City of Des Moines

21630 11th Avenue South, Suite D, Des Moines, WA 98198
Phone: (206) 870-7576 Fax: (206) 870-6544

ISSUED: 11/9/2011

PERMIT #: BLD2011-0447

BUILDING PERMIT

PARCEL: 2560806120

ADDRESS: 25129 8TH PL S, DES MOINES

OWNER	APPLICANT	CONTRACTOR
JIMMIE D & VALORIE ROBINSON 25129 8TH PL S DES MOINES, WA 98198	MIKE CARLSON EXCVTN/CONST LLC Po Box 699 Duvall, WA 98019	MIKE CARLSON EXCVTN/CONST LLC Po Box 699 Duvall, WA 98019 LIC #: MIKECCE919D6 EXP: 3/26/2013

PLUMBING CONTRACTOR	MECHANICAL CONTRACTOR	ELECTRICAL CONTRACTOR
LIC #: EXP:	LIC #: EXP:	LIC #: EXP:

BLD2011 0447

WORK DESCRIPTION

SPIRAL NAILINGS AND SMALL CAGED WALLS FOR SECURING THE HILLSIDE PER PLANS

PERMIT TYPE:	Residential	PERMIT SUBTYPE:	Single Family Residence
TYPE OF CONSTRUCTION:		NUMBER OF DWELLING UNITS:	0
SPRINKLER REQUIRED:	N	NUMBER OF BEDROOMS:	0
GRADING PERMIT REQUIRED:	N	NUMBER OF BATHROOMS:	0
OCCUPANT GROUP:		NUMBER OF STORIES:	0
OCCUPANT LOAD:		LOT #:	0
CODE YEAR:	0	PROJECT VALUATION:	$40,000.00
SQ FT DWELLING / GARAGE:	0	LAND USE ZONE:	

SPECIAL CONDITIONS

- The Applicant is required to install a Temporary Erosion and Sedimentation Control Plan consistent with Appendix D of the 2009 King County Surface Water Design Manual.
-
-

PERMIT APPROVAL

PERMIT IS APPROVED FOR WORK DESCRIBED ABOVE IN ACCORD WITH THE APPROVED PLANS & SPECIFICATIONS. All provisions of law or ordinances governing this type of work will be complied with whether specified herein or not. The granting of this permit does not persume to give authority to violate or cancel the provisions of any other State or Local law regulating construction or the performance of construction.

SALES TAX NOTICE: Sales tax relating to construction and construction materials in the City of Des Moines must be reported on your sales tax return form and coded City of Des Moines #1709.

INSPECTION RECORD

INSPECTION	INSPECTOR	DATE	COMMENTS
Final Structure and Building			

ALL PERMITS EXPIRE 180 DAYS FROM ISSUANCE OR LAST INSPECTION - INSPECTION LINE: (206) 870-6531

City of Des Moines

21630 11th Avenue South, Suite D, Des Moines, WA 98198
Phone: (206) 870-7576 Fax: (206) 870-6544

PERMIT FEES/ RECEIPT

DATE: 11/4/2011

PERMIT #: LUA2011-0034
ADDRESS: 25129 8TH PL S, DES MOINES

TYPE: ROBINSON SLIDE REPAIR
PARCEL: 2560806120

OWNER

JIMMIE D & VALORIE ROBINSON
25129 8TH PL S
DES MOINES, WA 98198

FEE SUMMARY

Date	Description		Fee Amount	Paid	Balance Due
11/2/2011	Automation Fee		$10.00	$0.00	$10.00
11/2/2011	Land Use Activity Fee		$175.00	($175.00)	$0.00
		Total Due:	**$185.00**	**($175.00)**	**$10.00**

NOTICE: Fee charges at submittal are partial payments only. Final fees will be assesed after review of plans and other project data is completed.

PAYMENT TRANSACTIONS

Date	Receipt #	Method/Payee	Paid
11/4/2011	**REC000490**	**Check 8253/MIKE CARLSON EXCVTN/CONST LLC**	**($175.00)**
		Land Use Activity Fee	($175.00)

AZIZ
AZIZ Engineering Company

SERVING THE NORTHWEST & ALASKA SINCE 1984
a quarter-century power of ideas

engineers
geotechnical
geostructures
civil | surveying

Project No 431110

October 20, 2011

Jimmie and Valorie Robinson
25129 8th Place South
Des Moines, WA 98198

Reference: 25129 8th Place South, Des Moines WA – Slide Repair and Slope Stabilization

Dear Mr. and Mrs. Robinson:

This letter responds to the City of Des Moines Shoreline Master Program and the State Environmental Policy Act (WAC 197-11-880) requirements, establishing the need for urgently needed slide repair and stabilization at your subject residence, on an emergency basis, before the onset of winter storms and the corresponding rise in groundwater seepage conditions. Inclement weather in the Puget Sound area historically begins in November. Our recent geotechnical engineering report – submitted to the City for the necessary permits as a part of our carefully planned proposed mitigation measures for the subject slope stabilization – has reasonably established the existence of subsurface and topographic conditions prone to imminent slide events and soil rupture flow occurrences threatening your property and residence, as well as the adjoining properties and the beach area below. The latest landslide event took place last winter/spring. It has taken this long to complete the engineering and planning tasks ready for installation of the necessary mitigation measures. This construction should take place immediately while the perched groundwater is low and a few, but sufficient, weeks of relatively dry season still remain. This is to thwart imminent danger to your property of a larger landslide during the soon to arrive inclement weather.

