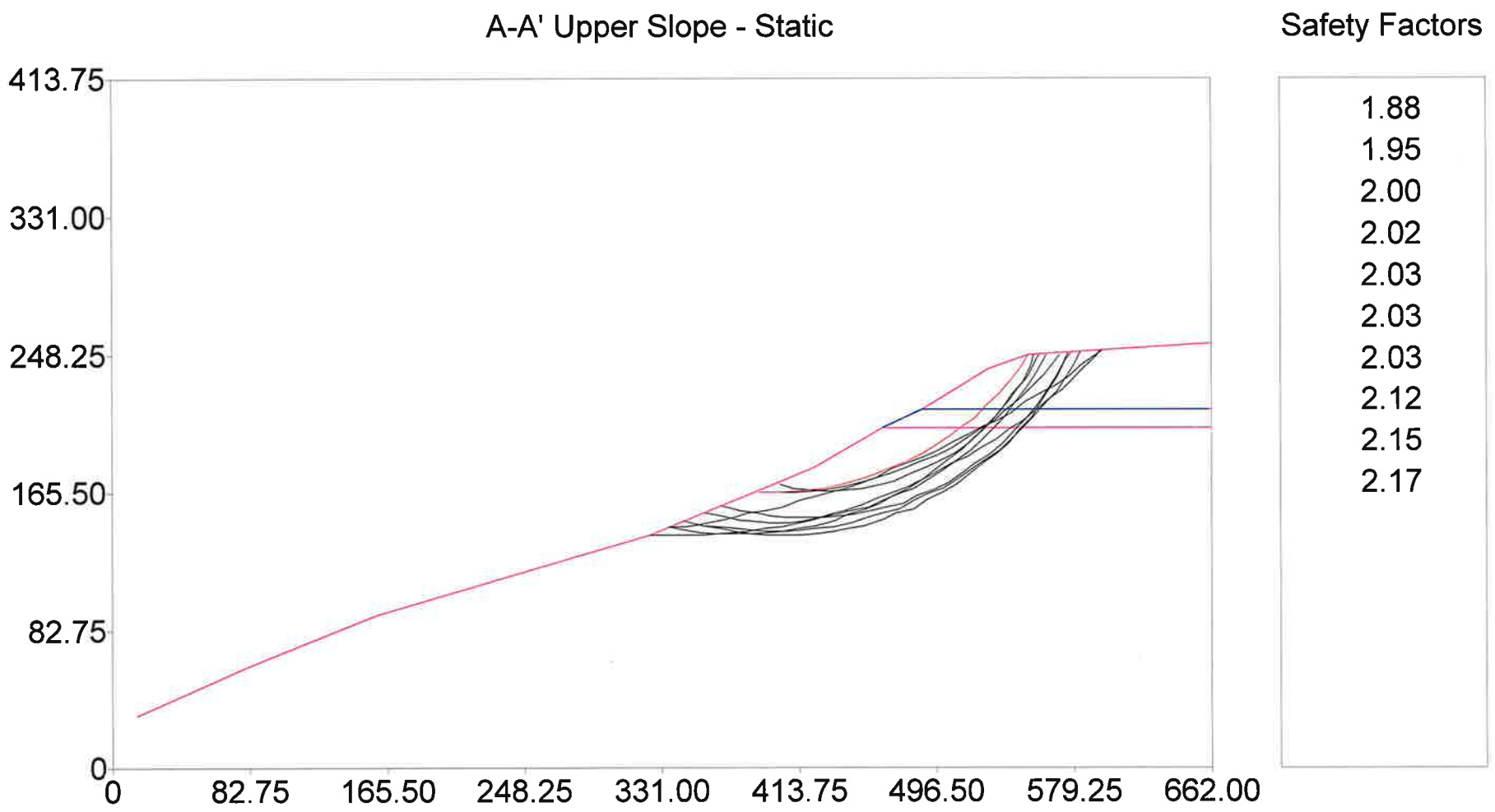
Failure Surface Specified By 58 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	62.22	52.22
2	71.98	54.39
3	81.73	56.61
4	91.47	58.88
5	101.20	61.20
6	110.92	63.56
7	120.62	65.98
8	130.31	68.44
9	139.99	70.95
10	149.66	73.52
11	159.31	76.13
12	168.95	78.78

13	178.58	81.49
14	188.19	84.25
15	197.79	87.05
16	207.38	89.90
17	216.95	92.80
18	226.50	95.75
19	236.04	98.74
20	245.57	101.79
21	255.08	104.88
22	264.57	108.02
23	274.05	111.21
24	283.51	114.44
25	292.96	117.72
26	302.39	121.05
27	311.80	124.43
28	321.20	127.85
29	330.58	131.32
30	339.94	134.84
31	349.28	138.41
32	358.60	142.02
33	367.91	145.68
34	377.20	149.39
35	386.47	153.14
36	395.72	156.94
37	404.95	160.78
38	414.16	164.68
39	423.35	168.62
40	432.52	172.60
41	441.68	176.63
42	450.81	180.71
43	459.92	184.83
44	469.01	189.00
45	478.08	193.21
46	487.12	197.47
47	496.15	201.78
48	505.15	206.13
49	514.14	210.52
50	523.10	214.96
51	532.03	219.45
52	540.95	223.98
53	549.84	228.55
54	558.71	233.17
55	567.55	237.84
56	576.38	242.55
57	585.17	247.30
58	591.74	250.89

Circle Center At X = -364.5 ; Y = 1994.6 and Radius, 1988.7

*** 2.063 ***


A-A' Upper Slope - Static
Safety Factors
1.88
1.95
2.00
2.02
2.03
2.03
2.03
2.12
2.15
2.17
413.75
331.00
248.25
165.50
82.75
0
0
82.75
165.50
248.25
331.00
413.75
496.50
579.25
662.00

** PCSTABL6 **

by
Purdue University

modified by
Peter J. Bosscher
University of Wisconsin-Madison

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

PROBLEM DESCRIPTION **MacDonald Plat A-A' Upper Slope - Static**

BOUNDARY COORDINATES

9 Top Boundaries
11 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	16.00	32.00	80.00	60.00	3
2	80.00	60.00	160.00	92.00	3
3	160.00	92.00	324.00	140.00	3
4	324.00	140.00	424.00	180.00	3
5	424.00	180.00	464.00	204.00	3
6	464.00	204.00	488.00	216.00	2
7	488.00	216.00	528.00	240.00	1
8	528.00	240.00	552.00	248.00	1
9	552.00	248.00	662.00	256.00	1
10	488.00	216.00	662.00	216.00	2
11	464.00	204.00	662.00	204.00	3

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	125.0	125.0	500.0	40.0	0.00	0.0	0
2	125.0	135.0	100.0	38.0	0.00	0.0	1
3	125.0	125.0	100.0	38.0	0.00	0.0	0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 3 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	464.00	204.00
2	488.00	216.00
3	660.00	216.00

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between X = 324.00 ft.
and X = 424.00 ft.

Each Surface Terminates Between X = 552.00 ft.
and X = 660.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 2.00 ft.

10.00 ft. Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	390.67	166.67
2	400.67	166.49
3	410.66	166.84
4	420.62	167.74
5	430.52	169.16
6	440.32	171.12
7	450.01	173.59
8	459.55	176.59
9	468.92	180.09
10	478.09	184.09
11	487.02	188.57
12	495.71	193.53
13	504.11	198.95
14	512.22	204.81
15	519.99	211.09

16	527.42	217.79
17	534.48	224.87
18	541.15	232.32
19	547.41	240.12
20	553.12	248.08

Circle Center At X = 399.0 ; Y = 352.8 and Radius, 186.3

*** 1.876 ***

Failure Surface Specified By 22 Coordinate Points

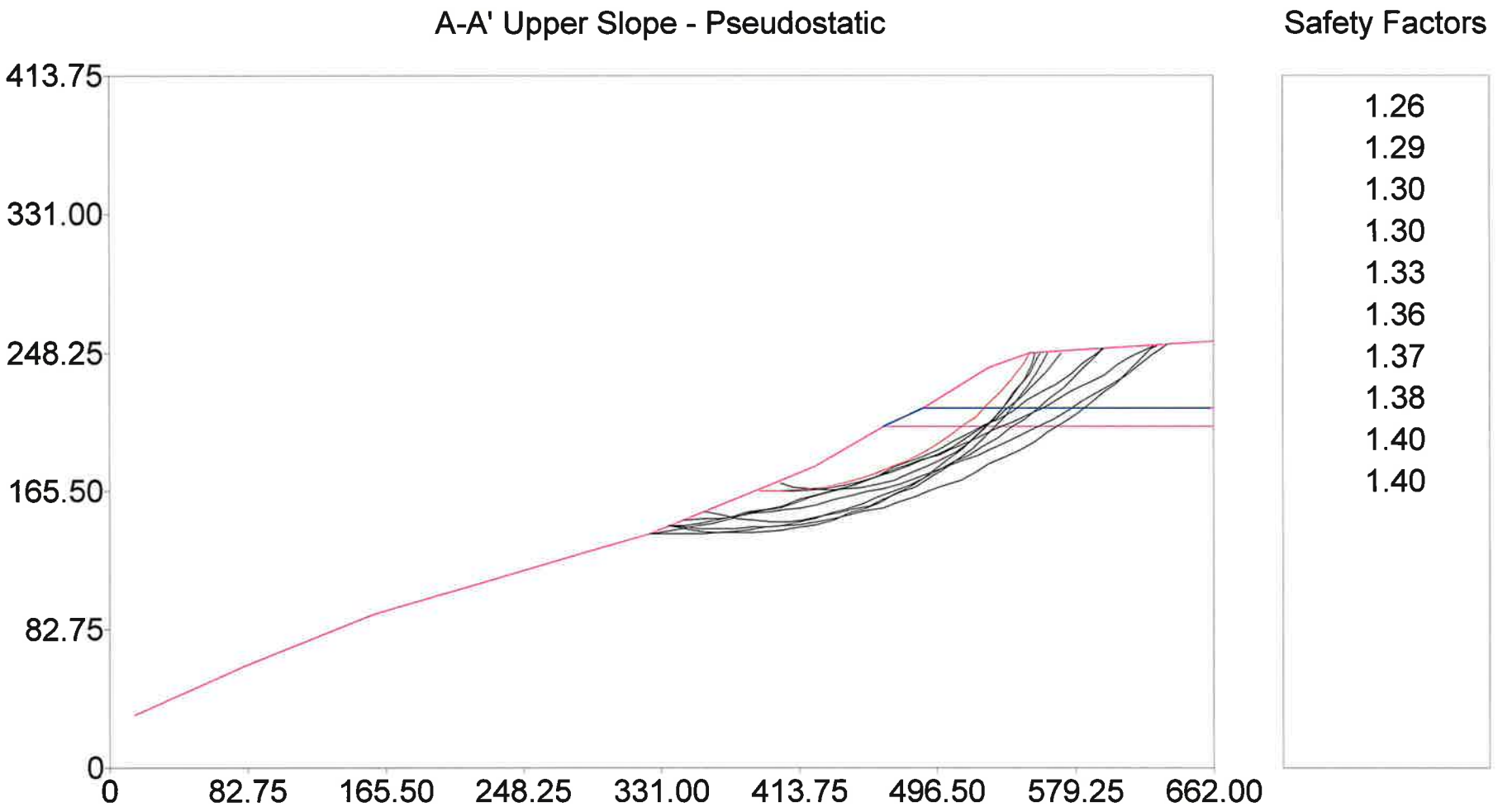
Point No.	X-Surf (ft)	Y-Surf (ft)
1	390.67	166.67
2	400.66	166.36
3	410.66	166.52
4	420.64	167.14
5	430.58	168.23
6	440.46	169.78
7	450.26	171.78
8	459.95	174.24
9	469.52	177.15
10	478.94	180.51
11	488.19	184.29
12	497.26	188.51
13	506.13	193.14
14	514.76	198.18
15	523.16	203.61
16	531.29	209.44
17	539.14	215.63
18	546.69	222.18
19	553.93	229.08
20	560.85	236.31
21	567.41	243.85
22	571.85	249.44

Circle Center At X = 402.3 ; Y = 381.0 and Radius, 214.7

*** 1.951 ***

Failure Surface Specified By 28 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)


A-A' Upper Slope - Pseudostatic
Safety Factors
1.26
1.29
1.30
1.30
1.33
1.36
1.37
1.38
1.40
1.40
413.75
331.00
248.25
165.50
82.75
0
0
82.75
165.50
248.25
331.00
413.75
496.50
579.25
662.00

** PCSTABL6 **

by
Purdue University

modified by
Peter J. Bosscher
University of Wisconsin-Madison

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

PROBLEM DESCRIPTION **MacDonald Plat**
A-A' Upper Slope - Pseudostatic

BOUNDARY COORDINATES

9 Top Boundaries
11 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	16.00	32.00	80.00	60.00	3
2	80.00	60.00	160.00	92.00	3
3	160.00	92.00	324.00	140.00	3
4	324.00	140.00	424.00	180.00	3
5	424.00	180.00	464.00	204.00	3
6	464.00	204.00	488.00	216.00	2
7	488.00	216.00	528.00	240.00	1
8	528.00	240.00	552.00	248.00	1
9	552.00	248.00	662.00	256.00	1
10	488.00	216.00	662.00	216.00	2
11	464.00	204.00	662.00	204.00	3

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	125.0	125.0	500.0	40.0	0.00	0.0	0
2	125.0	135.0	100.0	38.0	0.00	0.0	1
3	125.0	125.0	100.0	38.0	0.00	0.0	0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 3 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	464.00	204.00
2	488.00	216.00
3	660.00	216.00

A Horizontal Earthquake Loading Coefficient
Of0.200 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0 psf

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between X = 324.00 ft.
and X = 424.00 ft.

Each Surface Terminates Between X = 552.00 ft.
and X = 660.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 2.00 ft.

10.00 ft. Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	390.67	166.67
2	400.67	166.49
3	410.66	166.84
4	420.62	167.74
5	430.52	169.16
6	440.32	171.12
7	450.01	173.59

8	459.55	176.59
9	468.92	180.09
10	478.09	184.09
11	487.02	188.57
12	495.71	193.53
13	504.11	198.95
14	512.22	204.81
15	519.99	211.09
16	527.42	217.79
17	534.48	224.87
18	541.15	232.32
19	547.41	240.12
20	553.12	248.08

Circle Center At X = 399.0 ; Y = 352.8 and Radius, 186.3

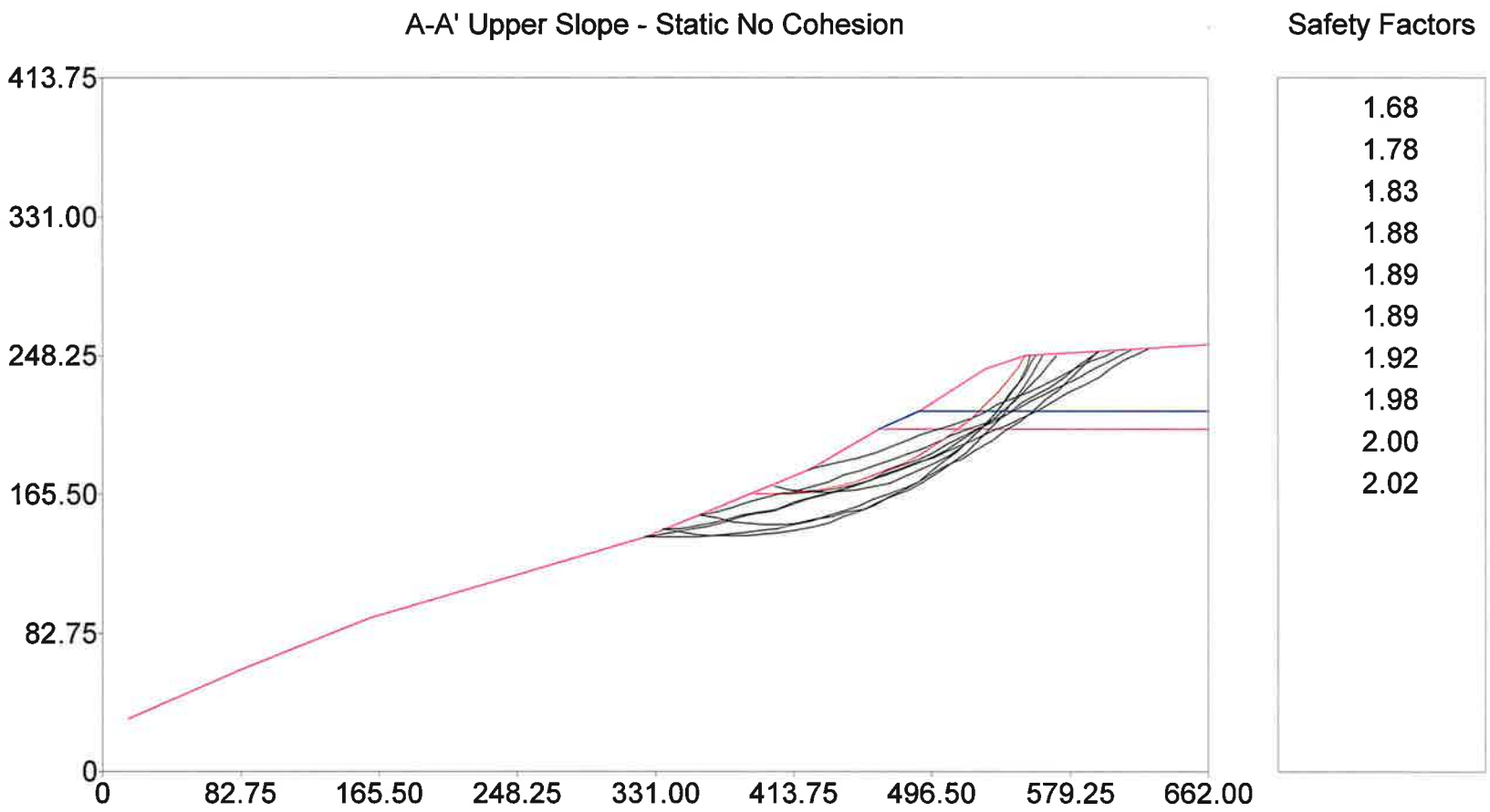
*** 1.260 ***

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	390.67	166.67
2	400.66	166.36
3	410.66	166.52
4	420.64	167.14
5	430.58	168.23
6	440.46	169.78
7	450.26	171.78
8	459.95	174.24
9	469.52	177.15
10	478.94	180.51
11	488.19	184.29
12	497.26	188.51
13	506.13	193.14
14	514.76	198.18
15	523.16	203.61
16	531.29	209.44
17	539.14	215.63
18	546.69	222.18
19	553.93	229.08
20	560.85	236.31
21	567.41	243.85
22	571.85	249.44

Circle Center At X = 402.3 ; Y = 381.0 and Radius, 214.7

*** 1.292 ***


A-A' Upper Slope - Static No Cohesion
Safety Factors
1.68
1.78
1.83
1.88
1.89
1.89
1.92
1.98
2.00
2.02
413.75
331.00
248.25
165.50
82.75
0
0
82.75
165.50
248.25
331.00
413.75
496.50
579.25
662.00

** PCSTABL6 **

by
Purdue University

modified by
Peter J. Bosscher
University of Wisconsin-Madison

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

PROBLEM DESCRIPTION **MacDonald Plat**
A-A' Upper Slope - Static No Cohesion

BOUNDARY COORDINATES

9 Top Boundaries
11 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	16.00	32.00	80.00	60.00	3
2	80.00	60.00	160.00	92.00	3
3	160.00	92.00	324.00	140.00	3
4	324.00	140.00	424.00	180.00	3
5	424.00	180.00	464.00	204.00	3
6	464.00	204.00	488.00	216.00	2
7	488.00	216.00	528.00	240.00	1
8	528.00	240.00	552.00	248.00	1
9	552.00	248.00	662.00	256.00	1
10	488.00	216.00	662.00	216.00	2
11	464.00	204.00	662.00	204.00	3

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	125.0	125.0	0.0	40.0	0.00	0.0	0
2	125.0	135.0	0.0	38.0	0.00	0.0	1
3	125.0	125.0	0.0	38.0	0.00	0.0	0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 3 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	464.00	204.00
2	488.00	216.00
3	660.00	216.00

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between X = 324.00 ft.
and X = 424.00 ft.

Each Surface Terminates Between X = 552.00 ft.
and X = 660.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 2.00 ft.

10.00 ft. Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	390.67	166.67
2	400.67	166.49
3	410.66	166.84
4	420.62	167.74
5	430.52	169.16
6	440.32	171.12
7	450.01	173.59
8	459.55	176.59
9	468.92	180.09
10	478.09	184.09
11	487.02	188.57
12	495.71	193.53
13	504.11	198.95

14	512.22	204.81
15	519.99	211.09
16	527.42	217.79
17	534.48	224.87
18	541.15	232.32
19	547.41	240.12
20	553.12	248.08

Circle Center At X = 399.0 ; Y = 352.8 and Radius, 186.3

*** 1.679 ***

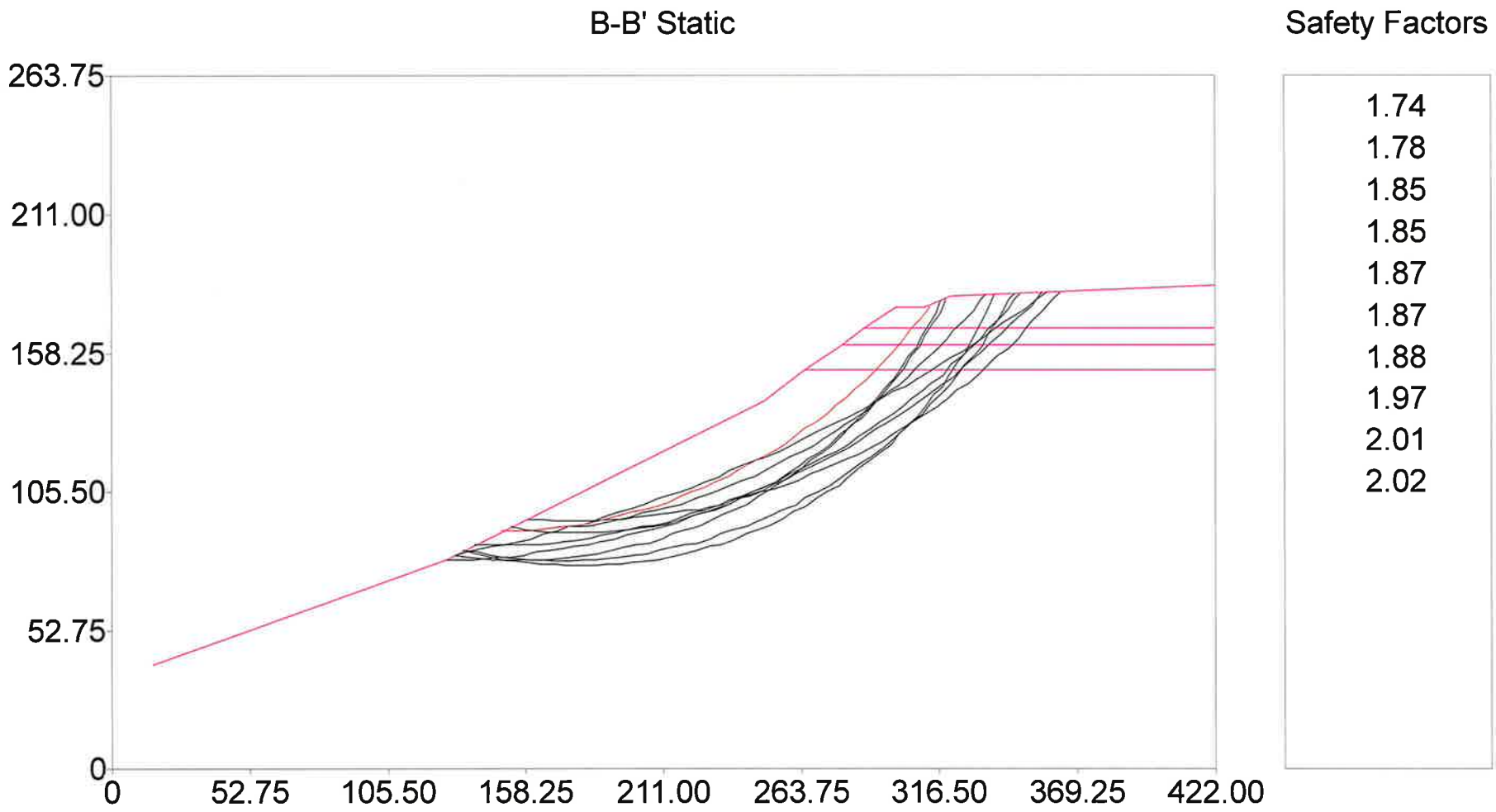
Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	390.67	166.67
2	400.66	166.36
3	410.66	166.52
4	420.64	167.14
5	430.58	168.23
6	440.46	169.78
7	450.26	171.78
8	459.95	174.24
9	469.52	177.15
10	478.94	180.51
11	488.19	184.29
12	497.26	188.51
13	506.13	193.14
14	514.76	198.18
15	523.16	203.61
16	531.29	209.44
17	539.14	215.63
18	546.69	222.18
19	553.93	229.08
20	560.85	236.31
21	567.41	243.85
22	571.85	249.44

Circle Center At X = 402.3 ; Y = 381.0 and Radius, 214.7

*** 1.780 ***

Failure Surface Specified By 30 Coordinate Points


B-B' Static
Safety Factors
263.75
211.00
158.25
105.50
52.75
0
0
52.75
105.50
158.25
211.00
263.75
316.50
369.25
422.00
1.74
1.78
1.85
1.85
1.87
1.87
1.88
1.97
2.01
2.02

** PCSTABL6 **

by
Purdue University

modified by
Peter J. Bosscher
University of Wisconsin-Madison

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

PROBLEM DESCRIPTION **MacDonald Plat B-B' Static**

BOUNDARY COORDINATES

9 Top Boundaries
12 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	16.00	40.00	128.00	80.00	4
2	128.00	80.00	250.00	140.00	4
3	250.00	140.00	266.00	152.00	4
4	266.00	152.00	280.00	162.00	3
5	280.00	162.00	288.00	168.00	2
6	288.00	168.00	300.00	176.00	1
7	300.00	176.00	312.00	176.00	1
8	312.00	176.00	322.00	180.00	1
9	322.00	180.00	422.00	184.00	1
10	288.00	168.00	422.00	168.00	2
11	280.00	162.00	422.00	162.00	3
12	266.00	152.00	422.00	152.00	4

ISOTROPIC SOIL PARAMETERS

4 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	125.0	125.0	500.0	36.0	0.00	0.0	0
2	120.0	120.0	500.0	36.0	0.00	0.0	0
3	130.0	130.0	200.0	38.0	0.00	0.0	0
4	125.0	125.0	100.0	38.0	0.00	0.0	0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between X = 128.00 ft.
and X = 160.00 ft.

Each Surface Terminates Between X = 312.00 ft.
and X = 422.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 20.00 ft.

5.00 ft. Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 40 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	149.33	90.49
2	154.33	90.67
3	159.32	90.98
4	164.30	91.40
5	169.27	91.94
6	174.23	92.59
7	179.17	93.37
8	184.09	94.26
9	188.99	95.27
10	193.86	96.40
11	198.70	97.65
12	203.51	99.00
13	208.29	100.48
14	213.03	102.06
15	217.73	103.76
16	222.39	105.57
17	227.01	107.50
18	231.58	109.53
19	236.10	111.67
20	240.56	113.92
21	244.98	116.27
22	249.33	118.73
23	253.62	121.29
24	257.86	123.95
25	262.02	126.72
26	266.12	129.58
27	270.15	132.54
28	274.11	135.59

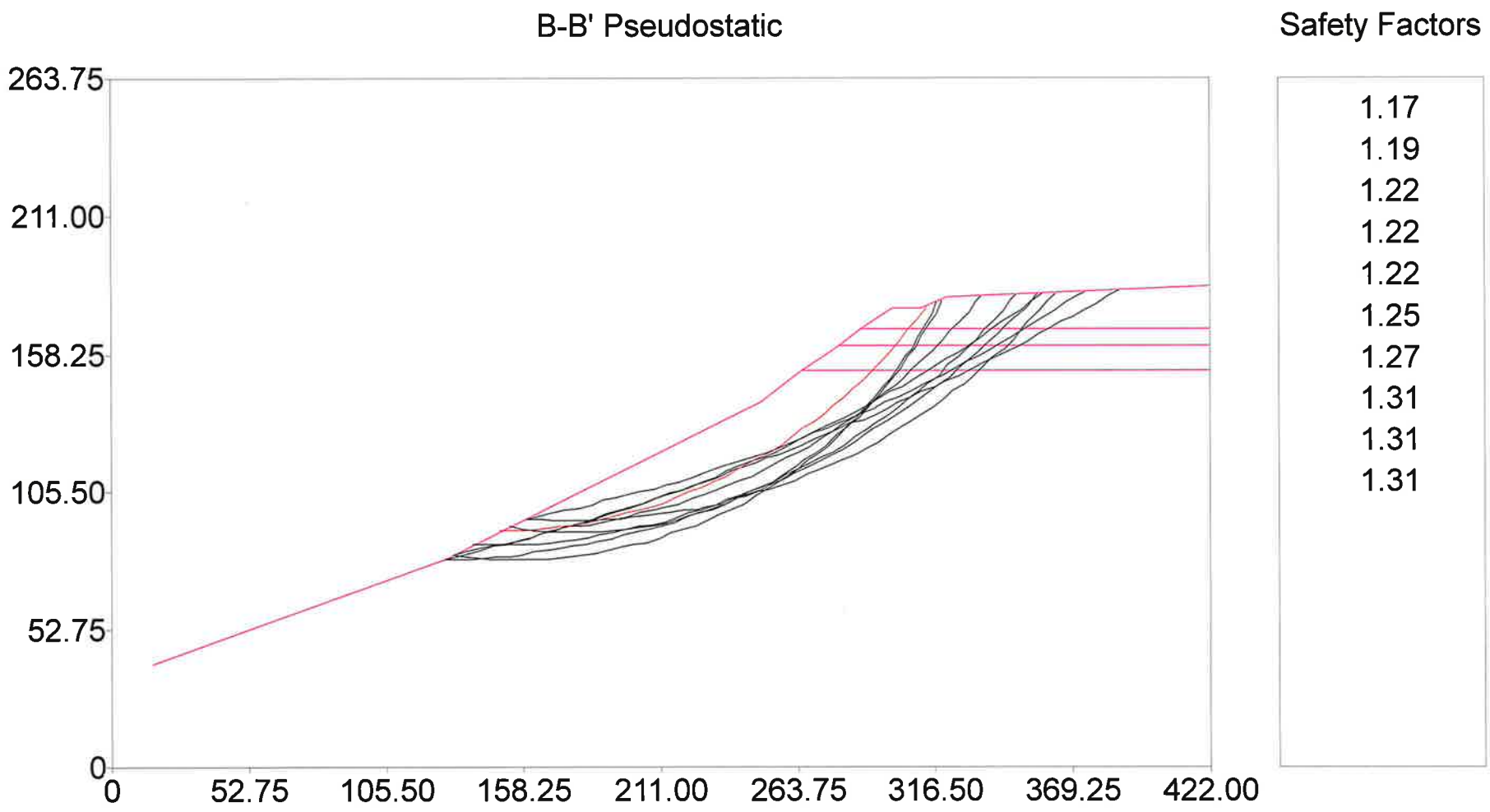
29	278.00	138.74
30	281.80	141.98
31	285.53	145.31
32	289.18	148.73
33	292.75	152.23
34	296.23	155.82
35	299.63	159.49
36	302.93	163.24
37	306.15	167.07
38	309.28	170.97
39	312.31	174.95
40	313.50	176.60

Circle Center At X = 144.2 ; Y = 299.9 and Radius, 209.4

*** 1.735 ***

Failure Surface Specified By 44 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	149.33	90.49
2	154.33	90.61
3	159.33	90.82
4	164.32	91.14
5	169.30	91.57
6	174.27	92.09
7	179.23	92.72
8	184.18	93.45
9	189.11	94.28
10	194.02	95.22
11	198.91	96.26
12	203.78	97.39
13	208.63	98.63
14	213.44	99.97
15	218.23	101.40
16	222.99	102.94
17	227.72	104.57
18	232.41	106.30
19	237.06	108.13
20	241.68	110.05
21	246.25	112.07
22	250.78	114.18
23	255.27	116.39
24	259.71	118.69
25	264.10	121.08
26	268.45	123.55
27	272.74	126.12
28	276.97	128.78


B-B' Pseudostatic
Safety Factors
263.75
211.00
158.25
105.50
52.75
0
0
52.75
105.50
158.25
211.00
263.75
316.50
369.25
422.00
1.17
1.19
1.22
1.22
1.22
1.25
1.27
1.31
1.31
1.31

** PCSTABL6 **

by
Purdue University

modified by
Peter J. Bosscher
University of Wisconsin-Madison

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

PROBLEM DESCRIPTION **MacDonald Plat B-B' Pseudostatic**

BOUNDARY COORDINATES

9 Top Boundaries
12 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	16.00	40.00	128.00	80.00	4
2	128.00	80.00	250.00	140.00	4
3	250.00	140.00	266.00	152.00	4
4	266.00	152.00	280.00	162.00	3
5	280.00	162.00	288.00	168.00	2
6	288.00	168.00	300.00	176.00	1
7	300.00	176.00	312.00	176.00	1
8	312.00	176.00	322.00	180.00	1
9	322.00	180.00	422.00	184.00	1
10	288.00	168.00	422.00	168.00	2
11	280.00	162.00	422.00	162.00	3
12	266.00	152.00	422.00	152.00	4

ISOTROPIC SOIL PARAMETERS

4 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	125.0	125.0	500.0	36.0	0.00	0.0	0
2	120.0	120.0	500.0	36.0	0.00	0.0	0
3	130.0	130.0	200.0	38.0	0.00	0.0	0
4	125.0	125.0	100.0	38.0	0.00	0.0	0

A Horizontal Earthquake Loading Coefficient
Of0.200 Has Been Assigned

A Vertical Earthquake Loading Coefficient

Of0.000 Has Been Assigned

Cavitation Pressure = 0.0 psf

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between X = 128.00 ft.
and X = 160.00 ft.

Each Surface Terminates Between X = 312.00 ft.
and X = 422.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 20.00 ft.

5.00 ft. Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 40 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	149.33	90.49
2	154.33	90.67
3	159.32	90.98
4	164.30	91.40
5	169.27	91.94
6	174.23	92.59
7	179.17	93.37
8	184.09	94.26
9	188.99	95.27
10	193.86	96.40
11	198.70	97.65
12	203.51	99.00
13	208.29	100.48
14	213.03	102.06
15	217.73	103.76
16	222.39	105.57
17	227.01	107.50
18	231.58	109.53
19	236.10	111.67

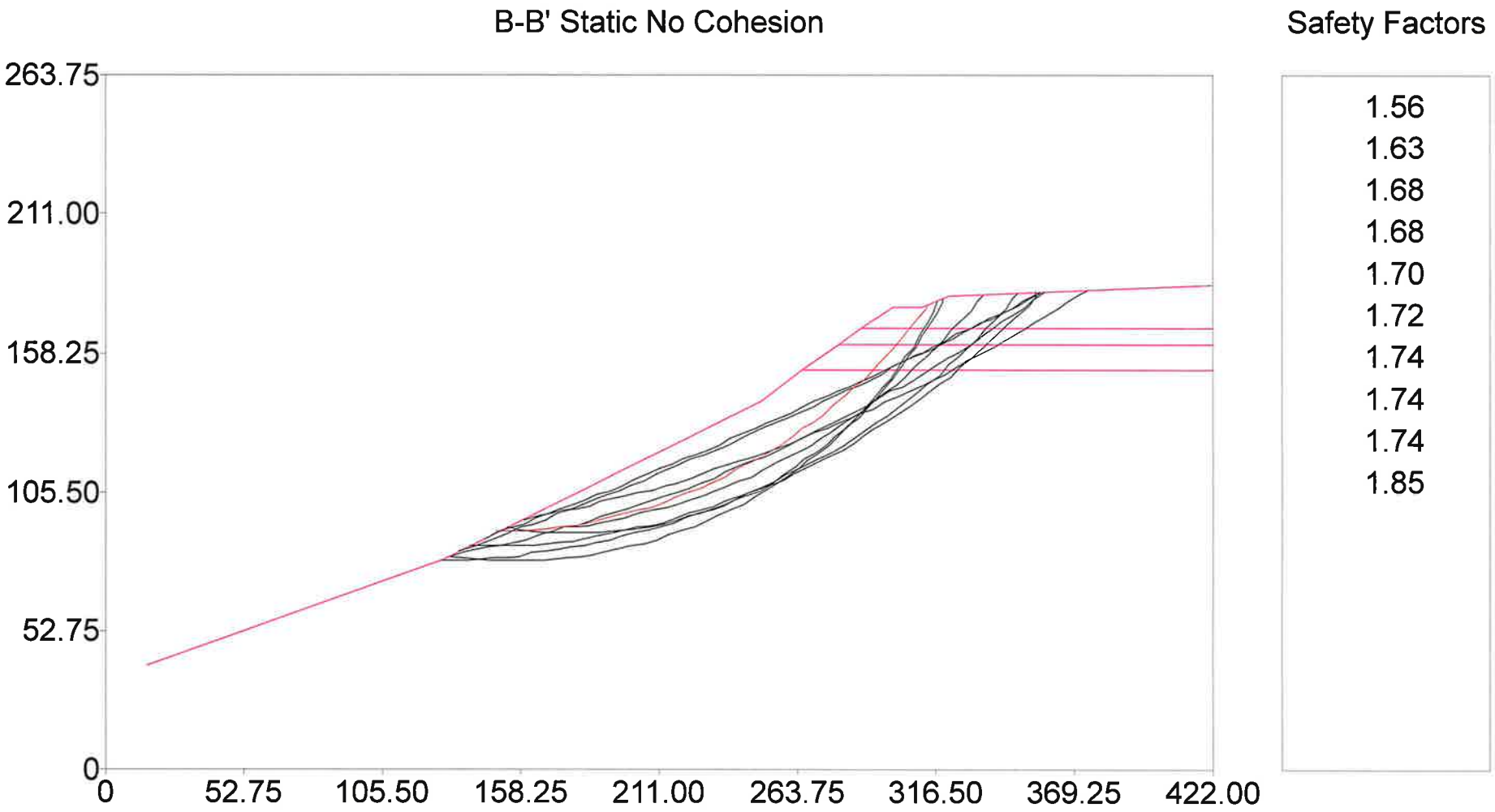
20	240.56	113.92
21	244.98	116.27
22	249.33	118.73
23	253.62	121.29
24	257.86	123.95
25	262.02	126.72
26	266.12	129.58
27	270.15	132.54
28	274.11	135.59
29	278.00	138.74
30	281.80	141.98
31	285.53	145.31
32	289.18	148.73
33	292.75	152.23
34	296.23	155.82
35	299.63	159.49
36	302.93	163.24
37	306.15	167.07
38	309.28	170.97
39	312.31	174.95
40	313.50	176.60

Circle Center At X = 144.2 ; Y = 299.9 and Radius, 209.4

*** 1.169 ***

Failure Surface Specified By 44 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	149.33	90.49
2	154.33	90.61
3	159.33	90.82
4	164.32	91.14
5	169.30	91.57
6	174.27	92.09
7	179.23	92.72
8	184.18	93.45
9	189.11	94.28
10	194.02	95.22
11	198.91	96.26
12	203.78	97.39
13	208.63	98.63
14	213.44	99.97
15	218.23	101.40
16	222.99	102.94
17	227.72	104.57
18	232.41	106.30
19	237.06	108.13


B-B' Static No Cohesion
Safety Factors
1.56
1.63
1.68
1.68
1.70
1.72
1.74
1.74
1.74
1.85
263.75
211.00
158.25
105.50
52.75
0
0
52.75
105.50
158.25
211.00
263.75
316.50
369.25
422.00

** PCSTABL6 **

by
Purdue University

modified by
Peter J. Bosscher
University of Wisconsin-Madison

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

PROBLEM DESCRIPTION **MacDonald Plat B-B' Static No Cohesion**

BOUNDARY COORDINATES

9 Top Boundaries
12 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	16.00	40.00	128.00	80.00	4
2	128.00	80.00	250.00	140.00	4
3	250.00	140.00	266.00	152.00	4
4	266.00	152.00	280.00	162.00	3
5	280.00	162.00	288.00	168.00	2
6	288.00	168.00	300.00	176.00	1
7	300.00	176.00	312.00	176.00	1
8	312.00	176.00	322.00	180.00	1
9	322.00	180.00	422.00	184.00	1
10	288.00	168.00	422.00	168.00	2
11	280.00	162.00	422.00	162.00	3
12	266.00	152.00	422.00	152.00	4

ISOTROPIC SOIL PARAMETERS

4 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	125.0	125.0	0.0	36.0	0.00	0.0	0
2	120.0	120.0	0.0	36.0	0.00	0.0	0
3	130.0	130.0	0.0	38.0	0.00	0.0	0
4	125.0	125.0	0.0	38.0	0.00	0.0	0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between X = 128.00 ft.
and X = 160.00 ft.

Each Surface Terminates Between X = 312.00 ft.
and X = 422.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 20.00 ft.

5.00 ft. Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 40 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	149.33	90.49
2	154.33	90.67
3	159.32	90.98
4	164.30	91.40
5	169.27	91.94
6	174.23	92.59
7	179.17	93.37
8	184.09	94.26
9	188.99	95.27
10	193.86	96.40
11	198.70	97.65
12	203.51	99.00
13	208.29	100.48
14	213.03	102.06
15	217.73	103.76
16	222.39	105.57
17	227.01	107.50
18	231.58	109.53
19	236.10	111.67
20	240.56	113.92
21	244.98	116.27
22	249.33	118.73
23	253.62	121.29
24	257.86	123.95
25	262.02	126.72
26	266.12	129.58

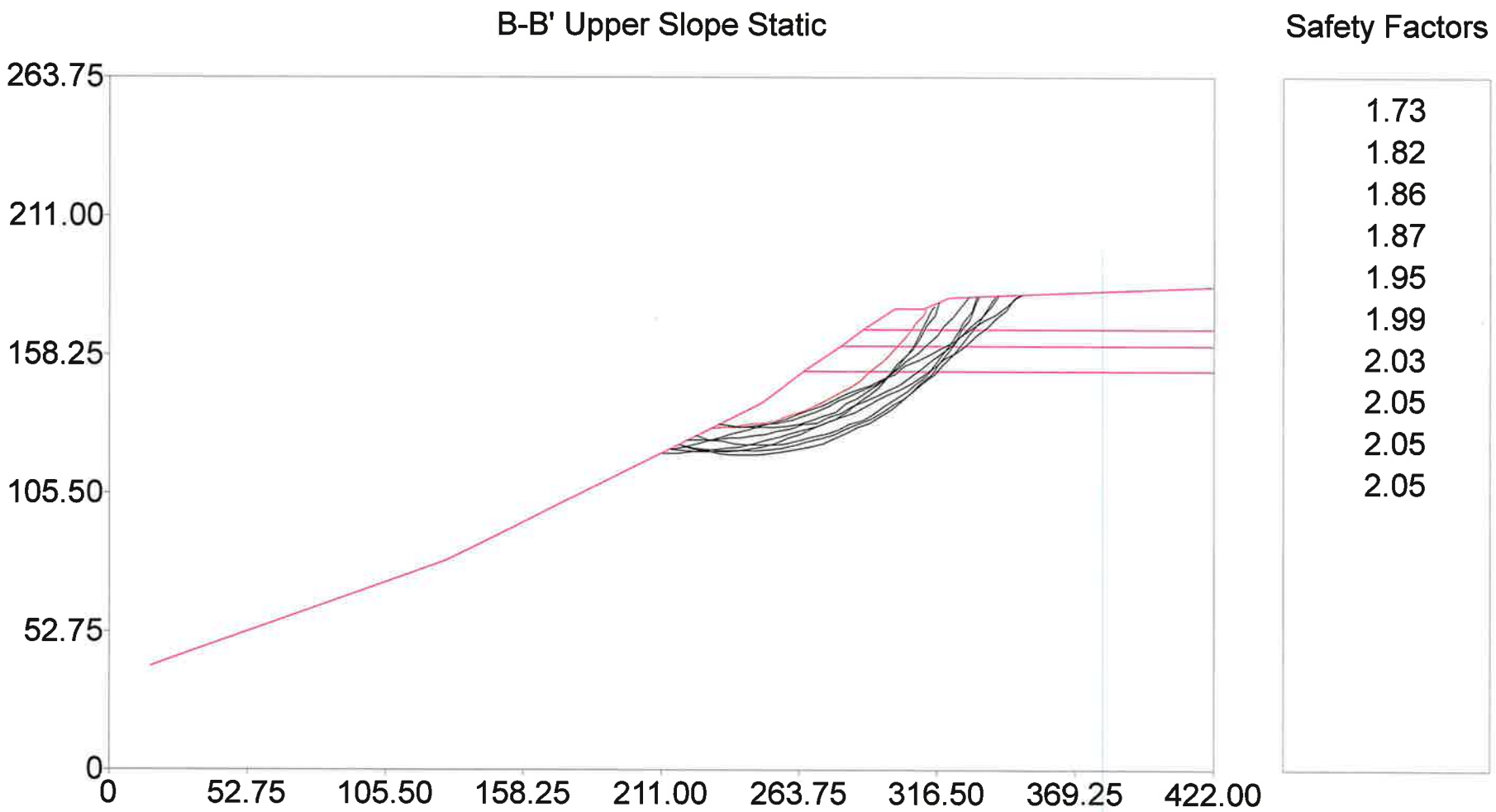
27	270.15	132.54
28	274.11	135.59
29	278.00	138.74
30	281.80	141.98
31	285.53	145.31
32	289.18	148.73
33	292.75	152.23
34	296.23	155.82
35	299.63	159.49
36	302.93	163.24
37	306.15	167.07
38	309.28	170.97
39	312.31	174.95
40	313.50	176.60

Circle Center At X = 144.2 ; Y = 299.9 and Radius, 209.4

*** 1.562 ***

Failure Surface Specified By 44 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	149.33	90.49
2	154.33	90.61
3	159.33	90.82
4	164.32	91.14
5	169.30	91.57
6	174.27	92.09
7	179.23	92.72
8	184.18	93.45
9	189.11	94.28
10	194.02	95.22
11	198.91	96.26
12	203.78	97.39
13	208.63	98.63
14	213.44	99.97
15	218.23	101.40
16	222.99	102.94
17	227.72	104.57
18	232.41	106.30
19	237.06	108.13
20	241.68	110.05
21	246.25	112.07
22	250.78	114.18
23	255.27	116.39
24	259.71	118.69
25	264.10	121.08
26	268.45	123.55


B-B' Upper Slope Static
Safety Factors
1.73
1.82
1.86
1.87
1.95
1.99
2.03
2.05
2.05
2.05
263.75
211.00
158.25
105.50
52.75
0
0
52.75
105.50
158.25
211.00
263.75
316.50
369.25
422.00

** PCSTABL6 **

by
Purdue University

modified by
Peter J. Bosscher
University of Wisconsin-Madison

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

PROBLEM DESCRIPTION **MacDonald Plat B-B' Upper Slope Static**

BOUNDARY COORDINATES

9 Top Boundaries
12 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	16.00	40.00	128.00	80.00	4
2	128.00	80.00	250.00	140.00	4
3	250.00	140.00	266.00	152.00	4
4	266.00	152.00	280.00	162.00	3
5	280.00	162.00	288.00	168.00	2
6	288.00	168.00	300.00	176.00	1
7	300.00	176.00	312.00	176.00	1
8	312.00	176.00	322.00	180.00	1
9	322.00	180.00	422.00	184.00	1
10	288.00	168.00	422.00	168.00	2
11	280.00	162.00	422.00	162.00	3
12	266.00	152.00	422.00	152.00	4

ISOTROPIC SOIL PARAMETERS

4 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	125.0	125.0	500.0	36.0	0.00	0.0	0
2	120.0	120.0	500.0	36.0	0.00	0.0	0
3	130.0	130.0	200.0	38.0	0.00	0.0	0
4	125.0	125.0	100.0	38.0	0.00	0.0	0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced
Along The Ground Surface Between X = 212.00 ft.
and X = 240.00 ft.

Each Surface Terminates Between X = 312.00 ft.
and X = 422.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 20.00 ft.

5.00 ft. Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Bishop Method
* *

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	230.67	130.49
2	235.66	130.67
3	240.64	131.11
4	245.60	131.80
5	250.51	132.73
6	255.37	133.92
7	260.16	135.34
8	264.87	137.01
9	269.49	138.92
10	274.01	141.06
11	278.42	143.42
12	282.70	146.00
13	286.85	148.80
14	290.85	151.80
15	294.69	155.00
16	298.36	158.39
17	301.86	161.97
18	305.17	165.71
19	308.29	169.62
20	311.20	173.68
21	312.94	176.38

Circle Center At X = 229.6 ; Y = 229.2 and Radius, 98.7

*** 1.725 ***

Failure Surface Specified By 26 Coordinate Points

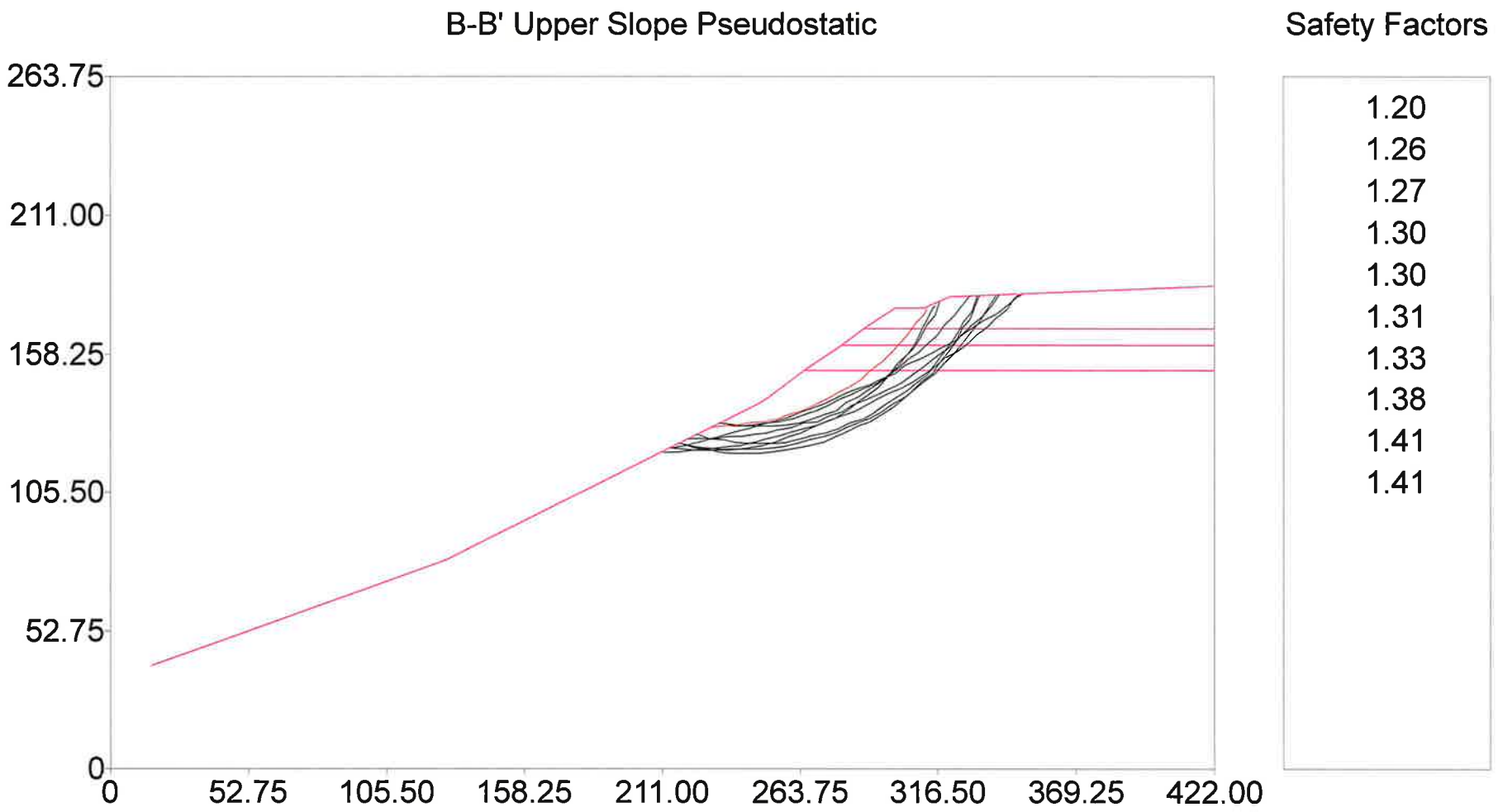
Point No.	X-Surf (ft)	Y-Surf (ft)
1	215.11	122.84
2	220.07	122.21
3	225.06	121.84
4	230.06	121.73
5	235.05	121.88
6	240.04	122.28
7	244.99	122.95
8	249.91	123.87
9	254.77	125.04
10	259.56	126.47
11	264.27	128.14
12	268.89	130.05
13	273.41	132.20
14	277.81	134.58
15	282.07	137.18
16	286.20	140.01
17	290.18	143.04
18	293.99	146.27
19	297.63	149.70
20	301.09	153.31
21	304.35	157.10
22	307.42	161.05
23	310.27	165.15
24	312.91	169.40
25	315.33	173.78
26	317.47	178.19

Circle Center At X = 229.7 ; Y = 218.2 and Radius, 96.4

*** 1.818 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	230.67	130.49
2	235.67	130.61
3	240.66	130.92
4	245.63	131.45
5	250.58	132.17


B-B' Upper Slope Pseudostatic
Safety Factors
1.20
1.26
1.27
1.30
1.30
1.31
1.33
1.38
1.41
1.41
263.75
211.00
158.25
105.50
52.75
0
0
52.75
105.50
158.25
211.00
263.75
316.50
369.25
422.00

** PCSTABL6 **

by
Purdue University

modified by
Peter J. Bosscher
University of Wisconsin-Madison

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

PROBLEM DESCRIPTION **MacDonald Plat**
B-B' Upper Slope Pseudostatic

BOUNDARY COORDINATES

9 Top Boundaries
12 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	16.00	40.00	128.00	80.00	4
2	128.00	80.00	250.00	140.00	4
3	250.00	140.00	266.00	152.00	4
4	266.00	152.00	280.00	162.00	3
5	280.00	162.00	288.00	168.00	2
6	288.00	168.00	300.00	176.00	1
7	300.00	176.00	312.00	176.00	1
8	312.00	176.00	322.00	180.00	1
9	322.00	180.00	422.00	184.00	1
10	288.00	168.00	422.00	168.00	2
11	280.00	162.00	422.00	162.00	3
12	266.00	152.00	422.00	152.00	4

ISOTROPIC SOIL PARAMETERS

4 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	125.0	125.0	500.0	36.0	0.00	0.0	0
2	120.0	120.0	500.0	36.0	0.00	0.0	0
3	130.0	130.0	200.0	38.0	0.00	0.0	0
4	125.0	125.0	100.0	38.0	0.00	0.0	0

A Horizontal Earthquake Loading Coefficient
Of0.200 Has Been Assigned

A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned

Cavitation Pressure = 0.0 psf

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between X = 212.00 ft.
and X = 240.00 ft.