Alternatively, the covering of slide area for erosion protection over the winter does not prevent the buildup of perched groundwater conditions from upslope very likely to cause more soil ruptures and slides in the upcoming winter/spring. With this approach, more damage is to be expected within and beyond the current slide zone, already weakened by that slide event, potentially extending into the adjoining properties. Other methods involve very heavy equipment risky to operate near the steep slopes this late in the season. The risk of no action, or minimal action, is too great.

The methods we have proposed, driven soil nailing with integral facing systems replacing rockeries that were destroyed by the previous slide, involve low impact but rapid construction techniques estimated to take approximately 10 workdays. Moreover, this system can be easily removed, fully or partially, and replaced with a better method if necessary. Our plans and specifications require the presence of a geotechnical engineer for directions and technical assistance throughout the construction. Based on our substantial design and construction experience in these systems, we are confident that successful completion of the proposed measures at this site can be achieved in two to three weeks with proper construction management engineering directions and technical assistant that we believe will be present.

I trust the above is sufficient for the regulatory considerations. I am available for any questions or comments as needed.

Sincerely,

AZIZ Engineering Company

Enayat S. Aziz, P.E., L.E.G.
Geostructures Engineer
and Engineering Geologist

ENAYAT S. AZIZ
STATE OF WASHINGTON
24330
REGISTERED PROFESSIONAL ENGINEER

SIGNED: 10/20/2011

State of Washington
Engineering Geologist
2502
Licensed Geologist

Enayat S. Aziz

7740 196th Avenue NE (Historic Red Brick Road) • P.O. Box 2758 • Redmond, WA 98073-2758 (Street 98053-4710)
425/ 898-1007 • fax 425/ 898-9699 • info@aziznw.com • www.aziznw.com

SHORELINE MANAGEMENT ACT

PERMIT DATA SHEET AND TRANSMITTAL LETTER

From: **(local government)**
City of Des Moines
21630 11th Avenue South
Suite D
Des Moines, WA 98198-6398

To: **(appropriate Ecology office)**
Department of Ecology
Attn: Barbara Nightingale
3190 160th Avenue Southeast
Bellevue, WA 98008

Date of Transmittal: November 4, 2011

Date of Receipt: **(provided by Ecology)**

Type of Permit: (Indicate all that apply)
Shoreline Exemption

Local Government Decision:

Applicant Information:

Name:
Jimmie D. Robinson

Address:
25129 8th Place South
Des Moines, WA 98198

Phone(s):
(253) 732-0261

Applicant's Representative: (if primary contact)

Name:
Mike Carlson

Address:
P.O. Box 699
Duvall, WA 98019

Phone(s): (206) 730-8249

Is the applicant the property owner? Yes

Location of the Property: (Section Township and Range to the nearest 1/4, 1/4 Section or latitude and longitude, and a street address where available)
SW 20 22N 4E
Tax Parcel 2560806120
25129 8th Place South

Water Body Name: Puget Sound

Shoreline of Statewide Significance: Yes

Environment Designation: Shoreline Residential

Description of the Project: (Summary of the intended use or project purpose)
The project involves emergency repair work to stabilize a landslide through the use an integral soil nail system

Notice of Application Date: N/A

Final Decision Date: November 4, 2011

By: Grant Fredricks – Planning, Building, Public Works Director

Staff Contact: Jason Sullivan – Senior Planner

Phone No: (206) 870-6551

C Y OF DES MOINES, WASHINGTO..
Development Services Division
21630 11th Avenue South, Suite D
Des Moines, WA 98198
Phone: (206) 870-7576 Fax: (206) 870-6544

COMBINED SHORELINE PERMIT EXEMPTION AND SEPA EXEMPTION DECISION

Project File No: LUA2011-0034

Project Name: Robinson Slide Repair

Project Address: 25129 8th Place South
Des Moines, WA 98198

Applicants: Jimmie D. Robinson
25129 8th Place South
Des Moines, WA 98198

Staff Contact: Jason Sullivan; Senior Planner

Date of Decision: November 4, 2011

FINDINGS OF FACT:

1. Shoreline Exemptions are authorized by the City of Des Moines Shoreline Master Program adopted by reference in Chapter 18.90 DMMC for certain qualifying projects.

2. In support of the Applicant's request for the emergency exemption the AZIZ Engineering Company submitted a letter from Enayat S. Aziz, P.E., L.E.G. verifying the existence of an emergency situation located on the subject property based on the following information:

   2.1 Geotechnical engineering report dated October 17, 2011 established the existence of subsurface and topographic conditions prone to imminent slide events and soil rupture flow occurrences threatening the property and residence, as well as the adjoining properties and the beach area below.

   2.2 The latest landslide event took place last winter/spring. It has taken this long to complete the engineering task installation of the necessary mitigation measures. This construction should take place immediately while the perched groundwater is low and a few, but sufficient, weeks of relatively dry season still remain. This is to thwart imminent danger to your property of a larger landslide during the soon to arrive inclement weather.

   2.3 Covering of slide area for erosion protection over the winter does not prevent the buildup of perched groundwater conditions from upslope very likely to cause more soil ruptures and slides in the upcoming winter/spring. With this approach, more

damage is to be expected within and beyond the current slide zone, already weakened by that slide event, potentially extending into the adjoining properties.

3. The Applicant's Engineer has proposed to install interlocking soil nails to stabilize the site and replace the rockeries that were destroyed by the previous slide.

4. Work necessary to avoid an imminent threat to public safety, prevent an imminent danger to public property and/or to prevent an imminent threat of serious environmental degradation is categorically exempt from review under the State Environment Policy Act (SEPA) pursuant to WAC 197-11-880

SHORELINE EXEMPTION CRITERIA:

Des Moines Shoreline Management Program Section 7.2(1)

> ***Emergency construction necessary to protect property from damage by the elements.*** *An "emergency" is an unanticipated and imminent threat to public health, safety, or the environment which requires immediate action within a time too short to allow full compliance with this chapter. Emergency construction does not include development of new permanent protective structures where none previously existed. Where new protective structures are deemed by the administrator to be the appropriate means to address the emergency situation, upon abatement of the emergency situation the new structure shall be removed or any permit which would have been required, absent an emergency, pursuant to chapter 90.58 RCW, these regulations, or the local master program, obtained. All emergency construction shall be consistent with the policies of chapter 90.58 RCW and the local master program. As a general matter, flooding or other seasonal events that can be anticipated and may occur but that are not imminent are not an emergency*

Planning, Building, and Public Works Conclusion: The Applicant has provided sufficient documentation from a licensed geotechnical engineer verifying the existence of an emergency situation as established by Section 7.2(1) of the Des Moines SMP. Therefore, the proposed work to stabilize the slope is considered an emergency action as the stabilization of the slope is need to address an imminent threat to public safety and imminent danger to private property.

Single Family homes are permitted within the Residential Shoreline Designation of the City of Des Moines Shoreline Master Program. The Des Moines Shoreline Master Program is consistent with the Shoreline Management Act and WAC 173.27. Therefore, the Shoreline Permit exemption for the proposal is consistent with the City's shoreline program and is also in compliance with the Shoreline Management Act.

The proposal was evaluated to determine if a review under SEPA was required; however, it was determined that the work is classified as an emergency action categorically exempt from SEPA pursuant to WAC 197-11-880 which was adopted by the City's SEPA Rules in Chapter 16.04 DMMC.

PLANNNING, BUILDING, AND PUBLIC WORKS DEPARTMENT DECISION:

The applicant's request for approval of a Shoreline and SEPA Exemption is granted subject to the following conditions:

1. **As the installation of the soil nail system would not normally have been exempt from the permit requirements of the City's Shoreline Master Program or review under the State Environmental Policy Act, the Applicant is required to submit a complete Joint Aquatic Resource Permit Application for a Shoreline Substantial Development Permit and for review under SEPA together with the fees established by the City of Des Moines Development and Engineering Services Fee Schedule not later than December 15, 2011. Failure to submit the required "after-the-fact" permit applications will be considered a violation of the Des Moines Municipal Code and shall be enforced through the provisions of Chapter 18.72 DMMC as presently adopted or subsequently amended.**

2. **As a result of the review of the "after-the-fact" permits, the applicant may be required to remove the installed soil nail system fully or partially.**

3. **The Applicant is required to install a Temporary Erosion and Sedimentation Control Plan consistent with Appendix D of the 2009 King County Surface Water Design Manual.**

Code Official: Grant Fredricks

Position/Title: Planning, Building, and Public Works Director
21630 11th Avenue South, Suite D
Des Moines, WA 98198

November 4, 2011
(Date*)

(Signature)

Project Lead Contact: Jason Sullivan, Senior Planner; Phone 206-870-6551; Email Address jsullivan@desmoineswa.gov.