Each Surface Terminates Between X = 312.00 ft.
and X = 422.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 20.00 ft.

5.00 ft. Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	230.67	130.49
2	235.66	130.67
3	240.64	131.11
4	245.60	131.80
5	250.51	132.73
6	255.37	133.92
7	260.16	135.34
8	264.87	137.01
9	269.49	138.92
10	274.01	141.06
11	278.42	143.42
12	282.70	146.00
13	286.85	148.80
14	290.85	151.80
15	294.69	155.00
16	298.36	158.39
17	301.86	161.97

18	305.17	165.71
19	308.29	169.62
20	311.20	173.68
21	312.94	176.38

Circle Center At X = 229.6 ; Y = 229.2 and Radius, 98.7

*** 1.201 ***

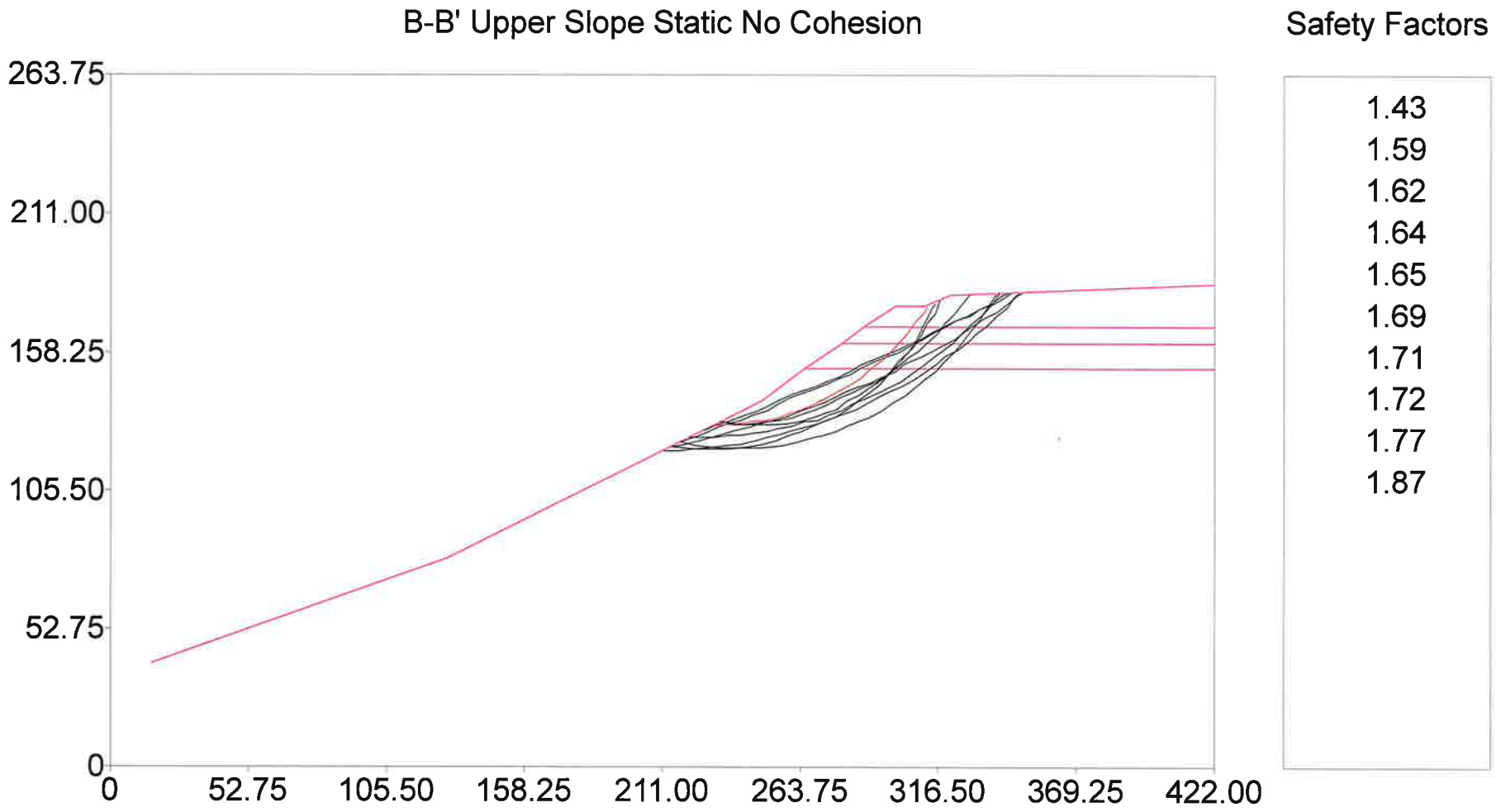
Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	215.11	122.84
2	220.07	122.21
3	225.06	121.84
4	230.06	121.73
5	235.05	121.88
6	240.04	122.28
7	244.99	122.95
8	249.91	123.87
9	254.77	125.04
10	259.56	126.47
11	264.27	128.14
12	268.89	130.05
13	273.41	132.20
14	277.81	134.58
15	282.07	137.18
16	286.20	140.01
17	290.18	143.04
18	293.99	146.27
19	297.63	149.70
20	301.09	153.31
21	304.35	157.10
22	307.42	161.05
23	310.27	165.15
24	312.91	169.40
25	315.33	173.78
26	317.47	178.19

Circle Center At X = 229.7 ; Y = 218.2 and Radius, 96.4

*** 1.263 ***

Failure Surface Specified By 24 Coordinate Points


B-B' Upper Slope Static No Cohesion
Safety Factors
1.43
1.59
1.62
1.64
1.65
1.69
1.71
1.72
1.77
1.87
263.75
211.00
158.25
105.50
52.75
0
0
52.75
105.50
158.25
211.00
263.75
316.50
369.25
422.00

** PCSTABL6 **

by
Purdue University

modified by
Peter J. Bosscher
University of Wisconsin-Madison

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

PROBLEM DESCRIPTION **MacDonald Plat**
B-B' Upper Slope Static No Cohesion

BOUNDARY COORDINATES

9 Top Boundaries
12 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	16.00	40.00	128.00	80.00	4
2	128.00	80.00	250.00	140.00	4
3	250.00	140.00	266.00	152.00	4
4	266.00	152.00	280.00	162.00	3
5	280.00	162.00	288.00	168.00	2
6	288.00	168.00	300.00	176.00	1
7	300.00	176.00	312.00	176.00	1
8	312.00	176.00	322.00	180.00	1
9	322.00	180.00	422.00	184.00	1
10	288.00	168.00	422.00	168.00	2
11	280.00	162.00	422.00	162.00	3
12	266.00	152.00	422.00	152.00	4

ISOTROPIC SOIL PARAMETERS

4 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	125.0	125.0	0.0	36.0	0.00	0.0	0
2	120.0	120.0	0.0	36.0	0.00	0.0	0
3	130.0	130.0	0.0	38.0	0.00	0.0	0
4	125.0	125.0	0.0	38.0	0.00	0.0	0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between X = 212.00 ft.
and X = 240.00 ft.

Each Surface Terminates Between X = 312.00 ft.
and X = 422.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 20.00 ft.

5.00 ft. Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	230.67	130.49
2	235.66	130.67
3	240.64	131.11
4	245.60	131.80
5	250.51	132.73
6	255.37	133.92
7	260.16	135.34
8	264.87	137.01
9	269.49	138.92
10	274.01	141.06
11	278.42	143.42
12	282.70	146.00
13	286.85	148.80
14	290.85	151.80
15	294.69	155.00
16	298.36	158.39
17	301.86	161.97
18	305.17	165.71
19	308.29	169.62
20	311.20	173.68
21	312.94	176.38

Circle Center At X = 229.6 ; Y = 229.2 and Radius, 98.7

*** 1.432 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	230.67	130.49
2	235.67	130.61
3	240.66	130.92
4	245.63	131.45
5	250.58	132.17
6	255.49	133.10
7	260.36	134.23
8	265.18	135.56
9	269.94	137.08
10	274.64	138.80
11	279.26	140.71
12	283.80	142.80
13	288.25	145.09
14	292.60	147.55
15	296.85	150.18
16	300.98	152.99
17	305.00	155.97
18	308.89	159.11
19	312.65	162.41
20	316.27	165.85
21	319.75	169.45
22	323.08	173.18
23	326.25	177.04
24	328.68	180.27

Circle Center At X = 230.4 ; Y = 252.5 and Radius, 122.0

*** 1.586 ***

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	215.11	122.84
2	220.07	122.21
3	225.06	121.84
4	230.06	121.73
5	235.05	121.88
6	240.04	122.28
7	244.99	122.95
8	249.91	123.87
9	254.77	125.04
10	259.56	126.47

TERRA ASSOCIATES, Inc.
Consultants in Geotechnical Engineering, Geology
and
Environmental Earth Sciences

June 26, 2015
Project No. T-7248

Mr. Greg Nelson
William Buchan Homes
2630 – 116th Avenue NE, #100
Bellevue, Washington 98004

Subject: Geotechnical Slope Evaluation
MacDonald Plat
12702 and 12704 – 72nd Avenue NE
Kirkland, Washington

Reference: Report of Geotechnical Investigation, Proposed Subdivision Joan MacDonald Estates, King County, Washington, Project No. 538, prepared by S&EE, dated May 1, 2006

Dear Mr. Nelson:

As requested, we performed a geotechnical evaluation of the eastern slope within the proposed MacDonald Plat Development. As we understand, William Buchan Homes plans to construct single-family residences on a total of 16 lots within the developed plat. The purpose of our work was to evaluate slope conditions and to provide geotechnical recommendations for steep slope buffer and building setback distances.

The project site consists of two tax parcels occupied by a single-family home and several outbuildings. The properties are located at the subject addresses in Kirkland, Washington. The focus of our evaluation is the steep slope which runs along the eastern and southern portions of the property. The slope varies in inclination from approximately 1.5H: 1V to 2H: 1V and is on the order of 200 feet in height terminating in a drainage channel at its toe. The slope is well vegetated with thick brush and mature deciduous and coniferous trees.

Review of the USGS Geologic Map of the Kirkland Quadrangle 1983, by James P. Minard, indicates soils at the site consist of glacial till (Qvt) overlying advance outwash (Qva). Shallow soil conditions encountered in test pits excavated for the referenced report confirm glacial till soils composed of dense to very dense silty sand with gravel are present at the site. Advance outwash likely underlies the till at depths of 30 to 60 feet below the ground surface.

12525 Willows Road NE, Suite 101, Kirkland, Washington 98034
Phone (425) 821-7777 • Fax (425) 821-4334

In general, observations at the site did not reveal and indication of past or current slope movements that would indicate a potential landslide hazard. We did not see any evidence of uniformly leaning trees, tension cracks, or seepage flowing from the slope face that would be indicative of unstable slopes. We did observe evidence of ongoing erosion along the upper portion of the slope. In the northeast property corner, we observed erosion around the root balls of plants. Exposed soil faces on the downslope side of these plants were on the order of 12 to 18 inches in height. In the southeast corner of the property, we observed erosion around the foundation of a small play house built against the crest of the slope. Approximately five to eight inches of soil had been eroded away from around the foundation. In the south-central portion of the property, we observed a concrete pad located adjacent to the slope which has since been undermined six to eight inches by erosion. Below this concrete pad, we also observed a washed out gully with exposed soils.

Based upon our reconnaissance of the slopes, there is no indication of past or current slope instability. The native glacial till and advance outwash soils exhibit high shear strengths and are inherently stable in steep conditions. Development of the plat as planned will have no impact on this current stability nor will residential properties be in jeopardy due to unstable slope conditions. However, the soils on the upper portion of the slope are experiencing erosion. This is due to stormwater currently flowing uncontrolled over the crest of the slope. The development of the property will largely mitigate this process with design and construction of stormwater facilities that will collect, detain and direct discharge to approved points of controlled discharge. In addition to these measures, we recommend maintaining a native vegetated buffer zone of ten feet from the slope crest with a building setback distance of ten feet from this buffer.

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

Sincerely yours,
TERRA ASSOCIATES, INC.

Alexander Dendy, E.I.T.
Staff Engineer

6-26-15

Theodore Schepper, P.E.
President

cc: Moira Haughian, Blueline Group

REPORT OF GEOTECHNICAL INVESTIGATION
PROPOSED SUBDIVISION
JOAN MACDONALD ESTATES
KING COUNTY, WASHINGTON
S&EE JOB NO. 538
MAY 1, 2006

TABLE OF CONTENTS

REPORT OF GEOTECHNICAL INVESTIGATION
PROPOSED SUBDIVISION
JOAN MACDONALD ESTATES
KING COUNTY, WASHINGTON

for

Mrs. Marcia MacDonald Pettersen

1.0 INTRODUCTION

We present in this report the results of our geotechnical investigation for the proposed development. The site is about 6.4 acres in size and located at 12704 72nd Avenue NE, Kirkland, Washington. We understand that the proposed development will involve new single-family lots, access roads, and underground utilities. The grading plan is not available at the time of this report. However, we anticipate that the maximum cut and fill will be on the order of 10 feet. For the purpose of this study, we have assumed that the structural load of future houses will be typical of residential homes.

2.0 SCOPE OF SERVICES

The purpose of our geotechnical investigation is to develop geotechnical recommendations regarding site preparation and foundation support. Specifically, our services included:

1. Review of available geologic information for the site and its vicinity.

2. Site reconnaissance to observe surface conditions including obvious signs of slope instability and wet and unstable soils.

3. Exploration of soil and groundwater conditions underlying the site through the excavation of 6 test pits.

4. Recommendations regarding type of foundation support. Our recommendations include allowable soil-bearing pressure and the total and differential settlements.

5. Recommendations regarding potential impacts of groundwater on site development.

6. Evaluation of the stability of the onsite slopes, recommendation regarding mitigations, if needed.

7. Recommendations regarding active and at-rest earth pressures to be used for the design of any retaining structures.

8. Recommendations regarding site preparation, including removal of unsuitable soils, suitability of onsite soils for use as fill, fill placement techniques, and compaction criteria.

9. Five copies of a written geotechnical report containing a site plan, test pit logs, a description of subsurface conditions, and our findings and recommendations.

3.0 SITE CONDITIONS

3.1 SURFACE CONDITIONS

The site is bounded to the west by 72nd Avenue NE, to the north by residences and to the south and east by steep slopes. These slopes are about 1.5H:1V to 2H:1V in inclination and 100 to 200 feet in height. At the time of this report, the site is occupied by houses, pool, horse riding arena, and stalls (see Figure 1). Other than the slope areas, the site surface is relatively flat and the elevation relief across this relatively flat area is about 20 feet. The steep slopes are covered with dense trees and thick undergrowth. During our site reconnaissance, we did not observe any obvious signs of deep-seated slope instability which typically include slump, tilting trees, cracks and fissures at the ground surface.

3.2 PUBLISHED GEOLOGIC INFORMATION

Published geologic information (Generalized Geologic Map of Northwestern King County, Washington State Department of Natural Resources) indicates that the site area is underlain by glacial till (or hardpan). The material is a hard, unsorted mixture of clay, silt, sand and gravel.

3.3 PUBLISHED SOIL SURVEY INFORMATION

Published SCS map of the King County area indicates that the surficial soil at site consists of Alderwood gravelly sandy loam (AgC). According to the survey, the permeability is moderately rapid in the surface layer and very slow below a depth of 24 to 40 inches; water moves on top of substratum in winter; and erosion hazard is moderate.

3.4 TEST PIT FINDINGS

The soil conditions underlying the site were explored by the excavation of 6 test pits, TP-1 through TP-6, on April 14, 2006. The approximate test pit locations are shown on Figure 1. Details of the field exploration program and the test pit logs are included in Appendix A.

Our test pits were excavated using a trackhoe to depths of 7 to 10 feet below the current ground surface. In general, the test pits indicate that the site is covered by approximately 0.5 feet of topsoil and 1.5 to 3.5 feet of surficial soils. The latter are underlain by glacial till. The surficial soils include silty sand, sand, and gravel. In general, these soils are loose. Fill soil about 2 feet in thickness was found at TP-1 location. The fill consists of loose gravel and is underlain by an old topsoil layer. The glacial till is a silty sand with fine to medium gravel. The material is dense to very dense. All test pits were terminated in till.

Seepage of groundwater was encountered in TP-1 and TP-3 at depths of 8 and 7.5 feet, respectively. The seepage rate was low to moderate and estimated to be about 1/5 gallon per minute (gpm). Based on the moisture states of the soil under the seepage zone, we believe that the groundwater was perched within the relatively impermeable till. Based on our experience, shallow, perched groundwater over till may occur in winter months. Also, the depth of deeper groundwater seepage zone may vary with season and precipitation.

3.5 INFILTRATION STUDY

We performed an infiltration study for the existing horse riding arena. The report of which is dated March 14, 2006 and has been submitted previously. The study concludes that the surface layer in the area has a low permeability and can be considered as an existing impervious surface.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 GENERAL

The development of the subject site is feasible from a geotechnical standpoint. Based on the test pit findings and our evaluations, we are of the opinion that the hillsides are currently stable except for a minor potential of shallow sloughing on and adjacent to the steep slopes. Provided that the recommendations in this report are followed, we believe that the potential of future slope instability will be very low. Please be aware that there is always an inherent risk of slope movement for any development near or on slopes. In addition to natural factors (soil, groundwater, heavy rainfall), other factors that may affect stability include excavations, fills, leaking or broken utility, improper drainage, lack of maintenance of drainage facilities or vegetation cover, unwise actions by adjacent property owners, or similar events or unknown conditions that may cause instability. Therefore, future property owners must be alert of any adverse impacts on the slope stability and take appropriate actions when necessary.

Details of our recommendations are presented in the following sections.

4.2 BUFFER AND SETBACKS

We recommend a no-disturbance (buffer) zone of 25 feet from the top steep slope and a building/structure setback of 15 feet from the buffer. No grading and clearing shall be allowed in the buffer. The existing vegetation in the buffer and on the steep slope should be protected.

4.3 INFILTRATION POTENTIAL

Our test pits indicate that the site is underlain by dense and relatively impermeable glacial till. Therefore, it is our opinion that onsite infiltration is not feasible. We understand that storm water detention ponds may be one of the options for storm water management. To avoid possible adverse impact on steep slope, we recommend that the all ponds be lined with an impervious liner.

4.4 FOUNDATION SUPPORT

We recommend that all structures be supported by conventional spread footings. The footings must be founded on structural fill or at least medium dense native soils. Please note that our test pits were loosely filled with the excavated soils. If these test pits coincide with the future footing locations, the upper 4 feet of the fill in the test pits should be removed, and then the pit backfilled with structural fill. The criteria for structural fill are presented in **Section 4.9 SITE PREPARATION AND STRUCTURAL FILL**. Details of our recommendations regarding the footing design are presented below.

Bearing Capacity: We recommend an allowable bearing pressure of 3,000 pounds per square feet (psf) for the footing design. This value includes a safety factor of at least 3, and can be increased by one-third for wind and seismic loads.

Footing Construction: The footing bearing materials will be moisture sensitive and susceptible to strength loss due to wetting and disturbance. As such, the footing bearing surfaces should be protected from weather and disturbance, and all organic, softened and loosened soils must be removed by over-excavation. Any over-excavation at the footing subgrade should be backfilled with structural fill, concrete, lean concrete or crushed rock. The crushed rock, if used, should be placed in 6 inches thick lifts and compacted by at least three passes of a compactor weighing greater than 200 pounds.

All footing subgrade should be inspected by a qualified geotechnical engineer prior to re-bar and concrete placements.

All exterior footings should be founded at least 18 inches below the adjacent finished grade to provide protection against frost action, and should be at least 18 inches in width to facilitate construction.

Settlement: Interior column footings designed in accordance with the above recommendations are expected to experience approximately 1/2 inch of settlement. Continuous wall footings should experience about 1/4 to 1/2 inch. Differential settlement between adjacent footings is expected to be 1/4 to 1/2 of an inch.

Lateral Resistance: Lateral resistance can be obtained from the passive earth pressure against the footing sides and the friction at the contact of the footing bottom and bearing soil. The former can be obtained using an equivalent fluid density of 250 pounds per cubic foot (pcf), and the latter using a coefficient of friction of 0.5. These values include a safety factor of 1.5.

Footing Near Slopes: For any footings near slopes of 20 percent or steeper, the bottom of the footing must be positioned in such a way that the horizontal distance from the outside footing edge to the slope face is at least 12 feet.

Footing Drain: Rigid, perforated drainpipes should be installed around all perimeter footings. Drainpipes should be at least 4 inches in diameter, covered by a layer of uniform size drain gravel of at least 12 inches in thickness, and be connected to a suitable discharge location. An adequate number of cleanouts should be installed along the drain line for future maintenance. **Footing drains should be separated from roof drains.**

4.5 SLAB SUPPORT

All slabs-on-grade can be supported on structural fill or at least medium dense native soils. We envision that the soil at the slab subgrade will be disturbed and loosened by construction activities at the time of slab construction. We therefore recommend that the slab subgrade be proof-rolled or probed just before pour. Any wet and loose areas should be over-excavated and backfilled with structural fill.

In order to promote uniform support and provide a capillary break, we recommend that slabs be underlain by a 6 mil. vapor barrier over a 4-inch thick layer of free draining gravel.

4.6 LATERAL EARTH PRESSURES

Lateral earth pressures on retaining walls or permanent subsurface walls, and resistance to lateral loads may be estimated using the following recommended soil parameters:

Soil Density (PCF)	**Equivalent Fluid Unit Weight (PCF)**			**Coefficient of Friction**
	Active	**At-rest**	**Passive**	
130	30	45	250	0.5

Note: 1) Hydrostatic pressures are not included in the above lateral earth pressures.

2) Lateral earth pressures are appropriate for level structural fill placed behind and in front of walls.

The active case applies to walls that are permitted to rotate or translate away from the retained soil by approximately 0.002H, where H is the height of the wall. This would be appropriate for a cantilever retaining wall. The at-rest case applies to unyielding walls, and would be appropriate for walls that are structurally restrained from lateral deflection such as basement walls, utility trenches or pits.

SURCHARGE INDUCED LATERAL LOADS

1) Additional lateral earth pressures will result from surcharge loads from floor slabs or pavements for parking that are located immediately adjacent to the walls. The surcharge-induced lateral earth pressures are uniform over the depth of the wall. Surcharge-induced lateral pressures for the "active" case may be calculated by multiplying the applied vertical pressure (in psf) by the active earth pressure coefficient (Ka). The value of Ka may be taken as 0.4. The surcharge-induced lateral pressures for the "at-rest" case are similarly calculated using an at-rest earth pressure coefficient (Ko) of 0.6. For surcharge loads that are not adjacent to the wall such as the proposed tiered walls, the induced lateral earth pressure will depend on the magnitude of the surcharge and the distance from the wall. Such induced lateral load can be estimated using the equations shown on Figure 2.

2) The slope-induced lateral earth pressure can be accounted for by increasing the effective height of the wall by one-half the slope height. For back slope continues beyond a horizontal distance equal to the height of the wall, only the part of slope-rise within this horizontal distance should be considered.

3) The traffic-induced lateral earth pressure can be accounted for by increasing the effective wall height by 2 feet.

SEISMIC INDUCED LATERAL LOADS

For seismic induced lateral loads, the dynamic force can be assumed to act at 0.6 H above the wall base and the magnitude can be calculated using the following equation:

$$Pe = 3/8*\gamma*H^2*a$$

Where Pe = seismic-induced lateral load

γ = soil density = 135 pcf

H = wall height

a = horizontal acceleration = 0.15

BACKFILL IN FRONT OF RETAINING WALLS

Backfill in front of the wall should be structural fill. The material and compaction requirements are presented in **Section 4.9 SITE PREPARATION AND STRUCTURAL FILL**. The density of the structural fill can be assumed to be 135 pounds per cubic feet.

BACKFILL BEHIND RETAINING WALLS

Backfill behind the wall should be free-draining materials which are typically granular soils containing less than 5 percent fines (silt and clay particles) and no particles greater than 4 inches in diameter. The backfill material should be placed in 6 to 8-inch thick horizontal lifts and compacted to at least 90 percent of the maximum density in accordance with ASTM D-1557 test procedures. In the areas where the fill will support pavement, sidewalk or slabs, the top two feet of the backfill should be compacted to at least 95 percent of the maximum density. Care must be taken when compacting backfill adjacent to retaining walls, to avoid creating excessive pressure on the wall.

DRAINAGE BEHIND RETAINING WALLS

Rigid, perforated drainpipes should be installed behind retaining walls. Drainpipes should be at least 4 inches in diameter, covered by a layer of uniform size drain gravel of at least 12 inches in thickness, and be connected to a suitable discharge location. An adequate number of cleanouts should be installed along the drain line for future maintenance.

4.7 ROCKERY WALLS

In addition to concrete retaining walls, reinforced or non-reinforced rockery walls can be considered for grading purposes. Please note that rockery walls should be designed by a geotechnical engineer for the

following conditions:

1. The wall will be used to retain fill.
2. The surface behind the wall is not level.
3. The wall will retain a cut embankment greater than 6 feet in height.

The design should consider the slope behind the wall, the wall height, the surcharge load behind the wall, and the strength of the reinforcing material (if required). We will be glad to perform this design, if requested.

4.8 TEMPORARY AND PERMANENT EXCAVATIONS

When temporary excavations are required during construction, the contractor should be responsible for the safety of their personnel and equipment. The followings cut angles are provided only as a general reference:

For temporary excavations less than 4 feet in depth, the cut bank may be excavated vertically. For temporary excavations greater than 4 feet in depth, the cut can be 1H:1V. Flatter slopes for all temporary cuts may be required if seepage occurs.

All permanent slopes should be no steeper than 2H:1V. Water should not be allowed to flow uncontrolled over the top of any slope. Also, all permanent slopes should be seeded with the appropriate species of vegetation to reduce erosion and maintain the slope stability.

4.9 SITE PREPARATION, STRUCTURAL FILL AND UNDERGROUND UTILITIES

We recommend that areas of structures and roads be stripped of vegetation, tree roots, and topsoil. All underground utilities should also be removed. After stripping and excavation, subgrades of slabs, pavement, or areas to receive new fill should be thoroughly proof-rolled using heavy construction equipment. If the subgrade is wet and proof rolling is not feasible, the area should be probed using a steel bar so as to avoid disturbance and rutting of the subgrade soils. Areas which are found to be loose or soft, or which contain organic soils should be over-excavated.