Attachment: Vicinity Map

Distribution: Applicant
Shorelines Division, Dept. of Ecology

25107
25121
25129
8TH PL S

City of Des Moines

PLANNING, BUILDING AND PUBLIC WORKS
www.desmoineswa.gov
21630 11TH AVENUE SOUTH, SUITE D
DES MOINES, WASHINGTON 98198-6398
(206) 870-7576 FAX (206) 870-6544

November 4, 2011

Mike Carlson Excavation
Attn: Mike Carlson
P.O. Box 699
Duvall, WA 98019

RE: LUA2011-0034, Robinson Slide Repair

Dear Mr. Carlson,

There are two purposes for this letter. First is to provide written notice as required by RCW 36.70B.070 that the Development Services Division has determined that the Joint Aquatic Resource Application (JARPA) submitted for the slide repair project for the Robinson Residence located at 25129 8th Place South has met the procedural submittal requirements established by the Des Moines Municipal Code. The application was deemed complete effective November 4, 2011. The Master Land Use Application number is LUA2011-0034. Please use this number when inquiring on this project.

The second purpose of this letter is to provide written notice as required by RCW 36.70B.130 and DMMC 18.56.210 that the City has approved with conditions the Shoreline Emergency Exemption for the above referenced project. A copy of the approved Shoreline Emergency Exemption Determination is attached to this letter.

Prior to issuance of the final decision by the City for the above referenced project the City determined that the project was categorically exempt from review under the State Environmental Policy Act (SEPA); therefore, a threshold determination was not issued pursuant to DMMC 16.04.230

This decision is a Type I Land Use Action, which is appealable to the Hearing Examiner as provided in DMMC 18.56.150 and 18.94.113. An appeal must be filed with the City of Des Moines City Clerk by November 14, 2011.

If there are any questions regarding the above comments contact Jason Sullivan by phone at (206) 870-6551 or email me at jsullivan@desmoineswa.gov.

Sincerely,

Jason Sullivan
Senior Planner
Development Services

Enclosures (1)

City of Des Moines

PLANNING, BUILDING AND PUBLIC WORKS
www.desmoineswa.gov
21630 11TH AVENUE SOUTH, SUITE D
DES MOINES, WASHINGTON 98198-6398
(206) 870-7576 FAX (206) 870-6544

November 2, 2011

Mike Carlson Excavation
Attn: Mike Carlson
P.O. Box 699
Duvall, WA 98019

PROVIDED BY EMAIL

Re: LUA2011-0034, Robinson Slide Repair

Dear Mr. Carlson:

The purpose of this letter is to provide written notice as required by RCW 36.70B.070 that the Joint Aquatic Resource Application (JARPA) submitted on November 1, 2011 for the slide repair project for the Robinson Residence located at 25129 8th Place South does not meet the procedural submittal requirements established by the Des Moines Municipal Code. The following additional information must be provided in order for the City to commence with the review of the application:

1. **Application Fees:** The application fee for the JARPA is due at the time that the application is submitted to the City. The application fee for the above referenced permit is $175.00

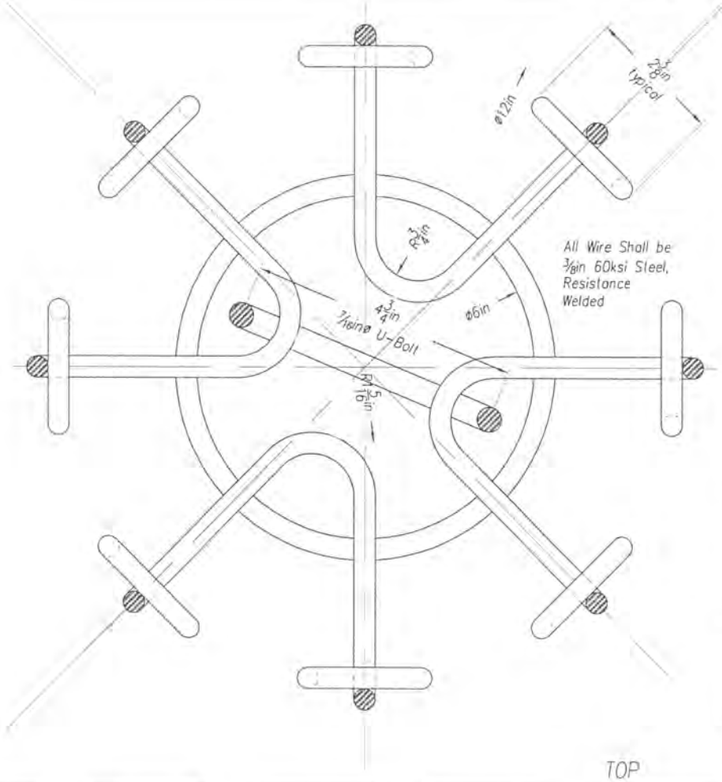
The City expects to complete its review of this application upon the receipt of additional materials. Should you have any questions about this letter, please contact the Development Services Division by phone at 206-870-6551 or by email at jsullivan@desmoineswa.gov. Plan review personnel from the Planning, Building and Public Works Department are also available in person at the front counter without appointment each weekday from 9 a.m. until 11 a.m.

If there are any questions regarding the above comments contact Jason Sullivan by phone at (206) 870-6551 or email me at jsullivan@desmoineswa.gov.

Sincerely,

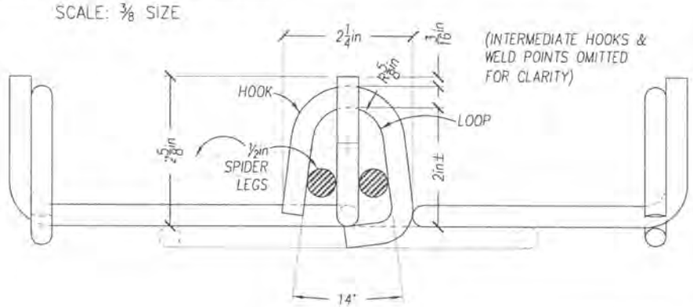
Jason Sullivan

Jason Sullivan
Senior Planner
Development Services



SEATTLE SPIDER HUB

SCALE: 3/8 SIZE



SPIDER WEB STEEPENED SLOPE CONSTRUCTION SEQUENCE

1. DIG A POT HOLE AT EACH NAIL LOCATION AS SHOWN IN TYPICAL SPIDER SECTION BELOW RIGHT. DRIVE THE STEEPENED SLOPE SPIRALNAIL INSIDE THE POT HOLE, BELOW THE SLOPE GRADE, AS SHOWN IN TYPICAL SPIDER SECTION.

2. INSTALL AND TIGHTEN THE NAILHEAD LOCK COLLAR CONNECTOR WITH THE U-BOLT ENGAGED AND BACKFILL TO BASE LEVEL OF SPIDER HUB.

3. PLACE AND ANCHOR THE SEATTLE SPIDER HUB OVER THE U-BOLT WITH EACH LEG ENGAGED THROUGH THE OPPOSING LOOPS OF THE HUB.

4. POSITION THE SPIDER LEG THRU THE LOOP IN THE HUB AT THE INCLINATION SHOWN (SHARPENED END INTO THE GROUND) SO WHEN COMPLETE THE END IS NO DEEPER THAN 18" BELOW THE SLOPE SURFACE.

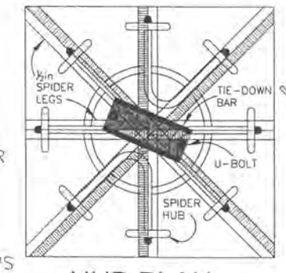
DRIVE THE SPIDER LEGS INDIVIDUALLY, ONE OPPOSITE PAIR AT A TIME THRU THE HUB LOOPS -- FIRST TO FORM THE "+" PATTERN THEN THE "X" PATERN. THEN PUSH THE LEG ENDS DOWN TO LOCK THEM UNDER THE HOOKS IN THE HUB. THIS CAN BE ACCOMPLISHED WITH EASE USING A REBAR BENDER.

5. AFTER ALL SPIDER LEGS ARE COMPLETE AND HOOKED INTO THE HUB, PLACE THE TIE-DOWN BAR OVER THE U-BOLT AND FASTEN WITH LUGS TORQUED TO 40 ft-lbs.

6. FILL THE POT HOLE AND REPAIR DISTURBED SLOPE FACE AS DIRECTED BY THE ENGINEER. PLACE MIN. 4-INCH TOPSOIL OVER DISTURBED SLOPE AND COVER WITH JUTE MESH ANCHORED IN PLACE.