The proof-rolling and/or probing should be observed/performed by an engineer from our office. Our

engineer will evaluate the over-excavation requirements and provide recommendation regarding the use of geotextile, if needed.

After stripping, over-excavation and excavation to the design grade, the top 12 inches of the native soils should be re-compacted to at least 90% of their maximum dry density as determined using ASTM D-1557 test procedures (Modified Proctor test).

Structural fill can then be placed in the over-excavation and fill areas. All fill materials should be approved by S&EE, Inc. prior to use and should meet both the material and compaction requirements presented below.

MATERIAL REQUIREMENTS

The structural fill material should be free of organic and frozen material. The on-site silty sand, sand and gravel are suitable for use as structural fill. The silty sands are moisture sensitive and should be moisture-conditioned to within ± 2% of their optimum moisture content prior to use. Suitable imported structural fill materials include sand, gravel, sand and gravel (pitrun), and crushed rock.

PLACEMENT AND COMPACTION REQUIREMENTS

The materials should be placed in loose horizontal lifts not exceeding a thickness of 12 inches. Structural fill should be compacted to at least 95% of the maximum dry density as determined using the ASTM D-1557 test procedures. Care must be taken when structural fill is placed on slopes. The procedure requires that the existing slope be benched so that the new fill can be keyed into the slope. We recommend testing the fill as it is placed.

Excavation subgrade and site surface should be graded so that surface water is directed away from the structural areas. Standing water should not be allowed. Final grades should be sloped away from buildings and roads unless the area is paved.

Construction of underground utility would encounter minimal groundwater seepage. We envision that the water can be handled by pumping from sumps.

4.10 SEISMIC CONSIDERATIONS

The site is located in a Zone 3 seismic risk area. We recommend that Site Class C as defined in the 2003 IBC be considered for the building design. The site is underlain by dense soils. As such, the liquefaction potential is negligible.

4.11 FLEXIBLE PAVEMENT

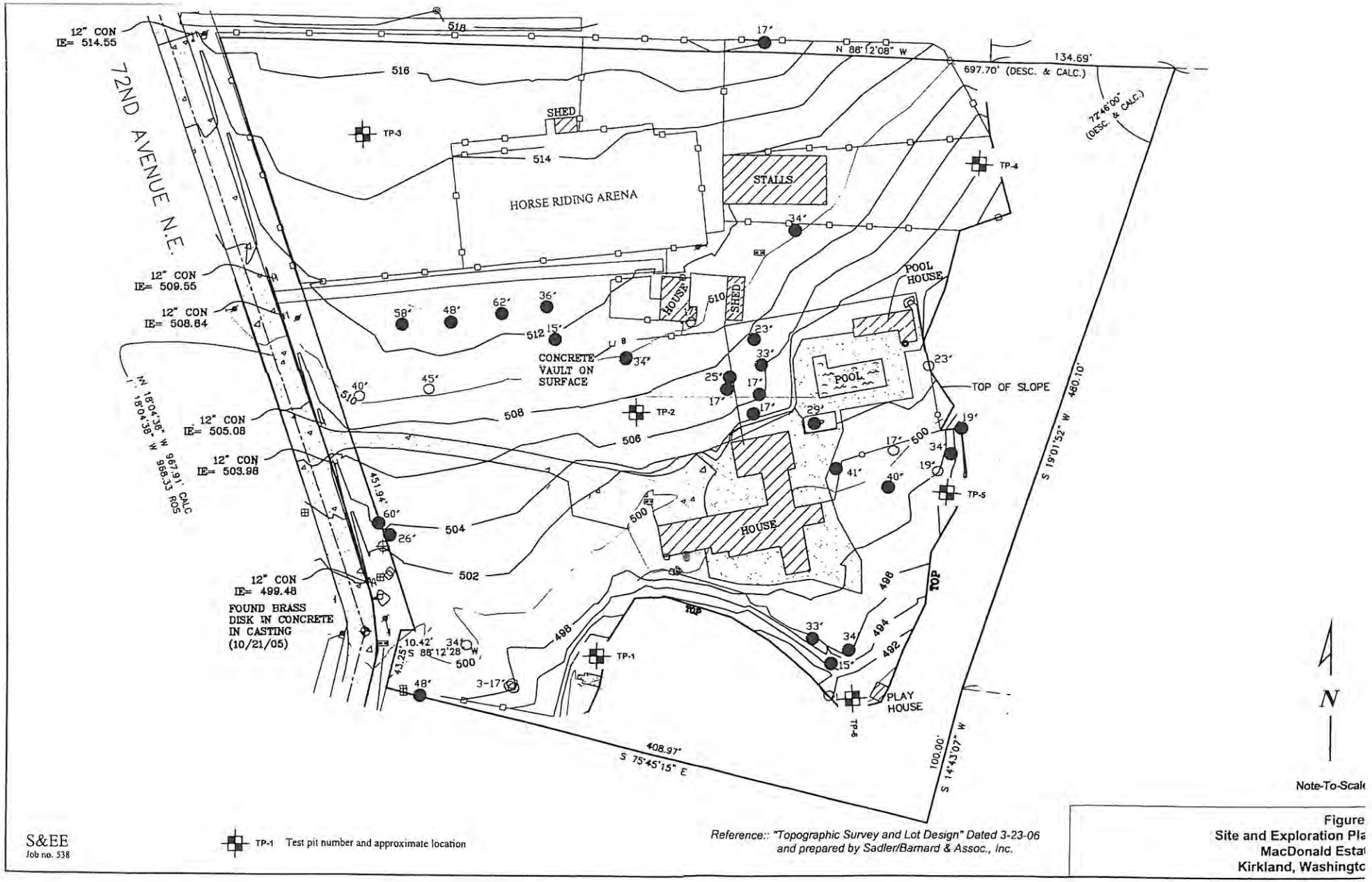
We recommend that the subgrade for flexible pavement be prepared in accordance with the recommendations presented in **Section 4.9 SITE PREPARATION AND STRUCTURAL FILL**. Based on the subsoil conditions, we believe that the prepared subgrade will have a California Bearing Ratio (CBR) of at least 10.

We recommend the following flexible pavement sections for light and medium traffic conditions:

Light traffic (Daily EAL = 5 or less): 2 inches asphaltic concrete over 4 inches base course
Medium traffic (Daily EAL = 20 to 80): 3 inches asphaltic concrete over 6 inches base course

The base course should be compacted to at least 95 percent of the maximum dry density as determined by ASTM D-1557 test method. The material should meet WSDOT aggregate specification 9-03.9(3) and have the following gradation:

Sieve Size	Percent Passing
1 ¼-inch	100
5/8-inch	50-80
1/4-inch	30-50
US No. 40	3-18
US No. 200	7.5 max.
% Fracture	75 min.


12" CON
IE= 514.55
72ND AVENUE N.E.
518
516
514
512
510
508
506
504
502
500
498
494
492
TP-3
SHED
HORSE RIDING ARENA
STALLS
TP-4
N 88°12'08" W
697.70' (DESC. & CALC.)
134.69'
72°46'00"
(DESC. & CALC.)
12" CON
IE= 509.55
12" CON
IE= 508.64
12" CON
IE= 505.08
12" CON
IE= 503.98
12" CON
IE= 499.48
FOUND BRASS
DISK IN CONCRETE
IN CASTING
(10/21/05)
N 18°04'38" W 967.91' CALC
18°04'38" W 968.33 ROS
451.94'
CONCRETE
VAULT ON
SURFACE
HOUSE
SHED
POOL HOUSE
POOL
TOP OF SLOPE
TP-2
TP-5
HOUSE
TOP
TOE
TP-1
10.42'
S 88°12'28" W
43.25'
3-17'
PLAY
HOUSE
TP-8
408.97'
S 75°45'15" E
100.00'
S 14°43'07" W
S 19°01'52" W 480.10'
N
Note-To-Scale
S&EE
Job no. 538
TP-1 Test pit number and approximate location
Reference:: "Topographic Survey and Lot Design" Dated 3-23-06
and prepared by Sadler/Barnard & Assoc., Inc.
Figure
Site and Exploration Pla
MacDonald Estat
Kirkland, Washingtc

4.12 ADDITIONAL SERVICES

Additional services may be required during the design and construction of the project. We envision that these additional services may include the following:

1. Review of design plans and response to contractor's questions and county's comments.

2. Provision of rockery wall and other geotechnical designs.

3. Monitoring of site grading and roadway subgrade preparation.

4. Monitoring the installation of surface and subsurface drains; observation and approval of discharge locations.

5. Monitoring of foundation subgrade preparation. Our representative will confirm the bearing capacity of the subgrade soils, and will assist the contractor in evaluating the over-excavation requirements, if any.

6. Monitoring the placement and compaction of structural and select fill. Our representative will confirm the suitability of the fill materials, perform field density tests, and assist the contractor in meeting the compaction requirements.

7. Other geotechnical issues deemed necessary.

5.0 CLOSURE

The recommendations presented in this report are provided for design purposes and are based on soil conditions disclosed by field observations and subsurface explorations. Subsurface information presented herein does not constitute a direct or implied warranty that the soil conditions between exploration locations can be directly interpolated or extrapolated or that subsurface conditions and soil variations different from those disclosed by the explorations will not be revealed. The recommendations outlined in this report are based on the assumption that the development plan is consistent with the description provided in this report. If the development plan is changed or subsurface conditions different from those disclosed by the exploration are observed during construction, we should be advised at once so that we can review these conditions, and if necessary, reconsider our design recommendations.

S&EE
SOIL & ENVIRONMENTAL ENGINEERS, INC.
16625 Redmond Way, Suite M 124, Redmond, Washington 98052, (425) 868-5868 FAX (425) 868-7427

May 1, 2006

Ms. Marcia Pettersen
C/O Lang Associates, Inc.
10658 Riviera Place NE
Seattle, WA 98125
Attn: Mr. De-En Lang

Geotechnical Investigation
Proposed Subdivision
Joan MacDonald Estates
King County, Washington

Dear De-En:

We are pleased to present herewith our Report of Geotechnical Investigation for the referenced project. Our services were authorized by Mrs. Marcia MacDonald Pettersen on September 6, 2005, and have been provided in accordance with our proposal dated August 15, 2005.

We appreciate the opportunity to provide our services. Should you have any question regarding the contents of this report or require additional information, please call.

Very truly yours,
SOIL & ENVIRONMENTAL ENGINEERS, INC.

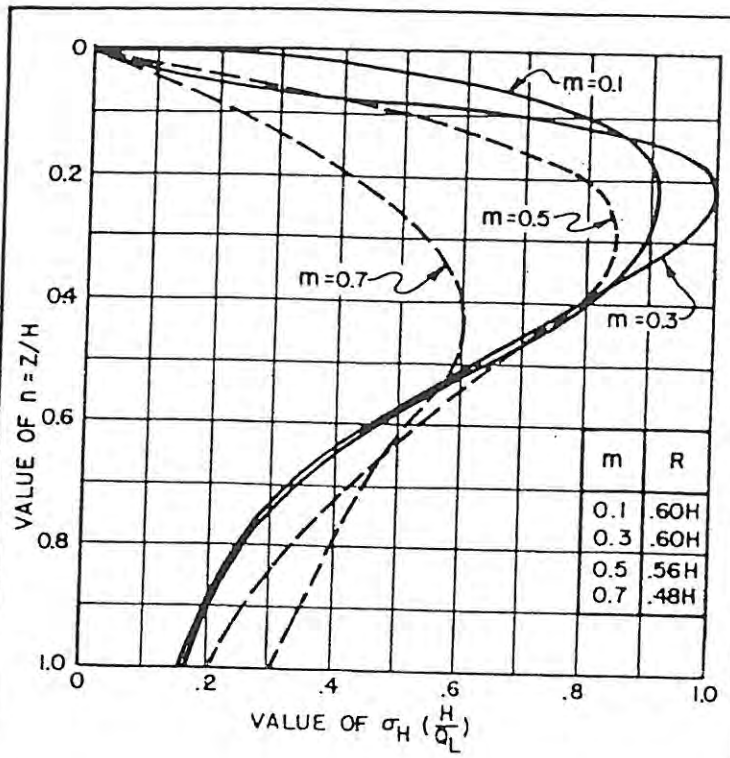
CHARNG-JENG SHIN
STATE OF WASHINGTON
28166
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES: NOV. 2006

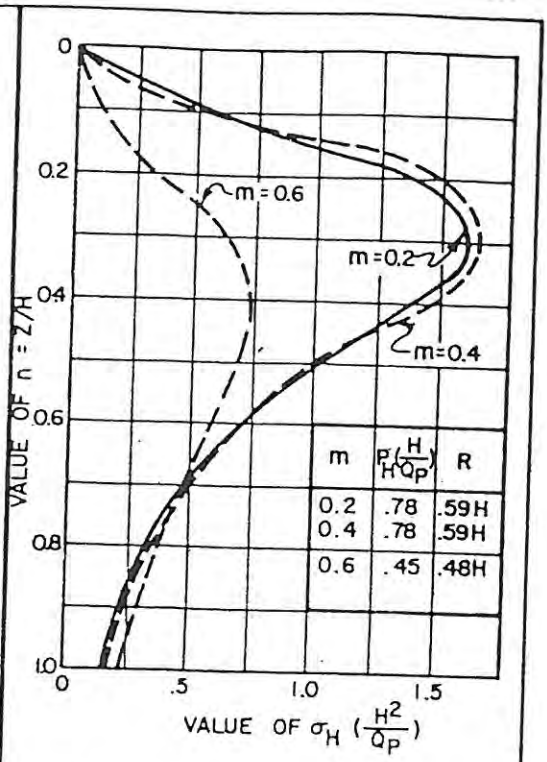
5-1-06

C. J. Shin, Ph.D., P.E.
President

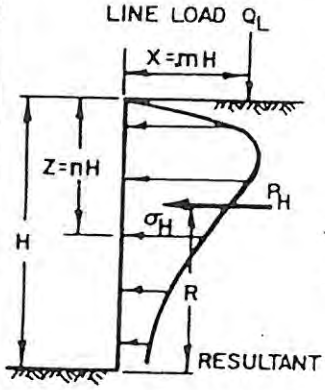
538rpt



m	R
0.1	.60H
0.3	.60H
0.5	.56H
0.7	.48H



m	$P_H(\frac{H}{Q_P})$	R
0.2	.78	.59H
0.4	.78	.59H
0.6	.45	.48H



FOR $m \leq 0.4$:

$$\sigma_H(\frac{H}{Q_L}) = \frac{0.20n}{(0.16+n^2)2}$$

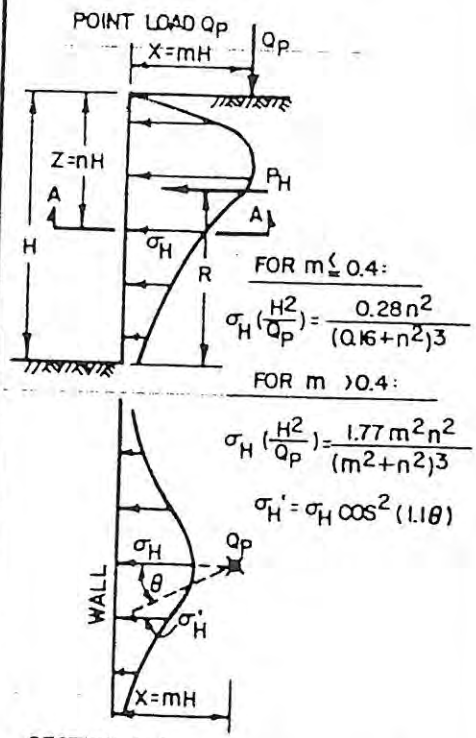
$$P_H = 0.55 Q_L$$

FOR $m > 0.4$:

$$\sigma_H(\frac{H}{Q_L}) = \frac{1.28m^2n}{(m^2+n^2)^2}$$

PRESSURES FROM LINE LOAD Q_L

(BOUSSINESQ EQUATION MODIFIED BY EXPERIMENT)



FOR $m \leq 0.4$:

$$\sigma_H(\frac{H^2}{Q_P}) = \frac{0.28n^2}{(0.16+n^2)^3}$$

FOR $m > 0.4$:

$$\sigma_H(\frac{H^2}{Q_P}) = \frac{1.77m^2n^2}{(m^2+n^2)^3}$$

$$\sigma'_H = \sigma_H \cos^2(1.1\theta)$$

SECTION A-A

PRESSURES FROM POINT LOAD Q_P

(BOUSSINESQ EQUATION MODIFIED BY EXPERIMENT)

rence: Foundations and Earth Structures,
ign Manual 7.2, Department of the Navy, May 1982

Calculation of Surcharge Loads on Subsurface Walls

Figure 2

APPENDIX A

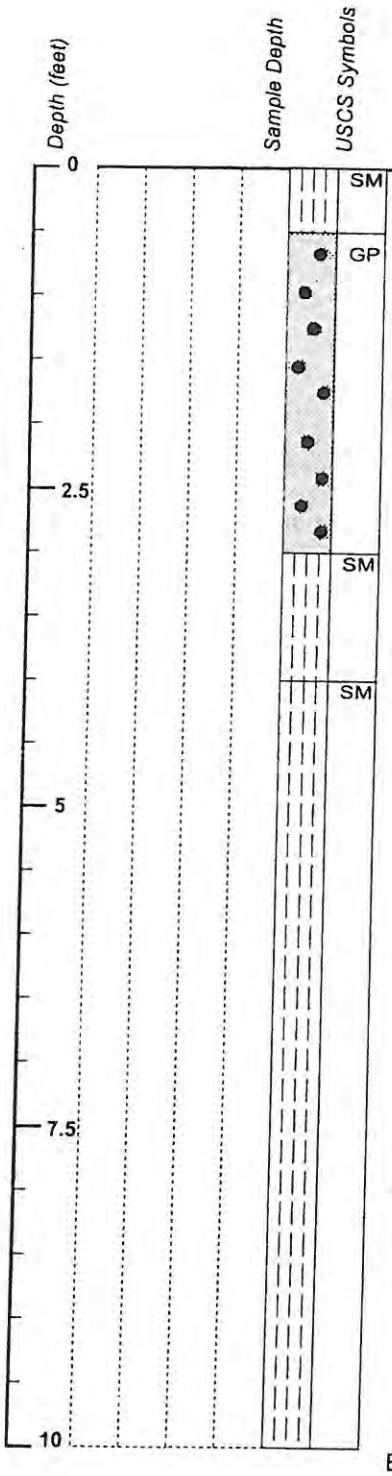
FIELD EXPLORATION AND LOGS

The soil conditions underlying the project site were explored by the excavation of 6 test pits on April 14, 2006. The approximated test pit locations are shown on Figure 1 - Site and Exploration Plan which is included at the end of this report.

The test pits were excavated with a Case 9007 trackhoe. A representative from S&EE was present throughout the exploration to excavate the pits and log the subsurface soil conditions. Test pit logs are presented in this appendix. A chart showing the Unified Soil Classification System is included at the end of this appendix.

All test pits were backfilled with the excavated soils, which were placed in 2-foot thick lifts and compacted with the trackhoe bucket. Please note that if these test pits coincide with the future footing locations, the upper 4 feet of the backfill in the test pits should be removed and then backfilled with structural fill.

TEST PIT TP-1



Soil Description

Brown silty sand with some gravel and roots (topsoil)

Brown fine to coarse gravel with fine to coarse sand and trace silt, some roots (damp)(loose)(fill)

Dark brown silty sand with roots (damp)(loose)(old topsoil)

Mottled light gray silty fine sand with some fine gravel (damp)(dense)(till)

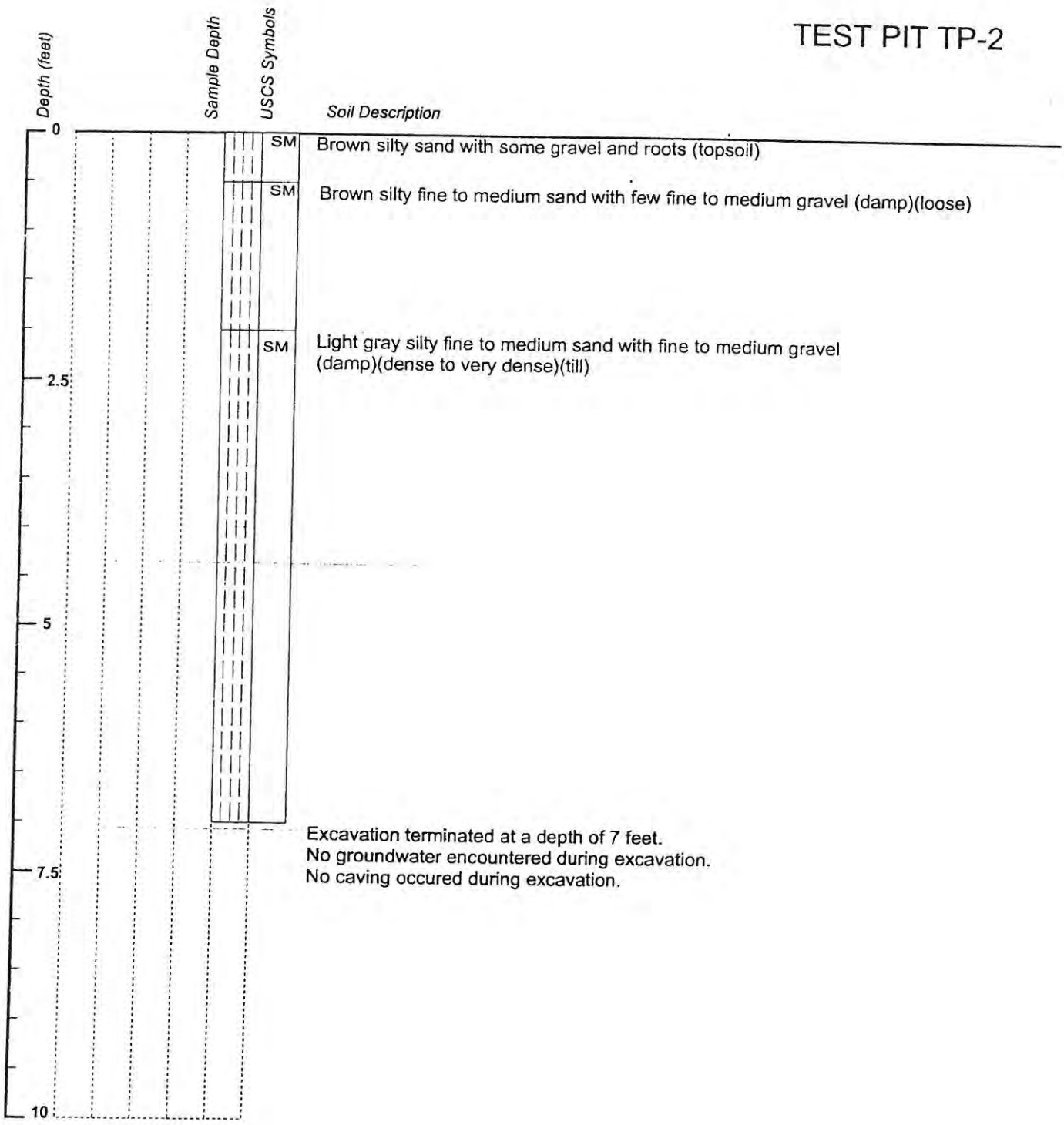
-groundwater seepage about 1/5 gallon per minute at 8 feet

Excavation terminated at a depth of 10 feet.
No caving occured during excavation

Client: Mrs. Marcia MacDonald Petersen
Exploration Method: Case 9007 trackhoe
Exploration Date: April 14, 2006
Ground Elevation: 491 feet

Figure A-1

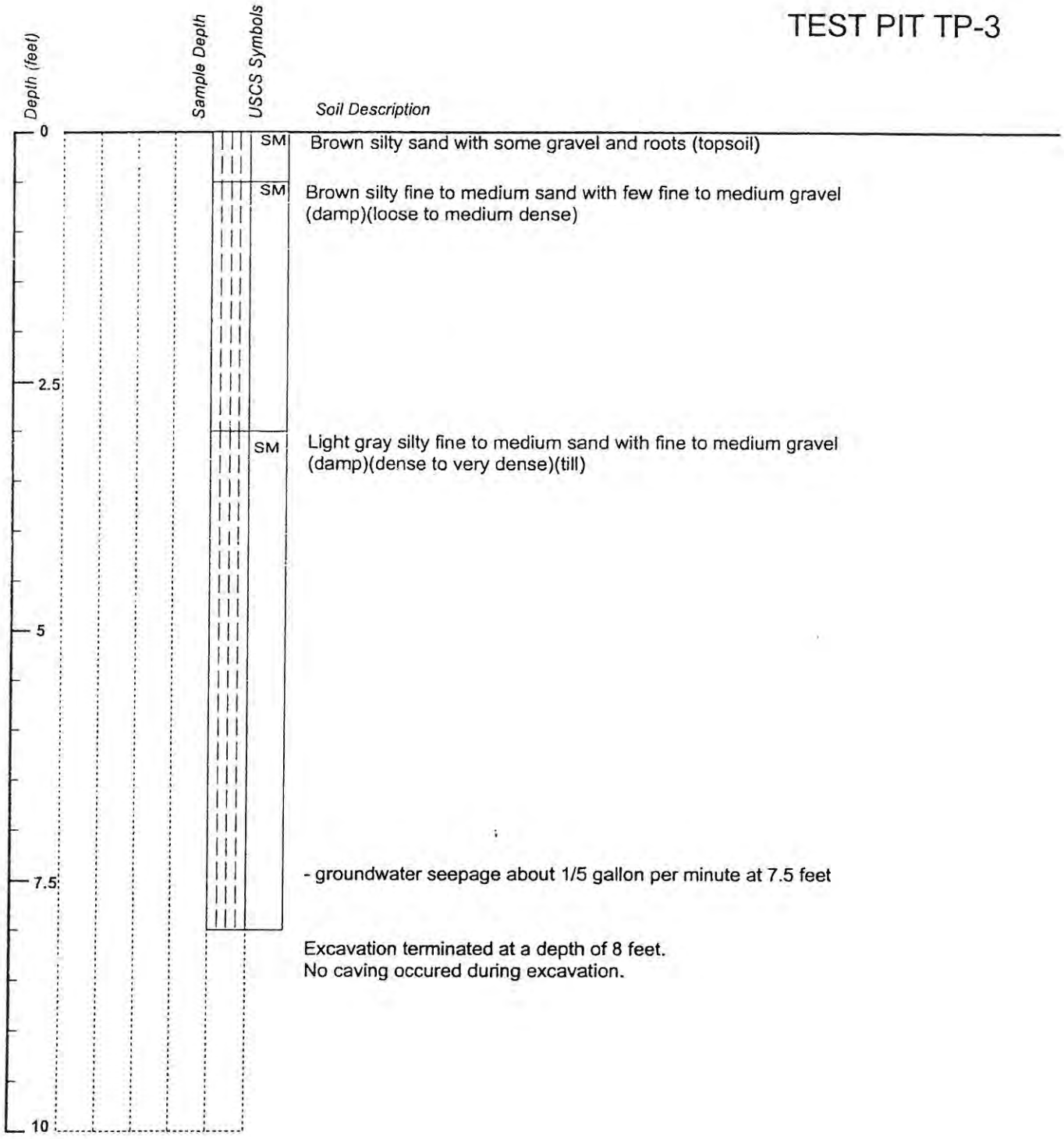
TEST PIT TP-2



Client: Mrs. Marcia MacDonald Petersen
Exploration Method: Case 9007 trackhoe
Exploration Date: April 14, 2006
Ground Elevation: 507 feet