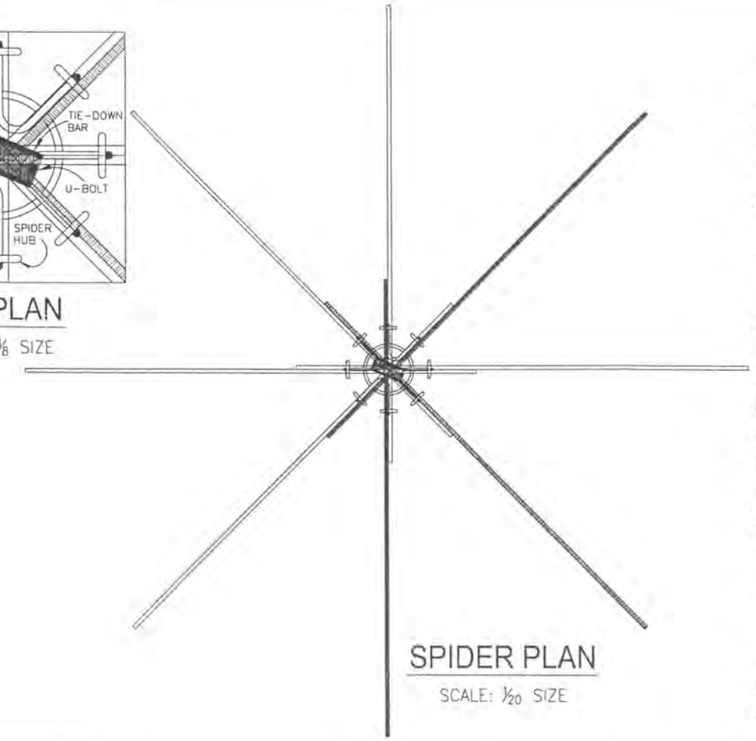
SPIDER FABRICATION SPECIFICATIONS

THE SPIDER IS COMPRISED OF THREE PREFABRICATED COMPONENTS. THE SPIDER HUB SHALL BE 3/8" STEEL BAR, ASTM A82 GRADE 60, SHOP BENT AND WELDED AS SHOWN ON THE DETAIL LEFT. THE SPIDER LEGS SHALL BE #4 (1/2" DIA.) DEFORMED BAR, ASTM A615 GRADE 40 WITH CHISEL SHARPENED DRIVING END. THE COLLAR PLATES SHALL BE 1/4" STEEL PLATE, ASTM A572 (AASHTO 223) 50-ksi WITH 3/8" GRADE 2 GALVANIZED NUT & BOLT. ALL PARTS SHALL BE HOT-DIP GALVANIZED PER SPIRALNAIL SPECIFICATIONS.



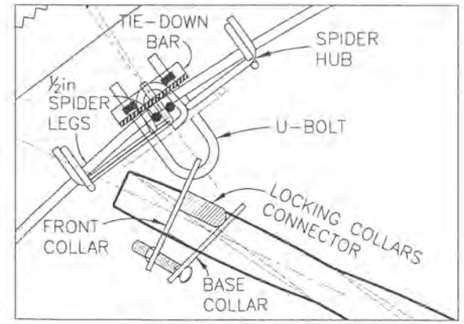
HUB PLAN

SCALE: 1/8 SIZE



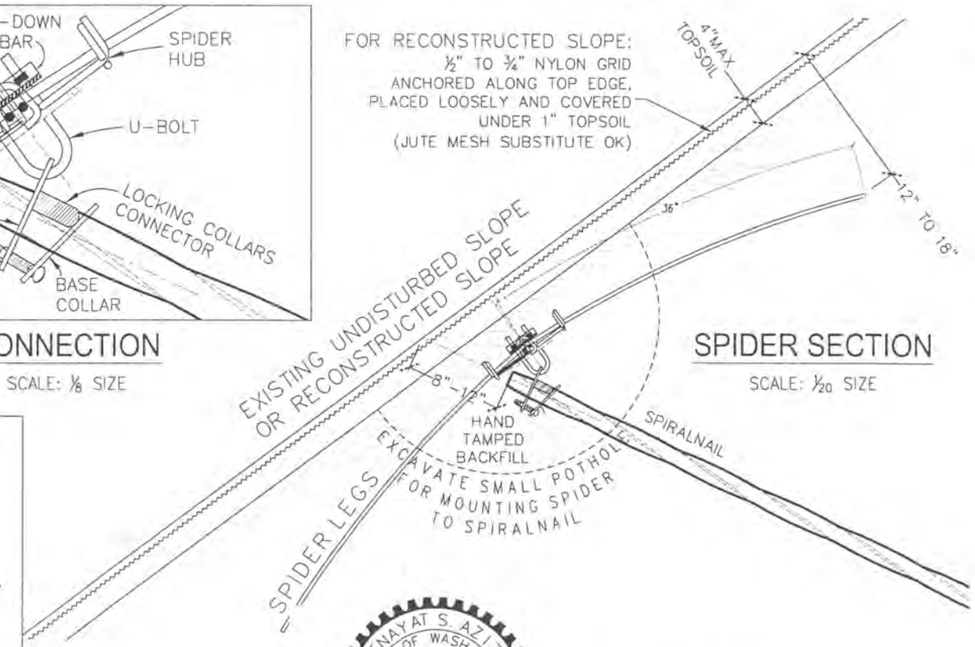
SPIDER PLAN

SCALE: 1/20 SIZE



CONNECTION

SCALE: 1/8 SIZE

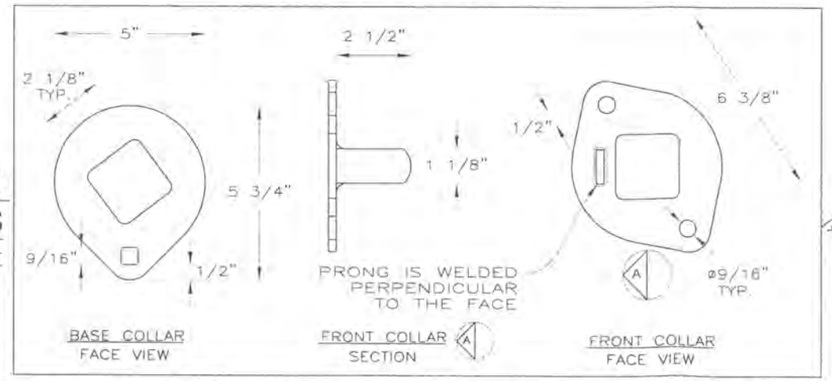


SPIDER SECTION

SCALE: 1/20 SIZE

LOCK COLLARS

SCALE: 1/5 SIZE



NOTE:
Seattle Spider system is copyrighted intellectual property of AZIZ Engineering Company; Pattent Application in process. All rights reserved, including fabrication, production, and copying. Permission is specifically for Olympic Discovery Trail, Lake Crescent 727+00 Slide Repair and Slope Stabilizatio.