Figure A-2

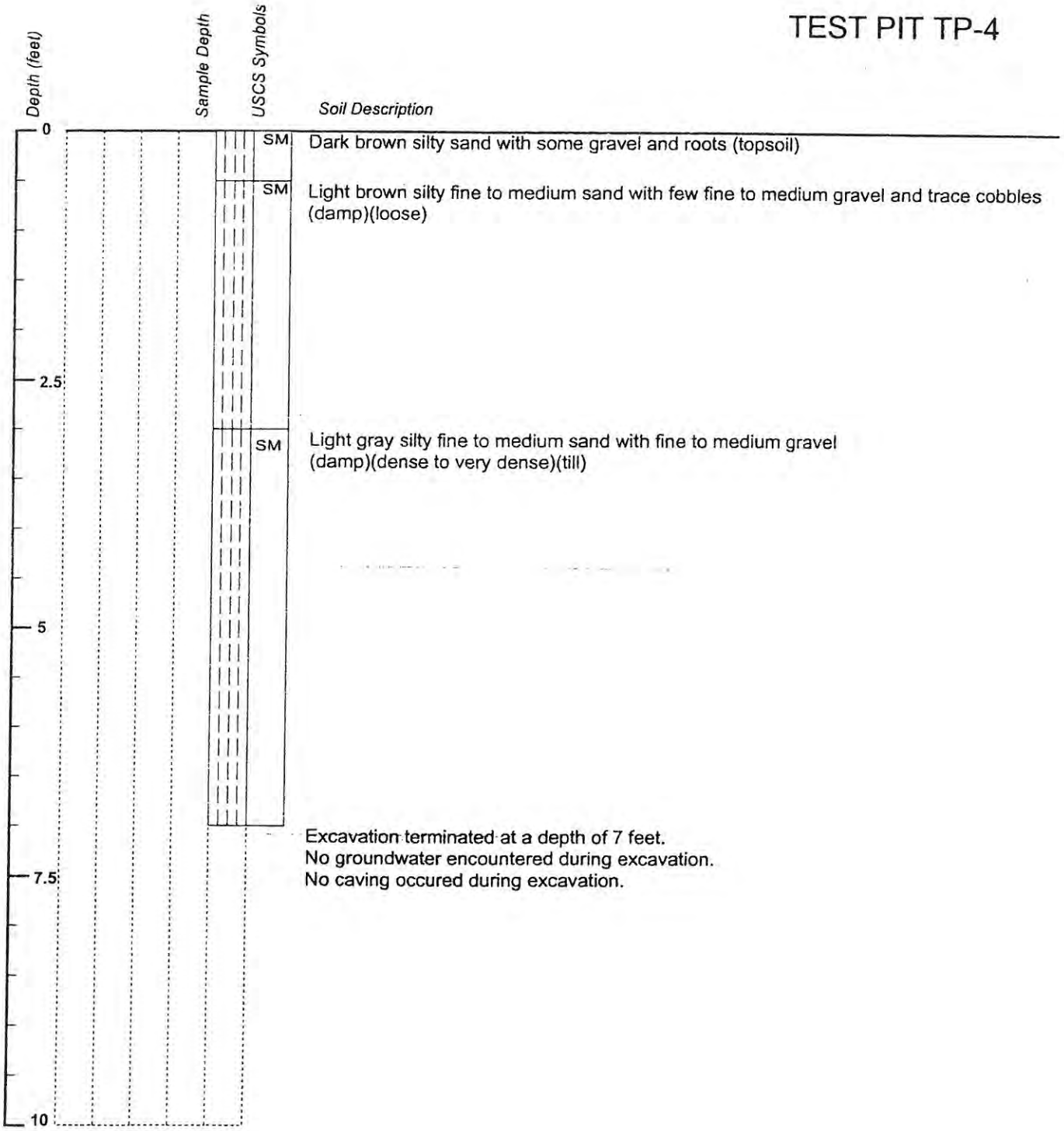
TEST PIT TP-3



Client: Mrs. Marcia MacDonald Petersen
Exploration Method: Case 9007 trackhoe
Exploration Date: April 14, 2006
Ground Elevation: 515 feet

Figure A-3

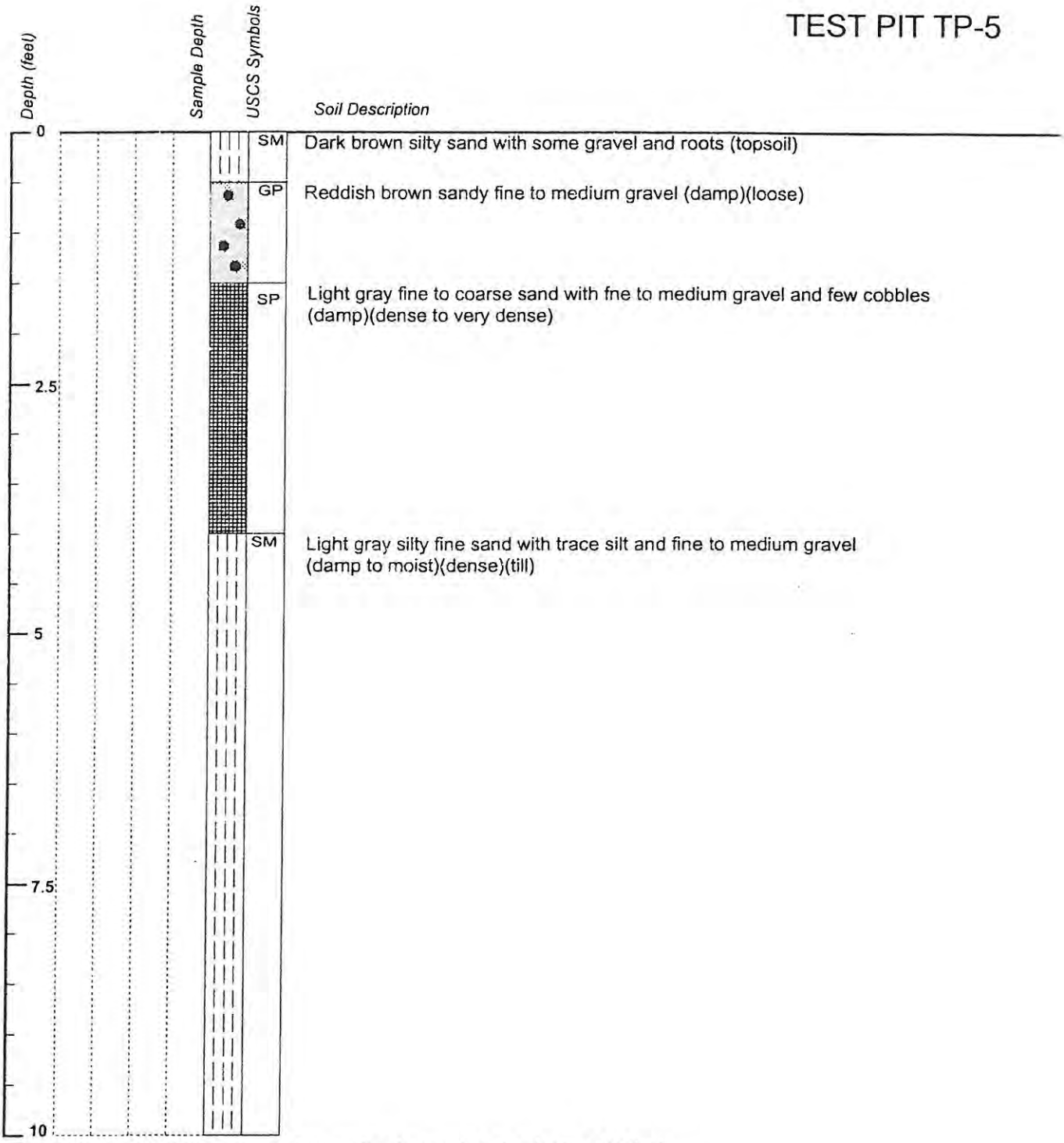
TEST PIT TP-4



Client: Mrs. Marcia MacDonald Petersen
Exploration Method: Case 9007 trackhoe
Exploration Date: April 14, 2006
Ground Elevation: 504 feet

Figure A-4

TEST PIT TP-5



Excavation terminated at a depth of 10 feet.
No groundwater encountered during excavation.
No caving occured during excavation.

Client: Mrs. Marcia MacDonald Petersen
Exploration Method: Case 9007 trackhoe
Exploration Date: April 14, 2006
Ground Elevation: 496 feet

Figure A-5

UNIFIED SOIL CLASSIFICATION SYSTEM

SYMBOL	LETTER	DESCRIPTION	MAJOR DIVISIONS		
	GW	WELL-GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	CLEAN GRAVELS (LITTLE OR NO FINES)	GRAVELS MORE THAN HALF OF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE SIZE	COARSE-GRAINED SOILS MORE THAN HALF OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE
	GP	POORLY-GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES			
	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		
	GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES			
	SW	WELL-GRADED SAND OR GRAVELLY SANDS, LITTLE OR NO FINES	CLEAN SANDS (LITTLE OR NO FINES)	SANDS MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE SIZE	
	SP	POORLY-GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES			
	SM	SILTY SANDS, SAND-SILT MIXTURES	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		
	SC	CLAYEY SANDS, SAND-CLAY MIXTURES			
	ML	INORGANIC SILTS, VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY	SILTS & CLAYS LIQUID LIMIT LESS THAN 50		FINE-GRAINED SOILS MORE THAN HALF OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE
	CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS			
	OL	ORGANIC SILTS AND ORGANIC SILT-CLAYS OF LOW PLASTICITY			
	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS	SILTS & CLAYS LIQUID LIMIT GREATER THAN 50		
	CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS			
	OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS			
	PT	PEAT AND OTHER HIGHLY ORGANIC SOILS	HIGHLY ORGANIC SOILS		

FOR VISUAL CLASSIFICATION, THE 1/4" SIZE MAY BE USED AS EQUIVALENT TO THE NO. 4 SIEVE SIZE

THE NO. 200 U.S. STANDARD SIEVE IS ABOUT THE SMALLEST PARTICLE VISIBLE TO THE NAKED EYE

7 DEPTH OF GROUNDWATER DURING EXCAVATION

SOIL CLASSIFICATION CHART AND KEY TO TEST PIT LOG

S&EE

Preliminary Drainage and Sewage Report

Enclosure 5

MACDONALD ESTATES PLAT
TRAFFIC IMPACT ANALYSIS

CITY OF KIRKLAND

Prepared for

Greg Nelson
William Buchan Homes
2630 116th Ave NE, Suite 100
Bellevue, WA 98004

Prepared by

11410 NE 124th St., #590
Kirkland, Washington 98034
Telephone: 425.522.4118

June 17, 2015

TraffEx
NORTHWEST TRAFFIC EXPERTS
11410 NE 124th St., #590 Kirkland, WA 98034
Phone: 425.522.4118 Fax: 425.522.4311

June 17, 2015

Greg Nelson
William Buchan Homes
2630 116th Ave NE, Suite 100
Bellevue, WA 98004

Re: MacDonald Estates Plat – City of Kirkland
Traffic Impact Analysis

Dear Mr. Nelson:

We are pleased to submit this traffic impact analysis for the proposed 16 lot MacDonald Estates Plat located at 12704 72nd Ave. NE in the City of Kirkland. Preliminary trip generation and project information was submitted to the City in a letter report dated May 12, 2015. The project passed the traffic concurrency test per the May 20, 2015 memo attached in the technical appendix.

This TIA was prepared based on the City of Kirkland's current Traffic Impact Analysis Guidelines, the concurrency model trip distribution provided by the City and discussions with Thang Nguyen a Transportation Engineer on the City's staff.

PROJECT DESCRIPTION

Figure 1 is a vicinity map showing the location of the site and the surrounding major street network. The proposed MacDonald Estates Plat is located at 12704 72nd Ave. NE in the City of Kirkland.

Figure 2 shows a preliminary site plan. The project consists of 16 single family homes. Proposed access is a new street to 72nd Ave. NE.

The 3.8 acre site is currently occupied by a single family home and associated outbuildings that will be removed with the development.

The anticipated build out and occupancy year of the MacDonald Estates Plat is 2017.

TRIP GENERATION

The removal of the existing single family home will result in a net increase of 15 single family homes with the development of this 16 lot plat. The MacDonald Estates plat is expected to generate the vehicular trips during an average weekday and during the street traffic peak hours as shown in the following table:

TRIP GENERATION (NET 15 SF HOMES) MACDONALD ESTATES PLAT

Time Period	*Trip equation*	*Trips Entering*	*Trips Exiting*	*Net New Trips Total*
Average Weekday	Ln(t)=0.92Ln(x) +2.72	91 50%	92 50%	183
AM Peak Hour	t=0.7x+9.74	5 25%	15 75%	20
PM Peak Hour	Ln(t)=0.90Ln(x) +0.51	12 63%	7 37%	19

t= number of trips x=number of units

A vehicle trip is defined as a single or one direction vehicle movement with either the origin or destination (exiting or entering) inside the study site.

The trip generation is calculated using the regression equations in the Institute of Transportation Engineers (ITE) Trip Generation – 9th Edition, for Single Family Detached Housing (ITE Land Use Code 210). These trip generation values account for all site trips made by all vehicles for all purposes, including resident, visitor, and service and delivery vehicle trips.

TRIP DISTRIBUTION AND ASSIGNMENT

Figure 3 shows the PM peak hour site generated traffic volumes and distribution at the site access/72nd St. NE and NE 138th Pl./Juanita Dr. NE intersections. The trip distribution is based on the concurrency model output provided by the City of Kirkland. The City requested LOS calculations for these two intersections.

EXISTING PHYSICAL CONDITIONS

The existing home and associated structures on the project site will be removed with development.

Street Facilities

The primary roads in the study area are classified per the City of Kirkland, are as follows:

72nd Ave NE	Local Street
NE 138th Pl.	Local Street
Juanita Dr. NE	Minor Arterial

72nd Ave NE and NE 138th Pl. have a posted speed limit of 25 mph and generally consists of two lanes with a pavement width of 22 ft. with no curb, gutter or sidewalk. There is a marked trail crossing where 72nd Ave. NE turns east and becomes NE 138th Place. 72nd Ave NE dead ends south of the project site where it intersects NE 126th Street.

Juanita Dr. NE at the intersection of NE 138th Pl. has a posted speed limit of 35 mph, is 34 ft wide including a southbound lane, a northbound lane and a northbound left turn lane with 8 ft. paved shoulders. The north and south approaches to the intersection are marked with 30 mph advisory speed signs.

Sight Distance

72nd Ave NE at the site access is essentially straight and flat. The sight distance meets current City of Kirkland's recommended sight distance requirement of 280 feet looking in both the north and south directions from the side street. The sight distance requirement is for a posted speed limit of 25 mph with stop sign controlled side streets.

The intersection of NE 138th Pl. at Juanita Dr. is on the outside of a horizontal curve. The sight distance meets current City of Kirkland's recommended sight distance requirement of 390 feet looking in both the north and south directions from the side street. The sight distance requirement is for a posted speed limit of 35 mph with stop sign controlled side streets

Accident History

WSDOT and City crash data records show five accidents were reported on or in the vicinity of 72nd Ave NE, NE 138th Pl., and Juanita Dr NE during the four year period from 1/12011 through 12/31/2014. Two accidents were due to driving under the influence, two were due to the driver apparently asleep and one was due to the driver not granting right of way. The crash data is attached in the technical appendix.

We have field reviewed the site and surrounding street system. Based on our field observations, the lack of accident activity and the excellent sight distance, we conclude there are no readily apparent safety issues.

EXISTING TRAFFIC CONDITIONS

Traffic Volumes

AM and PM peak hour turning movement counts was performed at the NE 138 Pl./Juanita Dr. NE intersection on June 3 and 4, 2015. The volumes on 72nd Ave. NE at the site access were calculated using ITE rates for single family homes based on the eleven homes with access to 72nd Ave. NE located south of the project site. The traffic volume turning movement count sheets are included in the technical appendix. Figures 3 and 4 respectfully show the existing AM and PM peak hour traffic volumes at the study intersections.

Level of Service Analysis

LOS is a qualitative measure describing operational conditions within a traffic flow, and the perception of these conditions by drivers or passengers. These conditions include factors such as speed, delay, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety. Levels of service are given letter designations, from A to F, with LOS A representing the best operating conditions (free flow, little delay) and LOS F the worst (congestion, long delays). Generally, LOS A and B are high, LOS C and D are moderate and LOS E and F are low.

Table 1 shows calculated levels of service (LOS) for existing conditions at the study intersection. The LOS's were calculated using the procedures in the Transportation Research Board Highway Capacity Manual. The LOS shown indicates overall intersection operation. At intersections, LOS is determined by the calculated average control delay per vehicle. The LOS and corresponding average control delay in seconds are as follows:

TYPE OF INTERSECTION	A	B	C	D	E	F
Signalized	≤ 10.0	>10.0 and ≤20.0	>20.0 and ≤35.0	>35.0 and ≤55.0	>55.0 and ≤80.0	>80.0
Stop Sign Control	≤10.0	>10 and ≤15	>15 and ≤25	>25 and ≤35	>35 and ≤50	>50

FUTURE TRAFFIC CONDITIONS WITHOUT THE PROJECT

Figures 3 and 4 show projected future AM and PM peak hour traffic volumes without the project. These volumes include the existing traffic volumes plus background traffic growth.

The City of Kirkland requires a 2.0% per year annual background growth factor be applied to existing traffic volumes to estimate future traffic volumes. The background

growth rate factor includes traffic volumes generated from other approved but unbuilt developments (pipeline projects), other planned developments, and general growth in traffic traveling through the area.

These 2015 volumes were increased by 2% per year (for a total of 4%) to estimate 2017 horizon year traffic volumes without the MacDonald Estates project.

FUTURE TRAFFIC CONDITIONS WITH PROJECT

Figures 3 and 4 show the projected PM peak hour traffic volumes with the proposed project. The site-generated peak hour traffic volumes were added to the projected future traffic volumes without project.

The study intersections are calculated to operate at acceptable levels of service in the AM and PM peak hours for future conditions including project generated traffic as shown in Tables 1 and 2.

TRAFFIC MITIGATION

The City of Kirkland requires a transportation impact mitigation fee of $3,942 per each detached single family residential unit. One existing residential unit will be removed with this development, therefore the net new number of residential units is 15 units. The current road impact fee is therefore estimated to be 15 units X $3,942 = $59,130.

Full width street improvements are required on all internal plat streets and half street improvements to 72nd Ave. NE frontage to City of Kirkland Standards including curb, gutter and sidewalk.

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

We recommend that the MacDonald Estates plat be constructed as shown on the site plan with the following traffic impact mitigation measures:

- Construct the full width street improvements on all internal plat streets and half street improvements to the 72nd Ave NE frontage to City of Kirkland Standards including curb, gutter and sidewalk.

- Contribute the transportation mitigation impact fee to the City of Kirkland estimated to be $59,130 using the current fee for a single family unit.

No other traffic mitigation should be necessary. If you have any questions, please call 425-522-4118. You may also contact us via e-mail at vince@nwtraffex.com or larry@nwtraffex.com.

Very truly yours,

Vincent J. Geglia
Principal
TraffEx

Larry D. Hobbs, P.E.
Principal
TraffEx

TABLE 1

AM PEAK HOUR LEVEL OF SERVICE SUMMARY

INTERSECTION	*EXISTING*	*2017 WITHOUT PROJECT*	*2017 WITH PROJECT*
Site Access/72nd Ave. NE	NA	NA	A 8.4 WB
NE 138th Pl./Juanita Dr NE	C 19.1 EB	C 20.2 EB	C 21.5 EB

TABLE 2

PM PEAK HOUR LEVEL OF SERVICE SUMMARY

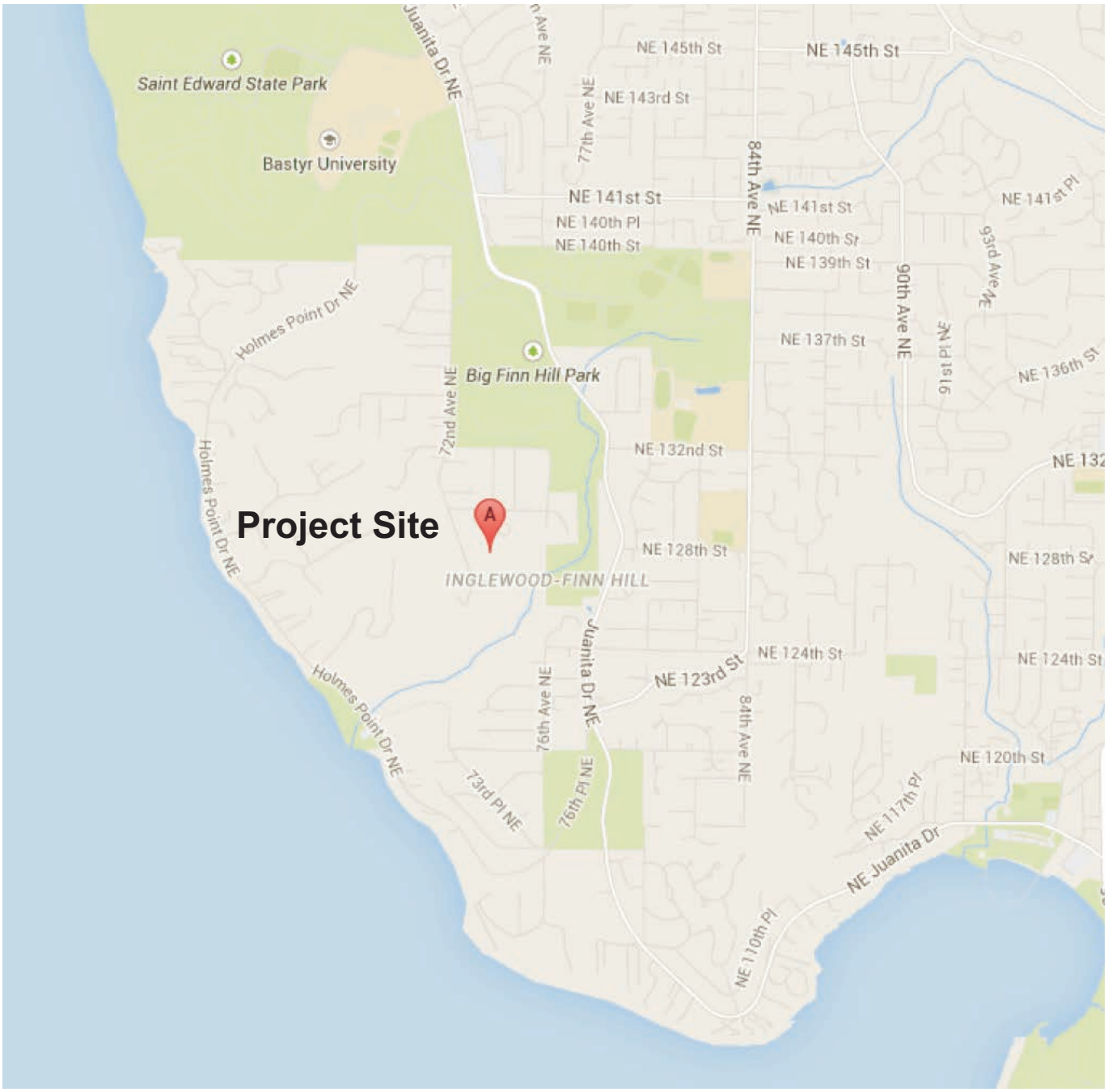
INTERSECTION	*EXISTING*	*2017 WITHOUT PROJECT*	*2017 WITH PROJECT*
Site Access/72nd Ave. NE	NA	NA	A 8.3 WB
NE 138th Pl./Juanita Dr NE	D 25.5 EB	D 27.8 EB	D 29.9 EB

XX Number shown is the average control delay in seconds per vehicle for the minor approach for unsignalized intersections, which determines the LOS for intersections per the Transportation Research Board Highway Capacity Manual

A Indicates calculated level of service

EB (eastbound) Indicates direction of the minor approach for the unsignalized intersection

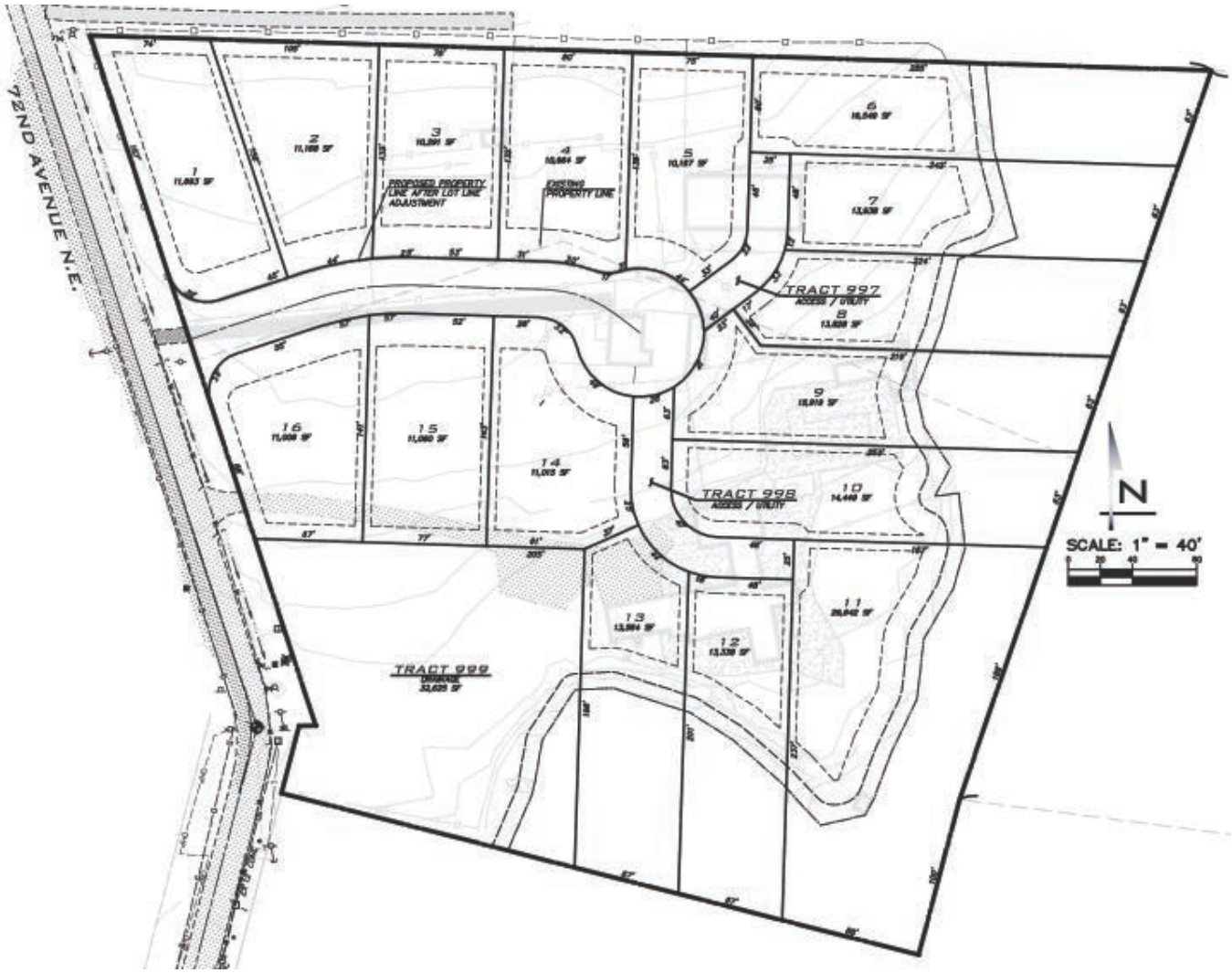
WB (westbound) Indicates direction of the minor approach for the unsignalized intersection



MacDonald Estates Plat

Vicinity Map

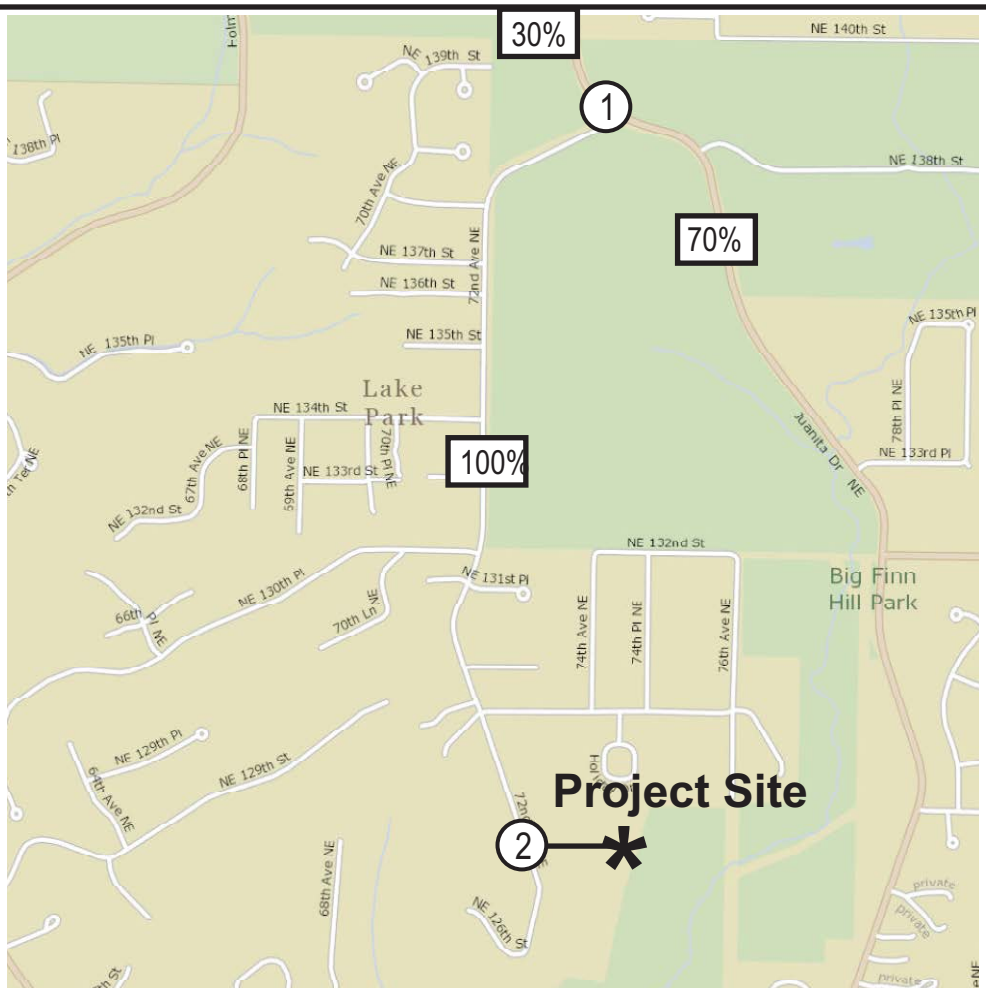
Figure 1



MacDonald Estates Plat

Site Plan

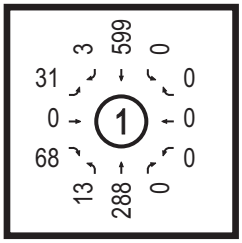
Figure 2



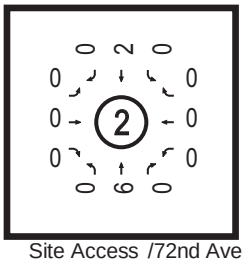
AM Peak Hour
Project Volumes

5 Enter
15 Exit
20 Total

Existing Traffic Volumes

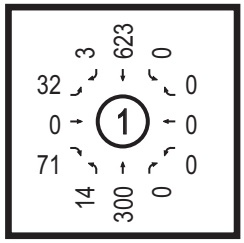


NE138th Pl/ Juanita Dr

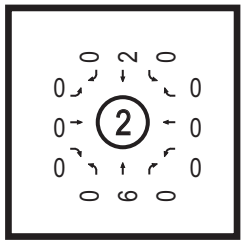


Site Access /72nd Ave

Future Without Project Traffic Volumes

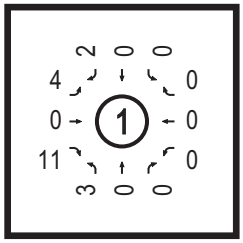


NE138th Pl/ Juanita Dr

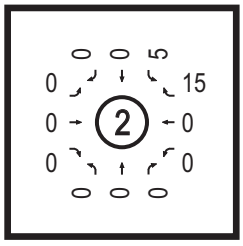


Site Access /72nd Ave

Project Generated Traffic Volumes

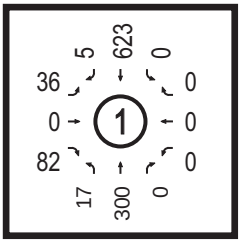


NE138th Pl/ Juanita Dr

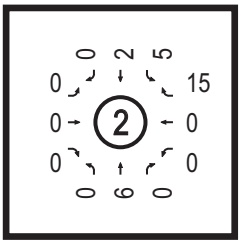


Site Access /72nd Ave

Future With Project Traffic Volumes



NE138th Pl/ Juanita Dr

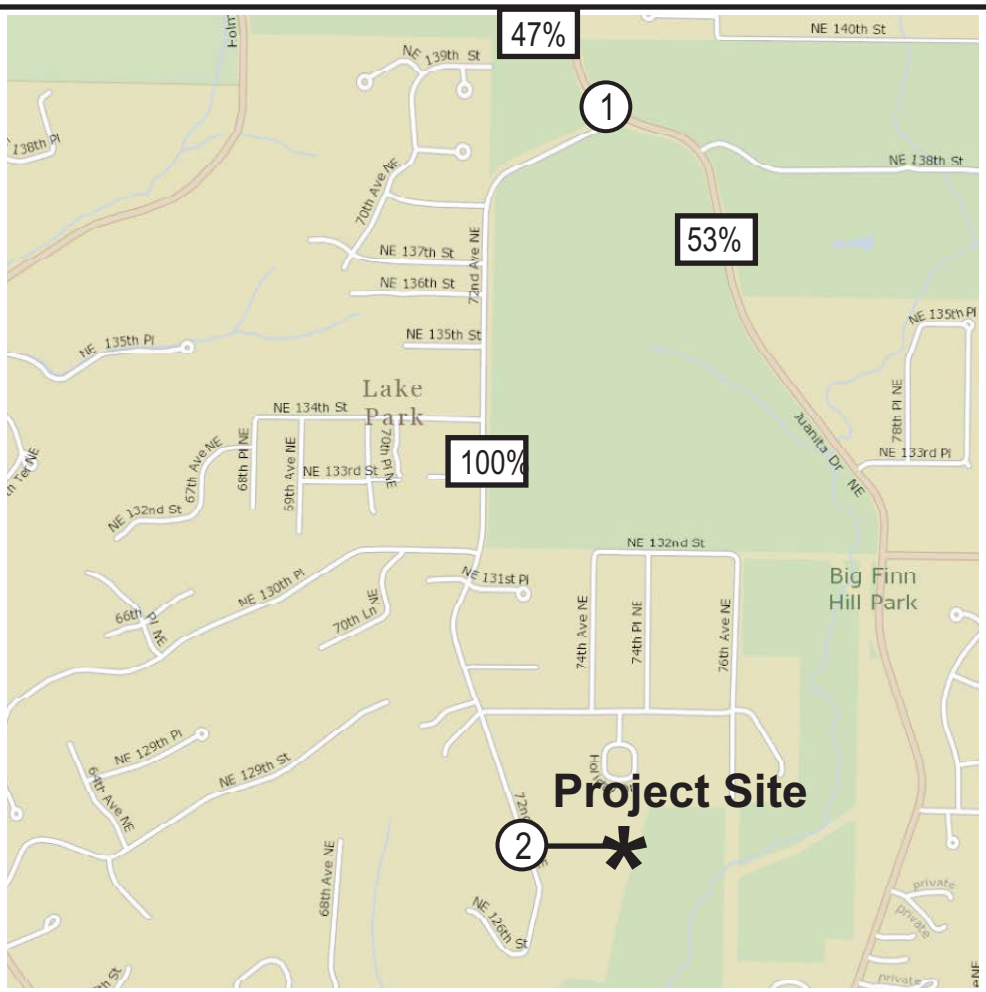


Site Access /72nd Ave

MacDonald Estates Plat

AM Peak Hour Traffic Volumes and Trip Distribution.

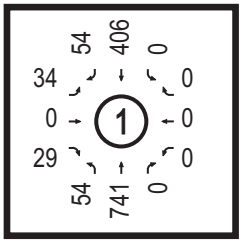
Figure 3



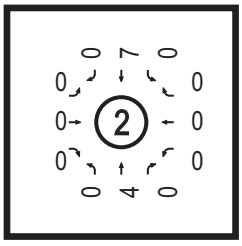
PM Peak Hour
Project Volumes

12 Enter
7 Exit
19 Total

Existing Traffic Volumes

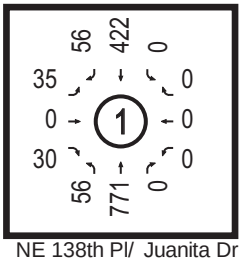


NE 138th Pl/ Juanita Dr

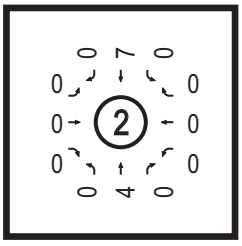


Site Access /72nd Ave

Future Without Project Traffic Volumes

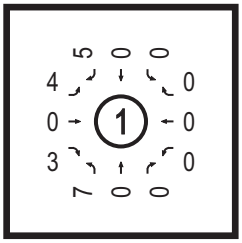


NE 138th Pl/ Juanita Dr

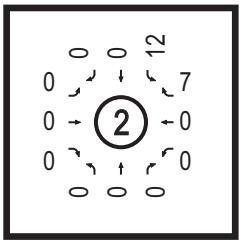


Site Access /72nd Ave

Project Generated Traffic Volumes

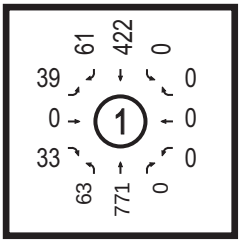


NE 138th Pl/ Juanita Dr

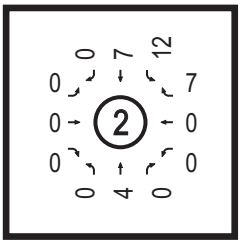


Site Access /72nd Ave

Future With Project Traffic Volumes



NE 138th Pl/ Juanita Dr



Site Access /72nd Ave

MacDonald Estates Plat

PM Peak Hour Traffic Volumes and Trip Distribution.

Figure 4

TECHNICAL APPENDIX

CITY OF KIRKLAND
Department of Public Works
123 Fifth Avenue, Kirkland, WA 98033 425.587.3800
www.kirklandwa.gov

MEMORANDUM

To: Planning Department

From: Thang Nguyen, Transportation Engineer

Date: May 20, 2015

Subject: MacDonald Estates Plat Traffic Concurrency Test Notice, Tran15-00820.

The purpose of this memo is to inform you that the proposed MacDonald Estates Plat residential development has passed traffic concurrency.

Project Description

The applicant proposed to replace the one existing single-family house with 16 single-family houses. One driveway off 72nd Avenue NE will project access to the project site. The project is located at 12702 72nd Avenue NE. The proposed project is anticipated to be completely built and occupied by the end of 2017. The project is forecasted to generate 183 net new daily trips, 19 net new PM peak hour trips and 20 net new AM peak hour trips.

This memo will serve as the concurrency test notice for the proposed project. Per *Section 25.10.020 Procedures* of the KMC (Kirkland Municipal Code), this Concurrency Test Notice will expire in one year (May 20, 2016) unless a development permit and certificate of concurrency are issued or an extension is granted.

EXPIRATION

The concurrency test notice shall expire and a new concurrency test application is required unless:

1. A complete SEPA checklist, traffic impact analysis and all required documentation are submitted to the City within 90 calendar days of the concurrency test notice (August 19, 2015).

2. A Certificate of Concurrency is issued or an extension is requested and granted by the Public Works Department within one year of issuance of the concurrency test notice. (A Certificate of Concurrency is issued at the same time a development permit or building permit is issued if the applicant holds a valid concurrency test notice.)

3. A Certificate of Concurrency shall expire six years from the date of issuance of the concurrency test notice unless all building permits are issued for buildings approved under the concurrency test notice.

APPEALS

The concurrency test notice may be appealed by the public or agency with jurisdiction. The concurrency test notice is subject to an appeal until the SEPA review process is complete and the appeal deadline has passed. Concurrency appeals are heard before the Hearing Examiner along with any applicable SEPA appeal. For more information, refer to the Kirkland Municipal Code, Title 25. If you have any questions, please call me at x3869.

cc: Vincent J. Geglia, TraffEx
John Burkhalter, Senior Development Engineer

OFFICER REPORTED CRASHES THAT OCCURRED on OR in the vicinity OF 72nd AVE NE, NE 138th PL
1/1/2011 - 12/31/2014

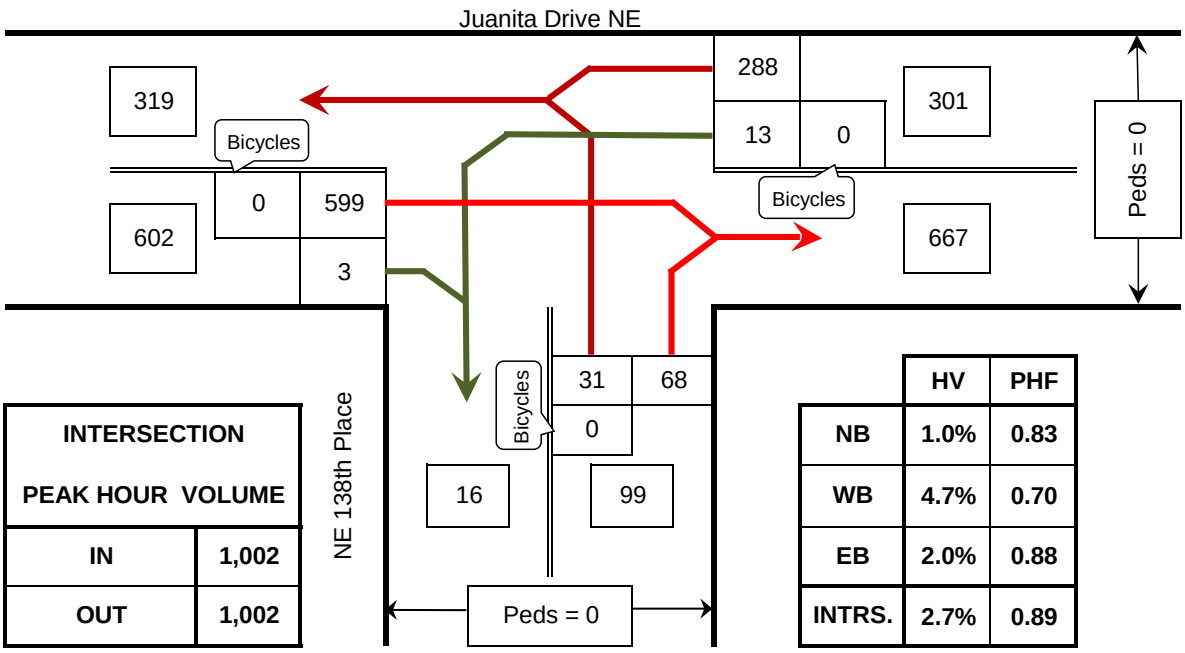
UNDER 23 UNITED STATES CODE – SECTION 409, THIS DATA CANNOT BE USED IN DISCOVERY OR AS EVIDENCE AT TRIAL IN ANY ACTION FOR DAMAGES AGAINST THE WSDOT, OR ANY JURISDICTIONS INVOLVED IN THE DATA

JURISDICTION	PRIMARY TRAFFICWAY	BLOCK NUMBER	INTERSECTING TRAFFICWAY	DIST FROM REF POINT	MI or FT	COMP DIR FROM REF POINT	REFERENCE POINT NAME	MILE POST	A / B	*REPORT NUMBER	DATE	TIME	MOST SEVERE INJURY TYPE	# INJ	# FAT	# VEH	# PED	# PEDAL	VEHICLE 1 TYPE	VEHICLE 2 TYPE	JUNCTION RELATIONSHIP	ROADWAY SURFACE CONDITIONS	LIGHTING CONDITIONS	FIRST COLLISION TYPE / OBJECT STRUCK	VEH 1 ACTION	MV DRIVER CONT CIRC 1 (UNIT 1)	VEH 1 COMP DIR FROM	VEH 1 COMP DIR TO	VEH 2 COMP DIR FROM	VEH 2 COMP DIR TO
City Street	72ND AVE NE	7000	NE 138TH ST							E303707	1/19/2014	1:08	No Injury	0	0	1	0	0	Passenger Car		At Intersection and Not Related	Dry	Dark-Street Lights On	Wood Sign Post	Going Straight Ahead	Under Influence of Alcohol	North	South		
City Street	72ND AVE NE	12700		385	F	N	NE 126TH ST			E371029	8/9/2014	17:15	No Injury	0	0	1	0	0	Passenger Car		Not at Intersection and Not Related	Dry	Daylight	Mailbox	Going Straight Ahead	Apparently Asleep	West	East		
City Street	NE 138TH PL	13800		135	F	N	72ND AVE NE			E386518	12/18/2014	10:43	No Injury	0	0	1	0	0	Pickup,Panel Truck or Van		Not at Intersection and Not Related	Wet	Daylight	Utility Pole	Going Straight Ahead	Apparently Asleep	East	West		
City Street	JUANITA DR	13800		102	F	SE	NE 138TH PL			E293775	12/14/2013	18:02	Serious Injury	6	0	2	0	0	Passenger Car	Passenger Car	Not at Intersection and Not Related	Wet	Dark-Street Lights On	From opposite direction -	Going Straight Ahead	Under Influence of Alcohol	North	South	South	North
City Street	JUANITA DR	13900	72ND AVE NE							E266428	7/16/2013	11:55	Possible Injury	1	0	2	0	0	Pickup,Panel Truck or Van	Passenger Car	At Intersection and Related	Dry	Daylight	Entering at angle	Making Left Turn	Did Not Grant RW to Vehicle	SW	NW	NW	SW

TRAFFIC DATA GATHERING

TURNING MOVEMENTS DIAGRAM

7:00 AM - 9:00 AM PEAK HOUR: 7:15 AM TO 8:15 AM



INTERSECTION PEAK HOUR VOLUME	
IN	1,002
OUT	1,002

	HV	PHF
NB	1.0%	0.83
WB	4.7%	0.70
EB	2.0%	0.88
INTRS.	2.7%	0.89

HV = Heavy Vehicles
PHF = Peak Hour Factor

Juanita Drive NE @ NE 138th Place

Kirkland, WA

COUNTED BY:	SW	DATE OF COUNT:	Thu. 6/4/15
REDUCED BY:	CN	TIME OF COUNT:	7:00 AM - 9:00 AM
REDUCTION DATE:	Thu. 6/4/15	WEATHER:	Sunny

TRAFFIC DATA GATHERING

INTERSECTION TURNING MOVEMENTS REDUCTION SHEET

LOCATION: Juanita Drive NE @ NE 138th Place
Kirkland, WA

DATE OF COUNT: Thu. 6/4/15
TIME OF COUNT: 7:00 AM - 9:00 AM

COUNTED BY: SW
WEATHER: Sunny

TIME INTERVAL ENDING AT	FROM NORTH ON						FROM SOUTH ON NE 138th Place						FROM EAST ON Juanita Drive NE						FROM WEST ON Juanita Drive NE						INTERVAL TOTALS
	Peds	HV	Bicycle	Left	Thru	Right	Peds	HV	Bicycle	Left	Thru	Right	Peds	HV	Bicycle	Left	Thru	Right	Peds	HV	Bicycle	Left	Thru	Right	
05:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	1	0	9	0	15	0	0	0	3	46	0	0	1	0	0	171	1	245
07:30 AM	0	0	0	0	0	0	0	0	0	6	0	21	0	3	0	1	50	0	0	1	0	0	170	1	249
07:45 AM	0	0	0	0	0	0	0	0	0	8	0	12	0	1	0	1	59	0	0	5	0	0	151	1	232
08:00 AM	0	0	0	0	0	0	0	1	0	10	0	20	0	3	0	6	77	0	0	3	0	0	127	1	241
08:15 AM	0	0	0	0	0	0	0	0	0	7	0	15	0	7	0	5	102	0	0	3	0	0	151	0	280
08:30 AM	0	0	0	0	0	0	0	0	0	14	0	18	0	5	0	5	75	0	0	3	0	0	98	6	216
08:45 AM	0	0	0	0	0	0	0	1	0	6	0	22	0	7	0	3	67	0	0	3	0	0	119	3	220
09:00 AM	0	0	0	0	0	0	0	0	0	3	0	22	0	4	0	9	80	0	0	2	0	0	134	4	252
PEAK HOUR TOTALS	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**31**	**0**	**68**	**0**	**14**	**0**	**13**	**288**	**0**	**0**	**12**	**0**	**0**	**599**	**3**	**INTERSECTION**
ALL MOVEMENTS	**0**						**99**						**301**						**602**						**1002**
% HV	**#N/A**						**1.0%**						**4.7%**						**2.0%**						**2.7%**
PEAK HOUR FACTOR	**#N/A**						**0.83**						**0.70**						**0.88**						**0.89**

PHF = Peak Hour Factor

7:00 AM - 9:00 AM PEAK HOUR: **7:15 AM** **TO 8:15 AM**

REDUCED BY: CN

DATE OF REDUCTION: 6/4/2015

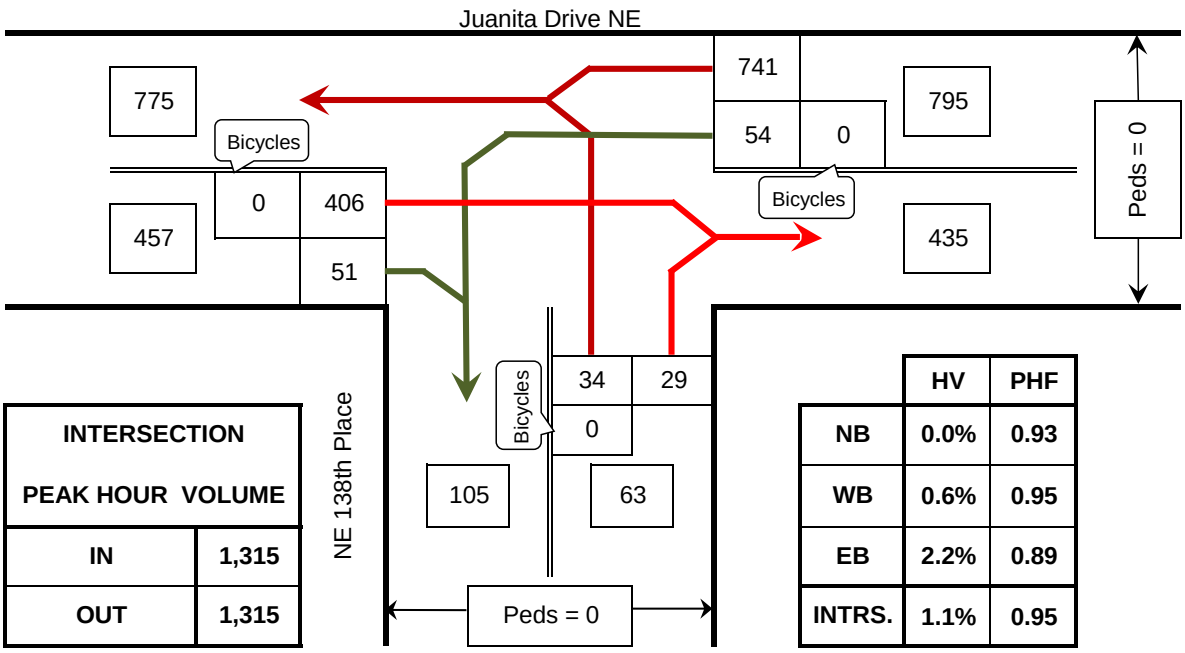
ROLLING HOUR COUNT

TIME INTERVAL	FROM NORTH ON						FROM SOUTH ON NE 138th Place						FROM EAST ON Juanita Drive NE						FROM WEST ON Juanita Drive NE						INTERVAL TOTALS
	Peds	HV	Bicycle	Left	Thru	Right	Peds	HV	Bicycle	Left	Thru	Right	Peds	HV	Bicycle	Left	Thru	Right	Peds	HV	Bicycle	Left	Thru	Right	
5:00 AM - 6:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 AM - 6:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 AM - 6:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 AM - 6:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:00 AM - 7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15 AM - 7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 AM - 7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 AM - 7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 AM - 8:00 AM	0	0	0	0	0	0	0	2	0	33	0	68	0	7	0	11	232	0	0	10	0	0	619	4	967
7:15 AM - 8:15 AM	0	0	0	0	0	0	0	1	0	31	0	68	0	14	0	13	288	0	0	12	0	0	599	3	1002
7:30 AM - 8:30 AM	0	0	0	0	0	0	0	1	0	39	0	65	0	16	0	17	313	0	0	14	0	0	527	8	969
7:45 AM - 8:45 AM	0	0	0	0	0	0	0	2	0	37	0	75	0	22	0	19	321	0	0	12	0	0	495	10	957
8:00 AM - 9:00 AM	0	0	0	0	0	0	0	1	0	30	0	77	0	23	0	22	324	0	0	11	0	0	502	13	968

TRAFFIC DATA GATHERING

TURNING MOVEMENTS DIAGRAM

4:00 PM - 6:00 PM PEAK HOUR: 4:45 PM TO 5:45 PM



INTERSECTION PEAK HOUR VOLUME	
IN	1,315
OUT	1,315

	HV	PHF
NB	0.0%	0.93
WB	0.6%	0.95
EB	2.2%	0.89
INTRS.	1.1%	0.95

HV = Heavy Vehicles
PHF = Peak Hour Factor

Juanita Drive NE @ NE 138th Place

Kirkland, WA

COUNTED BY:	SW	DATE OF COUNT:	Wed. 6/3/15
REDUCED BY:	CN	TIME OF COUNT:	4:00 PM - 6:00 PM
REDUCTION DATE:	Thu. 6/4/15	WEATHER:	Overcast

TRAFFIC DATA GATHERING

INTERSECTION TURNING MOVEMENTS REDUCTION SHEET

LOCATION: Juanita Drive NE @ NE 138th Place
Kirkland, WA

DATE OF COUNT: Wed. 6/3/15
TIME OF COUNT: 4:00 PM - 6:00 PM

COUNTED BY: SW
WEATHER: Overcast

TIME INTERVAL ENDING AT	FROM NORTH ON						FROM SOUTH ON NE 138th Place						FROM EAST ON Juanita Drive NE						FROM WEST ON Juanita Drive NE						INTERVAL TOTALS
	Peds	HV	Bicycle	Left	Thru	Right	Peds	HV	Bicycle	Left	Thru	Right	Peds	HV	Bicycle	Left	Thru	Right	Peds	HV	Bicycle	Left	Thru	Right	
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	5	0	12	0	5	0	16	157	0	0	2	0	0	105	8	303
04:30 PM	0	0	0	0	0	0	0	0	0	10	0	14	0	3	0	9	175	0	0	2	0	0	97	16	321
04:45 PM	0	0	0	0	0	0	0	0	0	6	0	6	0	2	0	9	175	0	0	3	0	0	97	9	302
05:00 PM	0	0	0	0	0	0	0	0	0	10	0	7	0	1	0	10	182	0	0	5	0	0	103	9	321
05:15 PM	0	0	0	0	0	0	0	0	0	8	0	8	0	3	0	13	190	0	0	0	0	0	112	16	347
05:30 PM	0	0	0	0	0	0	0	0	0	10	0	5	0	0	0	9	182	0	0	3	0	0	99	13	318
05:45 PM	0	0	0	0	0	0	0	0	0	6	0	9	0	1	0	22	187	0	0	2	0	0	92	13	329
06:00 PM	0	0	0	0	0	0	0	0	0	7	0	6	0	1	0	17	165	0	0	2	0	0	88	12	295
PEAK HOUR TOTALS	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**34**	**0**	**29**	**0**	**5**	**0**	**54**	**741**	**0**	**0**	**10**	**0**	**0**	**406**	**51**	**INTERSECTION**
ALL MOVEMENTS	**0**						**63**						**795**						**457**						**1315**
% HV	**#N/A**						**0.0%**						**0.6%**						**2.2%**						**1.1%**
PEAK HOUR FACTOR	**#N/A**						**0.93**						**0.95**						**0.89**						**0.95**

PHF = Peak Hour Factor

4:00 PM - 6:00 PM PEAK HOUR: **4:45 PM** **TO** **5:45 PM**

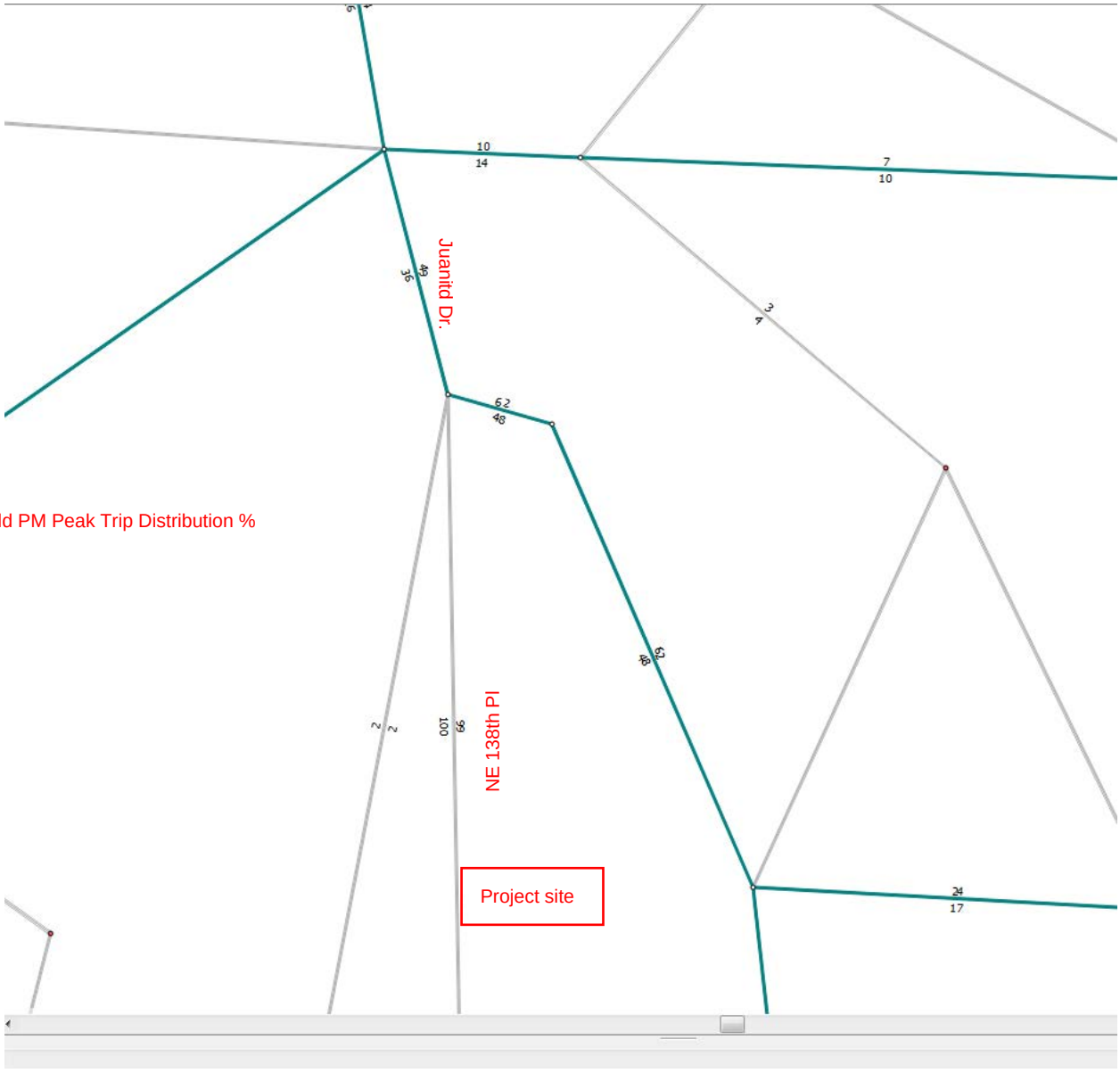
REDUCED BY: CN

DATE OF REDUCTION: 6/4/2015

ROLLING HOUR COUNT

	FROM NORTH ON						FROM SOUTH ON NE 138th Place						FROM EAST ON Juanita Drive NE						FROM WEST ON Juanita Drive NE						INTERVAL TOTALS
TIME INTERVAL	Peds	HV	Bicycle	Left	Thru	Right	Peds	HV	Bicycle	Left	Thru	Right	Peds	HV	Bicycle	Left	Thru	Right	Peds	HV	Bicycle	Left	Thru	Right	
2:00 PM - 3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:15 PM - 3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:30 PM - 3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:45 PM - 3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00 PM - 4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:15 PM - 4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:30 PM - 4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:45 PM - 4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00 PM - 5:00 PM	0	0	0	0	0	0	0	0	0	31	0	39	0	11	0	44	689	0	0	12	0	0	402	42	1247
4:15 PM - 5:15 PM	0	0	0	0	0	0	0	0	0	34	0	35	0	9	0	41	722	0	0	10	0	0	409	50	1291
4:30 PM - 5:30 PM	0	0	0	0	0	0	0	0	0	34	0	26	0	6	0	41	729	0	0	11	0	0	411	47	1288
4:45 PM - 5:45 PM	0	0	0	0	0	0	0	0	0	34	0	29	0	5	0	54	741	0	0	10	0	0	406	51	1315
5:00 PM - 6:00 PM	0	0	0	0	0	0	0	0	0	31	0	28	0	5	0	61	724	0	0	7	0	0	391	54	1289

MacDonald PM Peak Trip Distribution %



Intersection	
Int Delay, s/veh	2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	31	68	13	288	599	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	0	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	1	1	0	5	2	0
Mvmt Flow	35	76	15	324	673	3

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1028	675	676	0	-	0
Stage 1	675	-	-	-	-	-
Stage 2	353	-	-	-	-	-
Critical Hdwy	6.41	6.21	4.1	-	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.309	2.2	-	-	-
Pot Cap-1 Maneuver	260	456	925	-	-	-
Stage 1	508	-	-	-	-	-
Stage 2	713	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	256	456	925	-	-	-
Mov Cap-2 Maneuver	256	-	-	-	-	-
Stage 1	508	-	-	-	-	-
Stage 2	701	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	19.1	0.4	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	925	-	366	-	-
HCM Lane V/C Ratio	0.016	-	0.304	-	-
HCM Control Delay (s)	9	-	19.1	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0	-	1.3	-	-

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	32	71	14	300	623	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	0	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	1	1	0	5	2	0
Mvmt Flow	36	80	16	337	700	3

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1071	702	703	0	-	0
Stage 1	702	-	-	-	-	-
Stage 2	369	-	-	-	-	-
Critical Hdwy	6.41	6.21	4.1	-	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.309	2.2	-	-	-
Pot Cap-1 Maneuver	246	440	904	-	-	-
Stage 1	493	-	-	-	-	-
Stage 2	702	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	242	440	904	-	-	-
Mov Cap-2 Maneuver	242	-	-	-	-	-
Stage 1	493	-	-	-	-	-
Stage 2	690	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	20.2	0.4	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	904	-	351	-	-
HCM Lane V/C Ratio	0.017	-	0.33	-	-
HCM Control Delay (s)	9.1	-	20.2	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.1	-	1.4	-	-

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	36	82	17	300	623	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	0	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	1	1	0	5	2	0
Mvmt Flow	40	92	19	337	700	6

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1078	703	706	0	-	0
Stage 1	703	-	-	-	-	-
Stage 2	375	-	-	-	-	-
Critical Hdwy	6.41	6.21	4.1	-	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.309	2.2	-	-	-
Pot Cap-1 Maneuver	243	439	902	-	-	-
Stage 1	493	-	-	-	-	-
Stage 2	697	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	238	439	902	-	-	-
Mov Cap-2 Maneuver	238	-	-	-	-	-
Stage 1	493	-	-	-	-	-
Stage 2	682	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	21.5	0.5	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	902	-	349	-	-
HCM Lane V/C Ratio	0.021	-	0.38	-	-
HCM Control Delay (s)	9.1	-	21.5	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.1	-	1.7	-	-

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	34	29	54	741	406	51
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	0	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	1	2	0
Mvmt Flow	36	31	57	780	427	54

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1348	454	481	0	-	0
Stage 1	454	-	-	-	-	-
Stage 2	894	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	168	610	1092	-	-	-
Stage 1	644	-	-	-	-	-
Stage 2	403	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	159	610	1092	-	-	-
Mov Cap-2 Maneuver	159	-	-	-	-	-
Stage 1	644	-	-	-	-	-
Stage 2	382	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	25.5	0.6	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1092	-	241	-	-
HCM Lane V/C Ratio	0.052	-	0.275	-	-
HCM Control Delay (s)	8.5	-	25.5	-	-
HCM Lane LOS	A	-	D	-	-
HCM 95th %tile Q(veh)	0.2	-	1.1	-	-

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	35	30	56	771	422	56
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	0	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	1	2	0
Mvmt Flow	37	32	59	812	444	59

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1403	474	503	0	-	0
Stage 1	474	-	-	-	-	-
Stage 2	929	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	156	595	1072	-	-	-
Stage 1	630	-	-	-	-	-
Stage 2	388	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	147	595	1072	-	-	-
Mov Cap-2 Maneuver	147	-	-	-	-	-
Stage 1	630	-	-	-	-	-
Stage 2	367	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	27.8	0.6	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1072	-	225	-	-
HCM Lane V/C Ratio	0.055	-	0.304	-	-
HCM Control Delay (s)	8.6	-	27.8	-	-
HCM Lane LOS	A	-	D	-	-
HCM 95th %tile Q(veh)	0.2	-	1.2	-	-

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	39	33	63	771	422	61
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	0	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	1	2	0
Mvmt Flow	41	35	66	812	444	64

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1420	476	508	0	-	0
Stage 1	476	-	-	-	-	-
Stage 2	944	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	152	593	1067	-	-	-
Stage 1	629	-	-	-	-	-
Stage 2	381	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	143	593	1067	-	-	-
Mov Cap-2 Maneuver	143	-	-	-	-	-
Stage 1	629	-	-	-	-	-
Stage 2	357	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	29.9	0.6	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1067	-	219	-	-
HCM Lane V/C Ratio	0.062	-	0.346	-	-
HCM Control Delay (s)	8.6	-	29.9	-	-
HCM Lane LOS	A	-	D	-	-
HCM 95th %tile Q(veh)	0.2	-	1.5	-	-

Intersection	
Int Delay, s/veh	4.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	7	4	0	12	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	8	4	0	13	8

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	38	4	0	0	4	0
Stage 1	4	-	-	-	-	-
Stage 2	34	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	979	1085	-	-	1631	-
Stage 1	1024	-	-	-	-	-
Stage 2	994	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	971	1085	-	-	1631	-
Mov Cap-2 Maneuver	971	-	-	-	-	-
Stage 1	1024	-	-	-	-	-
Stage 2	986	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.3	0	4.6
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	1085	1631	-
HCM Lane V/C Ratio	-	-	0.007	0.008	-
HCM Control Delay (s)	-	-	8.3	7.2	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	0	-

Intersection	
Int Delay, s/veh	5.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	15	6	0	5	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	16	7	0	5	2

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	20	7	0	0	7	0
Stage 1	7	-	-	-	-	-
Stage 2	13	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	1002	1081	-	-	1627	-
Stage 1	1021	-	-	-	-	-
Stage 2	1015	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	999	1081	-	-	1627	-
Mov Cap-2 Maneuver	999	-	-	-	-	-
Stage 1	1021	-	-	-	-	-
Stage 2	1012	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.4	0	5.2
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	1081	1627	-
HCM Lane V/C Ratio	-	-	0.015	0.003	-
HCM Control Delay (s)	-	-	8.4	7.2	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	0	-

ROMTEC UTILITIES

Enclosure 6

November 13th, 2015

Greg Nelson
William E Buchan, Inc.

RE: NOISE AND SMELL OF THE MACDONALD ESTATES PUMP STATION

Dear Greg—

The following letter is in regards the MacDonald Estates pump station and the questions about noise and smell related to the system.

1. Noise

The pumps being used at the MacDonald Estate lift station are 15hp pumps, and each pump is capable of producing 65 decibels at 1kHz at the pump. The pump station is designed to operate one pump at a time, in alternation.

> *Note: Looking at the attached "loudness camparison chart" a 15HP pump is similar to the noise from a "dishwasher in the next room".*

The 15hp pumps will be located approximately 12' below grade elevation in the bottom of a water tight precast concrete dry well structure. From the top of the dry well structure (where the pumps are located) it is approximately 33 yards away from the nearest home.

The other factor to consider is the frequency and/or infrequency in which the pumps are started.

> *Note: The time when the pumps are operating frequently are when people are in their homes. Typically in the morning (during showering, or making breakfast) and/or in the evening (during dinner, showering, etc.). During the work day and during the night, the pumps will cycle (turn on) very infrequently.*

Pumps of this size, are actually very difficult to hear. When we are on a job site, we would typically have to open the hatch to hear whether a 15HP pump was on or not. In other words, (for a 15HP pump) when we are (10-40 feet away) we would open the hatch to assure that we can hear that the pump is either off or on.

Considering the factors; noise (decibel) level of the pump, the location of the pumps 12' below grade in a precast concrete structure, the proximity of the pump station in relation to the nearest homes, and frequency and/or infrequency of pump

Romtec Utilities, Inc. ~ 18240 North Bank Road ~ Roseburg ~ Oregon ~ 97470
Office 541-496-9678 / Fax 541-496-0804
romtec3@romtecutilities.com

operation, it would be very difficult, if not impossible, to hear the pump station operate.

2. Smell

Sewer lift stations normally do not smell when a person is near them or even standing on top of them. Sewer water is moving and has normally not gone septic, and thus does not smell.

Further, the Romtec Utilities lift station design is configured to maximize the average number of pump starts per day. In other words, we are both starting and stopping the lift station based on level, and we are also starting and stopping the lift station based on time (if there is enough water for a pump cycle).

This approach virtually guarantees that the water moves from the lift station to the discharge point (for the development) before the water could ever "go septic".

CONCLUSION

There are hundreds of thousands of sewage lift stations and manholes throughout the urban portions of the United States. We are often very near them, and quite unaware of them relative to noise and or smell.

Thank you,
Romtec Utilities, Inc.

Ben Cooper
Sales Manager

Romtec Utilities, Inc. ~ 18240 North Bank Road ~ Roseburg ~ Oregon ~ 97470
Office 541-496-9678 / Fax 541-496-0804
romtec3@romtecutilities.com

SOUTH REDDING 6-LANE PROJECT

LOUDNESS COMPARISON CHART (dBA)

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
Jet Fly-over at 1000 ft	110	Rock Band
	100	
Gas Lawn Mower at 3 ft	90	Food Blender at 3 ft
		Garbage Disposal at 3 ft
Diesel Truck at 50 ft at 50 mph	80	
Noisy Urban Area, Daytime		Vacuum Cleaner at 10 ft
Gas Lawn Mower at 100 ft	70	
Commercial Area		Normal Speech at 3 ft
Heavy Traffic at 300 ft	60	
		Large Business Office
Quiet Urban, Daytime	50	Dishwasher Next Room
Quiet Urban, Nighttime		
Quiet Suburban, Nighttime	40	Theater, Large Conference Room (Background)
	30	Library
Quiet Rural, Nighttime		Bedroom at Night, Concert Hall (Background)
	20	Broadcast/Recording Studio
	10	
Lowest Threshold of Human Hearing	0	Lowest Threshold of Human Hearing

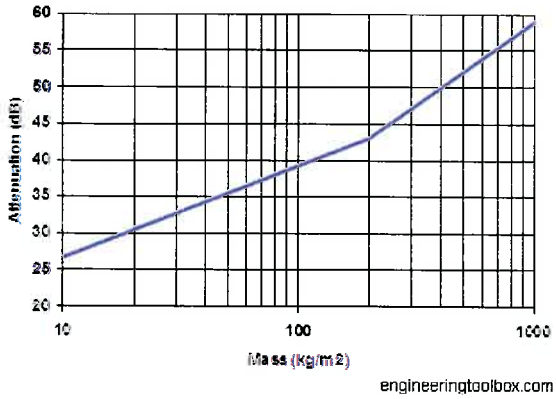
An increase of 3 dBA is barely perceptible to the human ear.

CITY OF REDDING · CALIFORNIA · Shasta County Regional Transportation Planning Agency · Caltrans

Sound Transmission Through Massive Walls or Floors, and other Building Elements

Sound and noise transmission through massive walls or floors - concrete or similar

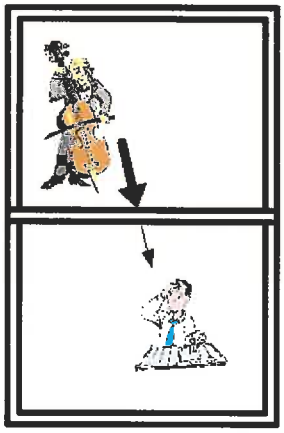
Sound transmission through a massive wall or floor depends primarily on the mass of the construction. The mean attenuation through a massive construction is indicated in the chart below:



The attenuation for a specific frequency can be modified by subtracting the value in the table below from the mean value indicated in the chart above.

Frequency (Hz)	63	125	250	500	1000	2000	4000	8000
Attenuation Correction (dB)	-13	-9	-5	-1	3	7	11	15

Example - Concrete Floor and Sound Attenuation



The mass of a concrete floor with density 2300 kg/m^3 and thickness 0.2 m can be calculated as

(2300 kg/m3) (0.2 m)

= *460 kg/m^2*

Using the chart above the mean sound attenuation for the floor can be estimated to

52 db

The attenuation at 1000 Hz

(52 db) - (3 dB)

= *49 dB*

Sound Transmission Loss of some typical Building Elements

Building Element	Sound Transmission Loss (dB)
230 mm brickwork, plastered both sides	55
230 mm brickwork, plastered one side	48
115 mm brickwork, plastered both sides	47
100 mm timber studs, plasterboard both sides, quilt in cavity	46
6 mm double glazing, 100 mm air gap	44
75 mm clinker concrete block, plastered both sides	44
115 mm brickwork, plastered one side	43
75 mm timber suds, plasterboard both sides	36
6 mm single glazing	29
one layer plasterboard	25

From: santo criscuolo <santoc1968@hotmail.com>
Sent: Tuesday, October 06, 2015 11:34 AM
To: Susan Lauinger
Subject: Lots on 72nd Ave NE - William Buchan and Blue Line Proposal

Good morning Susan,

I own a home on 72nd Ave NE just across the street from where Buchan and Blue Line have proposed building 16 new homes.

I just learned that Buchan has purchased the lot next to mine and is in the process of trying to purchase one more lot on the same side of the street. My understanding is that they plan to build 8 to 10 more homes in addition to the 16 homes already planned for the McDonald estate lots.

We're you aware of this? Are these additional homes being considered during your discussions regarding the first 16 homes?

If you were aware of this, how come it was not mentioned in previous communication?

If you were not aware of this, doesn't it seem a bit under handed? I spoke with the Buchan representative back in April and my wife attended the planning meeting on April 14th. These lots/the additional building was never mentioned.

As you probably are aware the community is less than thrilled about the development of the first 16 homes and I am sure that an additional 8 homes is going to cause even more concern.

Rightly so! The development of so many homes will strip away what makes the neighborhood unique not to mention the inconveniences of two plus years of building and traffic congestion.

I am not against progress or development. I am against over development and 20 plus homes in such a small area is over development.

I am aware of the deadline of Oct 5 to submit comments on the first 16 homes but this is new information and the community should be made aware of this and have a chance to share their perspective before any decisions are made about any of the proposals for any of the lots.

I'd appreciate hearing from you.

Thank you.

Santo Criscuolo
425 894 2375
12715 72nd Ave NE

Kirkland, WA 98034

From: bruceahilton@comcast.net
Sent: Saturday, October 03, 2015 10:15 AM
To: Susan Lauinger
Subject: Permit Number SUB15-01346 and Permit SUB15-01345

Hello,

Our property is directly north of the two parcels noted above.

We are certainly not against any development of the properties but hope that any development will blend in with the existing character of the neighborhood.

A few concerns do come to mind.

We have a sump pump in our crawlspace as do many of our neighbors, the drainage line for ours, and most of our neighbors, goes out to the drainage ditch on the east side of 72Ave NE. We are concerned how any development of sidewalks and potential replacement of the ditch with a culvert would impact our drainage lines? Would we be able to tie into any new culvert?

Secondly, the "front" of my property faces directly south to the proposed development and essentially the back of the proposed homes. We are assuming they will be two story homes. Our concern is that the home will be set very far back on the lots so that they tower over the "front" of our property. Is there any mitigation for this situation? The proposal site map shows a reasonable set back, but I am unsure if this is just a architectural rendering or very real site maps?

We also have the normal and usual concerns about noise/dust/debris during the construction and ground preparation work.

Thanks for your consideration

Bruce and Myrna Hilton
12800 72 Ave NE
Kirkland WA 98034
425 820 6559
Bruceahilton@comcast.net

From: Aaron Lefohn <aaron.lefohn@gmail.com>
Sent: Tuesday, October 06, 2015 11:46 AM
To: Susan Lauinger
Subject: Development on 72nd Ave NE in Finn Hill

Hi Susan,
I am writing to you about the proposed developments on 72nd Ave NE in Finn Hill. For the record, I live at 12912 76th Ave NE, and have owned the property since 2010. I bought our 3/4 acre lot in 2010 and restored the decaying house on the property because of the unique character of the neighborhood. This neighborhood is a special pocket of Kirkland that is more rural and less "city" than almost anywhere else in Kirkland. Many of us bought property here because it is different. I love the fact that we have no sidewalks. I love the fact we have no street lights. I love the fact that 76th Ave NE is a dirt road. I love the fact that we lose power in almost every storm. And most of all, we all live here because of the natural surroundings of Big Finn Hill Park and O. O. Denny Park.

With this understanding of our neighborhood, I hope you can see why I am deeply concerned about the development on 72nd Ave NE. Other recent developments on 72nd Ave NE have been representative of "developer-greed, pack-them-in-as-close-as-possible, faceless, mindless developments." This kind of yard-less, land-less development is exactly what we do *not* want in our neighborhood.

I realize that development of the large private open space on 72nd Ave NE is inevitable, but I beg you to please require the developers to build large lots. Ideally 0.75 - 1+ acre lots with a minimum amount of privacy, trees, and separation. Please enhance and preserve the natural and large-lot character of our neighborhood rather than letting it transform into more faceless, soulless, yard-less suburbia. Kirkland has enough of that kind of development, our neighborhood is a destination/desirable neighborhood because it is *not* that, so please require all new development to enhance the natural and private character rather than diminish it for the sake of developer and city tax-base greed.

I am particularly concerned that the development on 72nd Ave NE is not only the 16 houses being proposed by Buchan/Blue Line, but also multiple properties on the West side of 72nd Ave NE. I recently learned that Buchan/Blue Line also purchased a property across the street from their 16-house development on which they plan to put 4 houses. And they are apparently also seeking to buy another property on 72nd Ave NE as well.

ALL of these developments (not just the 16 houses on the East side of 72nd Ave NE) need to be considered together with respect to the overall growth of the area, traffic, loss of nature, loss of trees, and loss of overall character to the neighborhood.

To be clear, I am not anti-development or anti-growth, but I do want to see intentional, well-thought-out growth that preserves the large-lot, private lot, and natural feel of the neighborhood. The 16 lot cul-du-sac development proposed does not accomplish this goal, especially when combined with the additional homes planned across the street.

Please stop the current development plans for 72nd Ave, and work with the developer and neighborhood to come up with a plan that enhances rather than destroys the natural character of the neighborhood.

Imagine the large lots near Bridal Trails. That kind of development would improve the neighborhood rather than destroy it. Please develop 72nd Ave NE with 0.75+ acre large, private lots that will attract nature-loving residents to our special, unique neighborhood.

Regards,
Aaron Lefohn, Ph.D.
Director of Research, NVIDIA Corporation

From: George Ploudre <go.pluto@frontier.com>
Sent: Sunday, October 04, 2015 1:54 PM
To: Susan Lauinger
Cc: Mara Williams; dkaiser@nud.net
Subject: Re: MacDonald Short Plat Cases No SUB15-01345 and SUB15-01346

Dear Ms. Susan Lauinger,

Thank you for providing us with a copy of the geotechnical and traffic studies for the MacDonald Short Plat Cases. The following are our comments/questions on the proposed short plat cases identified in the Subject Line of this document.

1) **Traffic:** We do hope that the City of Kirkland considers the additional traffic that will be generated by the Orler short plat of six more homes across the street from the MacDonald property in their evaluation.

2) **Erosion**: The geotechnical report did not mention the historic land slide which changed the channel of O.O. Denny Creek behind MacDonald's property. Erosion has been a serious problem in this area. About twenty years ago, a portion of the MacDonald hillside was lost to a failed County storm drain. In 1991, runoff from that area and above created a landslide that washed out some of our and MacDonald's property and a large portion of the county road and parkland. Estimated costs for remedial and permanent fixes were close to a million dollars. This area has been classified by King County geotechnical engineers as a Landslide Hazard Area, Erosion Hazard Area, and is included in the Northshore Critical Drainage Area.

3) **Storm Water**: With such a large, tight development as has been planned, would not a storm water storage vault be safer, also providing a play area for children, rather than the proposed retention pond? The lack of play area is likely to encourage the home owners to remove the natural vegetation required by the Kirkland City Development Regulations.

4) **Sewage**: The drawings do not address how sewage will be handled. We were told by employees of the Northshore Utility District that a proposed system has not yet been submitted by the developer or approved by the Utility District. How can the City approve a short plat that does not have a sewage plan? Mention has been made that a sewage pump station might be placed in the road rightaway between the Williams' property and ours. We strongly object to any structure that would prevent our access to our land from the road rightaway and might emit noise or odors that will harm the resale value of our property.

5) **Trees**: We were glad to see that the huge evergreen tree adjacent to 72nd Avenue NE was being left, but disappointed to learn that the three large evergreen trees on lots 7 and 8 will be removed.

Please continue to keep us informed as this project proceeds.

Sincerely yours,

George and Mary Ploudré

7171 NE 126th St
Kirkland, WA 98034
425-823-6077

CC: 1 - Brad and Mara Williams, 12604 - 72nd Avenue NE Kirkland
2 - Northshore Utility District - Dave Kaiser

From: Warren Raven <wrenfoto@hotmail.com>
Sent: Tuesday, September 15, 2015 11:18 AM
To: Susan Lauinger
Subject: Case NO. SUB15-01346 and 45

The 16 homes that are going up on Macdonald north and south plat case No. SUB15-01345 and 01346. Please make sure that all homes have a 10kW solar system on each and metal roofs and each down spout has rain barrels to collect the water run off for use in watering the landscaping or emergency drinking usage.

Thank you,

Warren Raven
Kirkland WA

From: Kathleen Redmond <kmredmond@me.com>
Sent: Monday, October 05, 2015 3:33 PM
To: Susan Lauinger
Cc: Amy Walen; Kurt Triplett; Jay Arnold
Subject: McDonald Estates Development - 72nd Ave NE

Dear Susan,

We must start our letter to you all with an apology. It was never our intention to be reactive in the case of developing the land in question. However, we have found ourselves dealing with aging parent issues on both sides of our family for the past few months, consuming a good deal of our lives. Hence, a letter to city officials on the very last day comments are welcome.

We have included the Mayor, Amy Walen, the City Manager, Kurt Triplett, and Council Member Jay Arnold as the chair of the Planning, Housing and Economic Development Committee, on this email as we believe the issue of development in this area goes well beyond the permitting of these 16 homes on the McDonald property. It seems in order to permit these homes and any others in the area, the city needs to have a plan to deal with the increase in population in this rather small neighborhood, which is already infrastructure challenged. **We also believe that how you move forward with this development will set a precedent for many others who are sure to follow.**

Please understand, we do not wish to halt or block the development of this property or any other. We simply request - actually, ***expect*** - you, as officials of the city of Kirkland and representatives of the current residents, be thoughtful and intentional as you move forward. By our calculations, there is the potentional for an additional 20+ homes over and above the 16 currently being considered for permits, and that is south of the intersection of 129th and 72nd. The potential for additional homes from the entrance to the platuea at 138th and Juanita Drive is much greater. In other words, these 16 homes may be just the first of many for which builders/developers will be seeking permits.

As we see it, there are three main areas of concern which ought to be fully considered as you look to permit development of any kind in this neighborhood. These are as follows: Public Safety/Traffic, Education and Environmental Impact. Of course, there are many issues to be considered, these seem to be the most pressing.

Public Safety/Traffic
It is rare to drive either direction on 72nd and not encounter walkers, runners or cyclists of all ages, including children. Yet, at certain times of the day, 72nd can be more like a speedway than a residential street. Like all streets in the neighborhood, 72nd does not have any sidewalks or even a shoulder suitable for pedestrians. As the population increases, there will be more walkers, runners and cyclists AND more vehicle traffic. This increase will include more cars traveling the roads as more school age children are walking to their unprotected bus stops in the morning.

What are the city's plans for the streets in this neighborhood? How will we handle more traffic? Are the long discussed speed humps a possibility? Is there any plan to install sidewalks or a walking path? Perhaps negotiating with the county to expand the shoulder and place a walking path on the Big Finn Hill Park side of 72nd? Are there other plans the city has in the works? If so, what are they? When will these improvements be made? When will we see these plans in the city budget?

Education

The public schools in our area have all been rebuilt in the past few years (Finn Hill Junior High/Discovery Community School, Carl Sandburg Elementary/Discovery School, Thoreau Elementary) and all of these schools are at or over capacity. Two teachers who live in our neighborhood and teach at two of these schools recently shared that their schools are looking at alternative classrooms to handle the overflow. This is important as we live in a very family friendly neighborhood. Most likely, families with school age or soon to be school age children will purchase many of the new homes built.

We assume there is a formula that calculates attrition for the current number of residents who feed into a given school. *How does the formula calculate in additional residents/students? What are the District's plans for increased population in these recently rebuilt schools? Is the School District even aware of the plans for new development? Do the city and School District communicate in any way regarding development, population changes and planning for growth?*

Environment

The McDonald property, and many other lots in our area with potential for development, are edged by steep slopes which create a Lake Washington watershed. In fact, the McDonald property runs off into Denny Creek which runs directly to Lake Washington.

Equally important to the watershed and runoff issues is the fact that these same hillsides are highlighted on the county maps of "sensitive areas" and "areas prone to slides". In fact, there was a small, but significant slide behind the existing pool house on the McDonald property approximately 12 years ago. The issue of slide is important to us as the corner of our property is on the edge of the ravine so there is potential for direct impact.

Prior to being annexed, the county determined it was not in the best interest of the watershed and/or the integrity of the slopes to place non-permeable surfaces closer than 100' from the edge of the ravine. It seems the city has a different take on this. We would be curious to know and understand the perspective of the city of Kirkland and why this differs from the county.

In the proposed McDonald development, the lots on the outside edge have property lines which go over the edge and into the ravine. In addition, some of the proposed homes will be a short distance from the edge of the ravine. This same scenario would be true for many other lots in the neighborhood.

What is being done or proposed to insure the integrity of the edge of the ravine? Is there any limitations to the amount of non-permeable surfaces in the development? How will the builder and new homeowners maintain the sensitive areas? Will the homeowners be educated on the issues or required to maintain the sensitive areas in a certain manner?

In addition to the issues regarding the ravines, how is the Holmes Point Overlay being taken into consideration? Obviously, there are provisions for "significant trees" as well as "native vegetation" in the Overlay and areas identified as "protected natural areas" which require additional remediation. It is our understanding that any property which runs off to Denny Creek falls into this category and the requirements of the Holmes Point Overlay must by met.

Since the Homes Point Overlay covers a large area, we assume the Planning Department is aware of it and takes this into account as permits are being reviewed. That said, we are curious how the Holmes Point Overlay is being incorporated into this development and will be for any future development in our area.

Again, it is not our intention to halt or block any development. In fact, we own a home on 72nd which is currently rented. We have been contacted by builders who would like to purchase the property and develop it into 3 homes. If we should ever decide to develop this property or sell to a builder, we would like to know the best interest of the neighborhood is being taken into consideration by city officials - officials whose responsibility it is (among many) to make **decisions in the best interest of all**. The McDonald property will send a clear message to all.

Warmly,

Kathleen Redmond and Gary Johnson
kmredmond@mac.com garymjohnson1@me.com

12805 Holiday Drive NE
Kirkland 98034

425.821.5534

From: Whit <whitmec@gmail.com>
Sent: Sunday, October 04, 2015 8:46 AM
To: Susan Lauinger
Cc: Chris Whitmer
Subject: Comments for case numbers SUB15-10345 and SUB15-10346

Christopher Whitmer
12965 76th Ave NE
Kirkland, WA 98034
whitmec@gmail.com
425-503-5389

Ms. Launinger et al;

The following are comments I would like to make regarding the planned Process I Short Plat Permit to divide the subject parcels to make way for **sixteen** new homes, eight on both plots.

When I moved to the area in 2013, one of the main reasons I was attracted to the area was it's "in the woods" feel and relatively low population density. It's an older neighborhood with rich surroundings and is very quiet. The homes in our neighborhood sit on larger lots of higher value which leads to residence enjoying the area more and creates a stable, more enriching neighborhood environment free of over population.

I give you the challenge to personally drive through the area, then review the proposed sites and plans yourself. I'm confident you will find It is unrealistic to think that **sixteen** new homes can reasonably be placed on these two parcels of land. I have reviewed the proposal for these parcels, and they clearly do not take into consideration the area's current surroundings and form of larger high-value lots with more realistic layouts. This plan calls for shoehorning in **sixteen** new homes that would bring with it more environmental impact, traffic, people and noise. This is a high-value area and the last thing it needs is an initial injection of high density housing all for the sake of the dollar. It needs to be fully understood that you only get one chance to do this right. Once the high-density home concept enters into an area, it's not long before you end up like the cities of New Castle or Renton. Cities filled with large homes on small lots with an influx of people, commotion and the associated crime rate.

I understand your responsibility is to determine *"whether the application complies with Kirkland's Zoning Code and other applicable code"* which asks whether this could be done or not. I think the more important question to consider is if it *should* be done. I would ask that you consider waiting on final determination of these applications until after Janice Coogan's "How should Finn Hill plan for future grow" meeting on 15OCT15. It seems reasonable to me to wait on any final decision until a complete consumption of what the residence of Finn Hill have to say about their future.

I thank you for your time and consideration. If you have any questions or comments, please contact me at the information provided.

Regards,
Chris Whitmer

September 29, 2015

Susan Lauinger
123 5th Ave
Kirkland, WA 98033

Re: Permit SUB15-01346 and SUB15-01345
MacDonald Subdivisions North & South

Dear Ms Lauginer,

We are writing to comment on the above listed subdivision. We are in favor of the development plans in regards to the number of houses and the size of the lots as listed on the Short Plat.

In regards to the sewer system and lift station that will be installed, we do have questions about the type, placement and access of the list station itself. Our property is located at 12604 72nd Ave NE and we own the adjoining property that runs along the easement where we understand the sewer lift station will be installed.

This second property is a buildable lot that we reserve the right to develop in the coming years and would like to confirm that the sewer lift station will be placed at the far bottom of the easement (as far down as possible near the Susan MacDonald memorial area) so as to allow us access to our property as well as reduction of noise and lingering smells from the station itself.

Our contact information is listed below for continued clarification and correspondence.

Sincerely,

Charles (Brad) and Mara Williams
425-829-6365 (Mara)
425-445-4412 (Brad)
12604 72nd Ave NE
Kirkland, WA 98034

Cc: Northshore Utility District, Dave Kaiser

Arie Verloop and Geri Bedford
12811 Holiday Drive NE
Kirkland, Washington 98034-5730
phone: 425.823.4468
fax: 425.814.4918
e-mail: averloop@aol.com

November 22, 2015

Kirkland Planning Department
Attention: Susan Lauinger
City of Kirkland
123 5th Avenue
Kirkland, WA 98033

RE: Groundwater Issues Holiday Drive / File No. SUB15 - 01346

Dear Ms. Lauinger,

We are bringing potential issues and concerns to your attention that could result from the planned construction activities and may lead to improper groundwater drainage from our and other properties on Holiday Drive down to the 8 Lot Short Plat ("McDonald's"). **We wish to be on record with our concerns.**

Our property is located at 12811 Holiday Drive NE, one of the properties bordering the 8 Lot Short Plat to the north. We have lived here since 1986. We are not aware of any past or current groundwater discharge problems on our property.

This, however, is not the case on the three properties north of us on Holiday Drive (and higher in elevation). Apparently/reportedly, groundwater and street water discharge coming from 74th Ave NE has caused the following issues over the years:

- At 12833 (Warren Raven family) relative large quantities of groundwater are flowing underneath his property ("a river" he calls it) and he has battled this from time to time. At the most southern and lowest point of this property, near the street asphalt, groundwater has welled up for years during the rainy season, causing a small stream after heavy rainfall, discharging along the outside edge of the circled street. For years, this persistent stream has caused slimy algae to accumulate from January through May.
- At 12825 (John Giaudrone, a professional land surveyor himself) has lived here for >35 years and had issues in the past. None have emerged after he connected to the street sewer and "retired" his septic tank and drain filed. He believes the local presence of a "hard plate" prevents the groundwater from deeply penetrating the ground.

- At 12815 (Eric Kirbach), groundwater accumulating in his crawl space forced him to install a sump pump. He also reports that in the early 1980's (before we moved in our home) a small stream would run towards the south along the fence line between our property and the property to the west (address: 12800 72nd Ave NE; Bruce Hilton) and water would pond on the McDonald's property. To remedy this ponding, Eric reports that drainage pipes were laid in the McDonald's property, paralleling the fence line to our south. We ourselves have not seen this stream run along the fence line to the west, nor ponding.

The point I am making is that over time, groundwater discharge issues have occurred near our properties in the form of small wells, steams, crawl spaces filling up, and ponding.

Our concern is that, possibly due to the presence of hard plates, during and after the development of the Plat (activities such as heavy trucks, soil leveling, excavations, new foundations, and sewer connections, etc.), groundwater discharge to the south might be affected and shifted, potentially leading to ponding on our property as well as on the new development.

We thought we bring this to your attention during the Plat proposal/permitting process, prior to starting "ground breaking" activities.

You may contact the above referenced neighbors at:

- Warren Raven: 12833 Holiday Drive NE, phone: 425-766-5041
- John Giuadrone: 12825 Holiday Drive NE, phone: 425-502-0602
- Eric Kirbach: 12815 Holiday Drive NE, phone: 425-647-6089
- Bruce Hilton: 12800 72nd Ave NE, phone: 425-820-6559

Thank you for your attention to this matter.

Sincerely,

Arie Verloop, P.E.
Geri Bedford

12811 Holiday Drive NE
425-823-4468 (home)
425-952-2825 (work)

Enclosure 8

NW 1/4, SEC 25, TWP 26N, RGE 5E, W.M.

MATCHLINE - SEE VIEW TO LEFT

NE 129TH ST

72ND AVE NE

EX CB 6235, TYPE I
RIM 419.3
12" CONC IE 417.37 (N)
12" CONC IE 417.36 (S)
12" CONC IE 417.2 (E)

12" CONC IE 417.8 (W)

EX SSMH 6247
RIM 419.87
8" PVC IE 409.17 (N,S,E)

12" CONC IE 416.29 (N)

12" CONC IE 414.26 (S)

12" CONC IE 413.88 (S)

4" FORCEMAIN (TYP)

12" CONC IE 413.23 (N)

12" CONC IE 410.91 (S)

12" CONC IE 410.17 (N)

12" PVC IE 407.7 (S)

12" CONC IE 402.97 (N)

12" CONC IE 402.37 (S)

12" CONC IE 401.97 (N)

SEE MATCHLINE AT TOP OF SHEET

SEE MATCHLINE AT BOTTOM OF SHEET

4" FORCEMAIN (TYP)

12" CONC IE 361.48 (SW)

12" CONC IE 361.28 (SE)

341'-8" SS

SSMH 9

EX CB 6162, TYPE I
RIM 355.18
6" CPEP IE 362.88 (E)
12" CONC IE 362.78 (N)
12" CONC IE 362.63 (S)

FUTURE SEWER MAIN (BY OTHERS)

EX CB 6153, TYPE I
RIM 361.85
12" CONC IE 359.55 (NE)
12" CONC IE 359.45 (NW)
MISSING SOUTH IE

TBM B
FOUND 1-3/4" BRASS DISC W/PUNCH 0.9' BELOW GRADE IN CASE AT CL INTX. OF 72ND AVE NE AND NE 126TH ST. (HELD FOR ROTATION)

R=25'

PROPOSED ASPHALT ACCESS ROAD

EX CB 6390, TYPE I
RIM 359.63
12" CONC IE 357.73 (N)
12" CPEP IE 357.63 (SSW)

15'

98'-8" SS

EX CB 6186, TYPE I
RIM 355.77
12" CPEP IE 353.01 (N)
12" CMP IE 352.91 (W)
16" CPEP IE 352.11 (S)

SSMH 10

PROPOSED CATCH BASIN

43'-8" SS

PROPOSED ROCK-CHECK MANHOLE

PROPOSED SWALE BYPASS

PROPOSED WETWELL

PROPOSED COVERED TELEMETRY

PROPOSED DRYWELL

PROPOSED GENSET/DIESEL GENERATOR

EX TREE (TO BE REMOVED-TYP)

MATCH EXISTING

12" IE 389.60 (S)

2 DROPS AT NE FACE

12" IE 389.02 (N)

EX FIRE HYDRANT (ADD 5" STORZ ADAPTOR)

SSMH 10

8" IE 393.43 (N)

1 DROP AT N FACE

EX CB 6285, TYPE I
RIM 394.45
8" PVC IE 392.56 (E)

PROPOSED 1" WATER METER (TYP)

72ND AVE NE SECTION, THIS SHEET

15" IE 389.52 (S)

15" IE 388.43 (N)

SSMH 6

29'-8" SS

SSMH 7

108'-8" SS

EX IMPACTED TREE (TO REMAIN-TYP)

12" IE 383.98 (S)

CB 10, TYPE II-48" W/ STORM FILTER

EX FIRE HYDRANT (RELOCATE BEHIND SIDEWALK ADD 5" STORZ ADAPTOR)

2 DROPS AT SE FACE

2 DROPS AT E FACE

TBM A
FOUND 1-¾" BRASS DISC W/PUNCH 0.8' BELOW GRADE IN CASE AT CL AP OF 72ND AVE NE (HELD)
EL 384.42

SSMH 8

EX CB 5039 W/GRATE
RIM 384.74
12" IE 383.04 (N)
12" IE 382.92 (S)

MATCH EXISTING

72ND AVE NE

MATCHLINE - SEE VIEW TO LEFT

LAKE PARK TO THE CITY OF SEATTLE VOL 11, PG 87

HOLIDAY LINE VOL 76, PG 32

CB 1, TYPE I W/ STANDARD GRATE

CB 2, TYPE I W/ STANDARD GRATE

CB 3, TYPE I W/ STANDARD GRATE

CB 4, TYPE I W/ STANDARD GRATE

SEE ROAD A SECTION, THIS SHEET

PROPOSED FIRE HYDRANT (TYP)

CB 4A, TYPE I W/ STANDARD GRATE

SSMH 1

SSMH 2

SSMH 3

110'-12" PVC SD

111'-12" PVC SD

156'-8" SS

119'-8" SS

65'-8" SS

CB 6, TYPE I W/ STANDARD GRATE

CB 5, TYPE I W/ STANDARD GRATE

SS CLEANOUT (TYP)

EX TREE (TO BE REMOVED-TYP)

APPROXIMATE LOCATION OF EX SEPTIC TANK (TO BE ABANDONED)

ROAD A

20' FRONT BSBL (TYP)

5' SIDE BSBL (TYP)

10' REAR BSBL (TYP)

66'-12" PVC SD

86'-12" SS

38'-12" SD

SSMH 4

SSMH 5

CB 7, TYPE I W/ STANDARD GRATE

TRACT A

TRACT B

91'-12" PVC SD

91'-8" PVC SD

6" SIDE SEWER (TYP)

CB 8, TYPE I W/ STANDARD GRATE

10' SLOPE BUFFER

TOP OF SLOPE

APPROXIMATE LOCATION OF EX SEPTIC TANK (TO BE ABANDONED)

CB 9, TYPE I W/ SOLID LOCKING LID

184'-8" SS

CONTROL STRUCTURE/ OVERFLOW

45'-8" PVC SD

106'-8" PVC SD

SDMH 1

EX TREE (TO BE SAVED-TYP)

341'-8" SS

EX CB 5041
RIM 380.65
12" IE 377.60 (N)
12" IE 377.52 (S)

EX CB 6131, TYPE I
RIM 374.23
12" CONC IE 372.43 (N,S)

SCALE: 1" = 40'
0 20 40 80

N

UNDERGROUND UTILITY NOTE

UNDERGROUND UTILITIES ARE SHOWN IN THE APPROXIMATE LOCATION. THERE IS NO GUARANTEE THAT ALL UTILITY LINES ARE SHOWN, OR THAT THE LOCATION, SIZE AND MATERIAL IS ACCURATE. THE CONTRACTOR SHALL UNCOVER ALL INDICATED PIPING WHERE CROSSING, INTERFERENCES, OR CONNECTIONS OCCUR PRIOR TO TRENCHING OR EXCAVATION FOR ANY PIPE OR STRUCTURES, TO DETERMINE ACTUAL LOCATIONS, SIZE AND MATERIAL. THE CONTRACTOR SHALL MAKE THE APPROPRIATE PROVISION FOR PROTECTION OF SAID FACILITIES. THE CONTRACTOR SHALL NOTIFY ONE CALL AT 8-1-1 (WASHINGTON811.COM) AND ARRANGE FOR FIELD LOCATION OF EXISTING FACILITIES BEFORE CONSTRUCTION.

BLUELINE
35 CENTRAL WAY, SUITE 400, KIRKLAND, WA 98033
P: 425.216.4651 F: 425.216.4652
WWW.THEBLUELINEGROUP.COM

SCALE: AS NOTED
PROJECT MANAGER: TODD A. OBERG, PE
PROJECT ENGINEER: TODD A. OBERG
DESIGNER: JUSTIN H. RODDA
ISSUE DATE: 11/11/2015

NO	DATE	BY	REVISIONS
1	6/30/15	JHR	REVISED PER MEETING WITH CITY ARBORIST

PRELIMINARY UTILITY PLAN

MACDONALD ESTATES

SHORT PLAT

PARCEL #4055700825

CITY OF KIRKLAND WASHINGTON

STATE OF WASHINGTON TODD A. OBERG 37408 REGISTERED PROFESSIONAL ENGINEER

11/11/15

JOB NUMBER: 14-024

SHEET NAME: PU-01

SHT 2 OF 3

2:24
Nov 11, 2015 – 4:13pm – User: dfodio
E:\Projects\14024LOW\Preliminary\Short Plat\South\4024PU.dwg

CITY OF KIRKLAND
Department of Public Works
123 Fifth Avenue, Kirkland, WA 98033 425.587.3800
www.kirklandwa.gov

MEMORANDUM

To: Susan Lauinger, Planner

From: Thang Nguyen, Transportation Engineer

August 26, 2015

Subject: MacDonald Estates Plat Residential Development Traffic Study Review, Tran15-00820

This memo summarizes my review of the traffic report dated June 17, 2015 *MacDonald Estates Plat Traffic Impact Analysis* report prepared by *TraffEx.* My findings and recommendations are summarized below, followed by my review comments on the traffic impacts documented in the traffic report.

Staff Findings

The proposed project passed traffic concurrency. Therefore, no off-site concurrency mitigation is required.

The proposed project will not create significant SEPA traffic impacts that warrant specific off-site transportation mitigation.

Staff Recommendations

Staff recommends the approval of the project with the following conditions:

SEPA Mitigation

Staff does not recommend any SEPA traffic mitigation because the proposed project will not create significant off-site SEPA traffic impacts.

Public Works Permit Conditions:

1. Pay transportation impact fees as discussed in the Transportation Impact Fee section of this memo.

Project Description and Trip Generation

The applicant proposed to replace the one existing single-family house with 16 single-family houses. One driveway off 72nd Avenue NE will project access to the project site. The project is located at 12702 72nd Avenue NE. The proposed project is anticipated to be completely built and occupied by the end of 2017. The project is forecasted to generate 183 net new daily trips, 19 net new PM peak hour trips and 20 net new AM peak hour trips.

Traffic Concurrency

Developments are tested for traffic concurrency for the weekday PM peak hour. The proposed project passed traffic concurrency. Per *Section 25.10.020 Procedures* of the KMC, this Concurrency Test Notice expires within one year of the concurrency test notice (May 20, 2016) unless a development permit and certificate of concurrency are issued or an extension is granted.

Concurrency Appeal

The concurrency test notice may be appealed by the public or by an agency with jurisdiction. The concurrency test notice is subject to an appeal until the SEPA review process is complete and the appeal deadline has passed. Concurrency appeals are heard before the Hearing Examiner along with any applicable SEPA appeal. For more information, refer to the Kirkland Municipal Code, Title 25.

Traffic Impacts

The scope of the traffic report was completed in accordance to the City of Kirkland TIA guidelines.

The citywide trip distribution was determined by using the Bellevue-Kirkland-Redmond (BKR) traffic model.

The City's Traffic Impact Analysis Guidelines (TIAG) requires a level of service (LOS) analysis using the Highway Capacity Manual Operational Method for intersections that have a proportionate share equal or greater than 1% as calculated using the method in the TIAG. Based on the proportionate share calculation for the full build-out of the proposed project, two intersections met the 1% proportionate share threshold.

1. NE 138th Place/Juanita Dr. NE
2. Project Driveway/72nd Street NE

Traffic Mitigation Threshold

The City requires developers to mitigate traffic impacts when one of the following two conditions is met:

1. An intersection level of service is at E and the project has a proportional share of 15% or more at the intersection.
2. An intersection level of service is at F and the project has a proportional share of 5% or more at the intersection.

Off-site and Driveway Operation Traffic Impacts

Both intersections analyzed were calculated to operate at LOS-D or better with the proposed project. Therefore, off-site SEPA mitigation for traffic operation is not warranted.

Traffic Safety
Based on WSDOT and the City of Kirkland collision data, there have been few crashes near the project site and at the NE 138th Place/Juanita Dr. NE intersection. From the accident data analysis, there is no pattern to suggest the intersection is unsafe. It is not anticipated that the proposed project would increase the number of crashes on public streets near the site.

Driveway & Sight Distance
The NE 138th Place/Juanita Dr. NE intersection and the driveway sight distances were measured and were found to exceed the City's sight distance.

Parking
The applicant proposed to provide parking to meet or exceed the City's minimum requirement.

Transportation Impact Fee
Per City's Ordinance 3685, Transportation Impact Fees is required for all developments and is calculated based on the most updated Transportation Impact Fee Schedule, January 1, 2015. Road impact fees are used to construct transportation capacity improvements throughout the City to help the City maintain traffic concurrency. Table 1 summarizes the road impact fee calculation for the proposed project.

Table 1. Road Impact Fee

	Size Dwelling Unit	**Impact Fee Rate per Unit**	
Single-family			
Proposed	16	$3,942	$63,072
Existing	1	$3,942	$3,942
Net New	**15**		**$59,130**

Final transportation impact fees will be determined at final building permit.

cc: John Burkhalter, Senior Development Engineer
Energov