seattle spider system shop & construction details

Robinson Residence; 25129 8th Place South

Slide Repair and Slope Stabilization; Des Moines WA

sheet 4 of 6

ENAYAT S. AZIZ
STATE OF WASHINGTON
24330
REGISTERED PROFESSIONAL ENGINEER

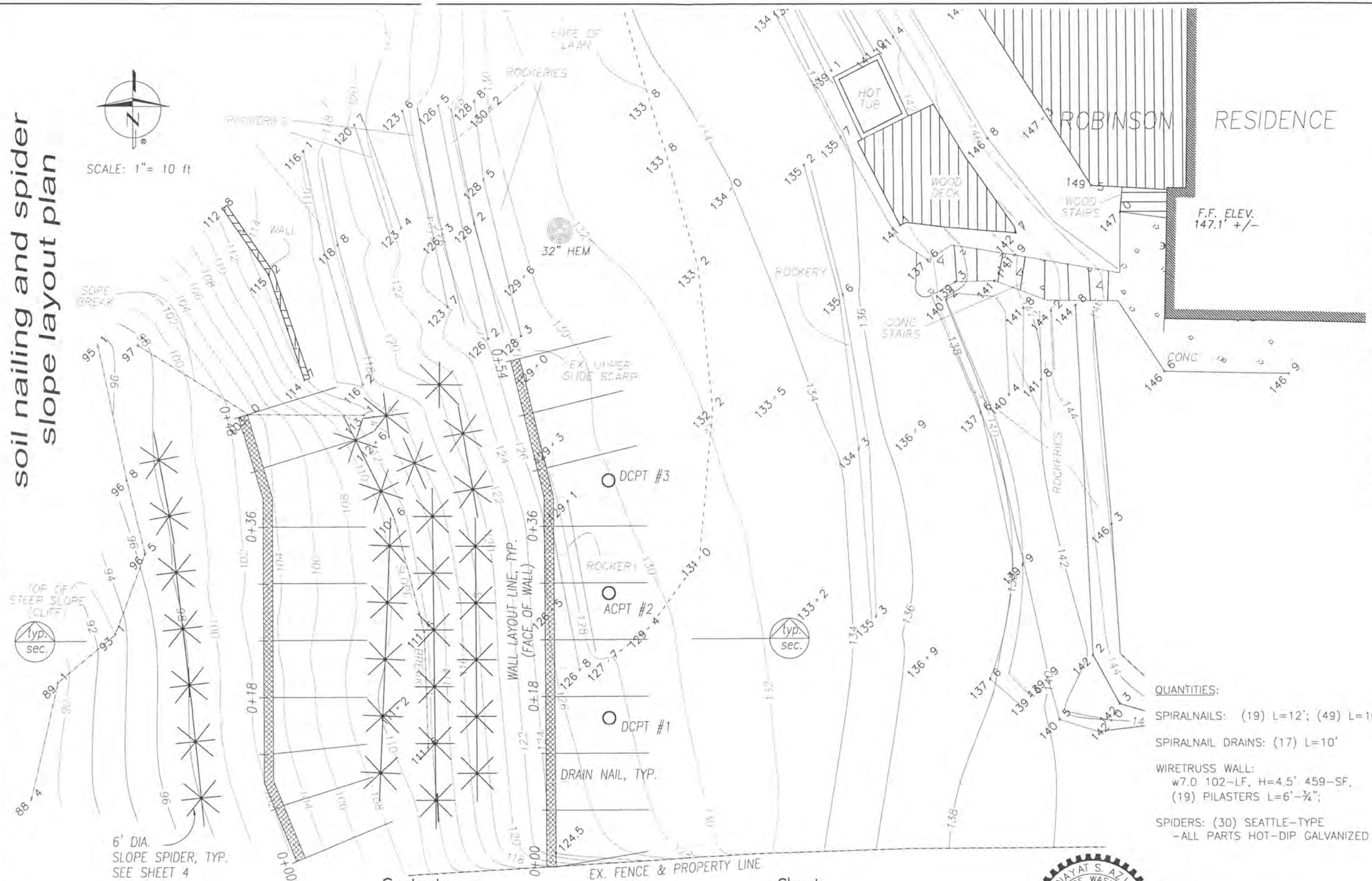
SIGNED: 10/14/11

AZIZ
AZIZ Engineering Company
7740 196th Ave NE (Historic Red Brick Rd)
P.O. BOX 2758
REDMOND, WA 98073-2758
425/898-1007 fax 425/898-9699 info@aziznw.com

AZIZ PROJECT No 431110 | DRAWING DATE 10/14/11 | SUBMITTED 10/17/11

soil nailing and spider slope layout plan

SCALE: 1"= 10 ft



NOTE:
WALL LAYOUT MAY VARY SLIGHTLY FROM WHAT IS SHOWN, TO BE ADJUSTED IN THE FIELD BY THE GEOTECHNICAL ENGINEER.

0 5 10 15 (feet)

Contents

	Sheet
Soil Nailing & Spider Slope Layout Plan	1
Typical Sections & Wall Elevation	2
Spiralnail Shop Details, Construction Notes & Specifications	3
Spider Slope Shop & Construction Details	4
Hilfiker Wiretruss Wall Shop & Assembly Details	5&6

QUANTITIES:

SPIRALNAILS: (19) L=12'; (49) L=10';

SPIRALNAIL DRAINS: (17) L=10'

WIRETRUSS WALL:
w7.0 102-LF, H=4.5' 459-SF,
(19) PILASTERS L=6'-¾";

SPIDERS: (30) SEATTLE-TYPE
-ALL PARTS HOT-DIP GALVANIZED

VENAYAT S. AZIZ
STATE OF WASHINGTON
24330
REGISTERED PROFESSIONAL ENGINEER

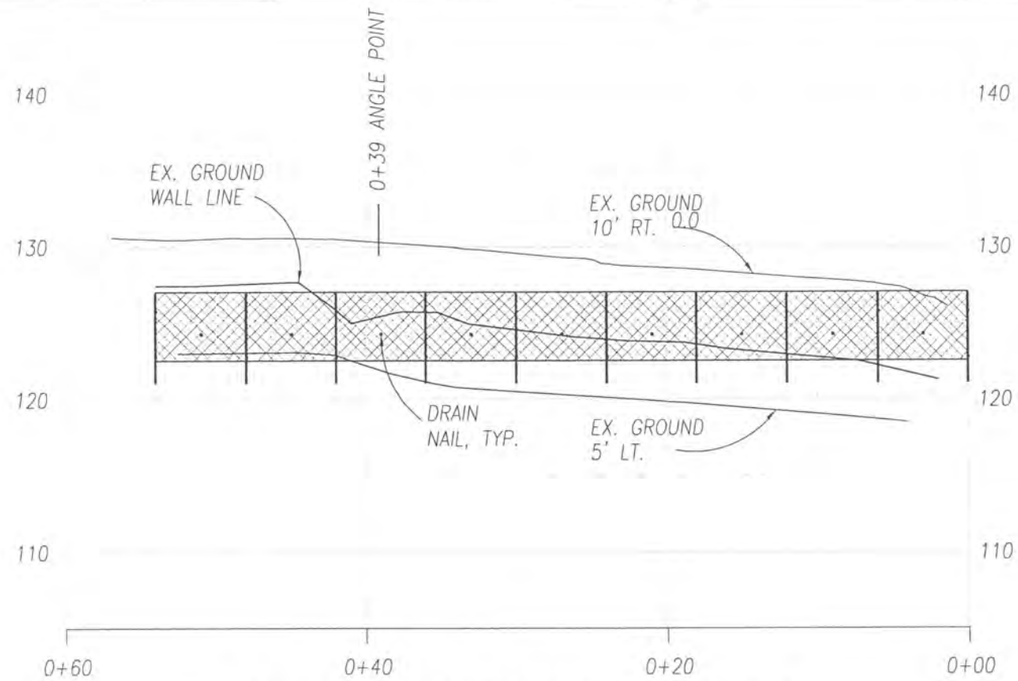
SIGNED: 10/14/11

AZIZ
AZIZ Engineering Company
7740 196th Ave NE (Historic Red Brick Rd)
P.O. BOX 2758
REDMOND, WA 98073-2758
425/898-1007 fax 425/898-9699 info@aziznw.com

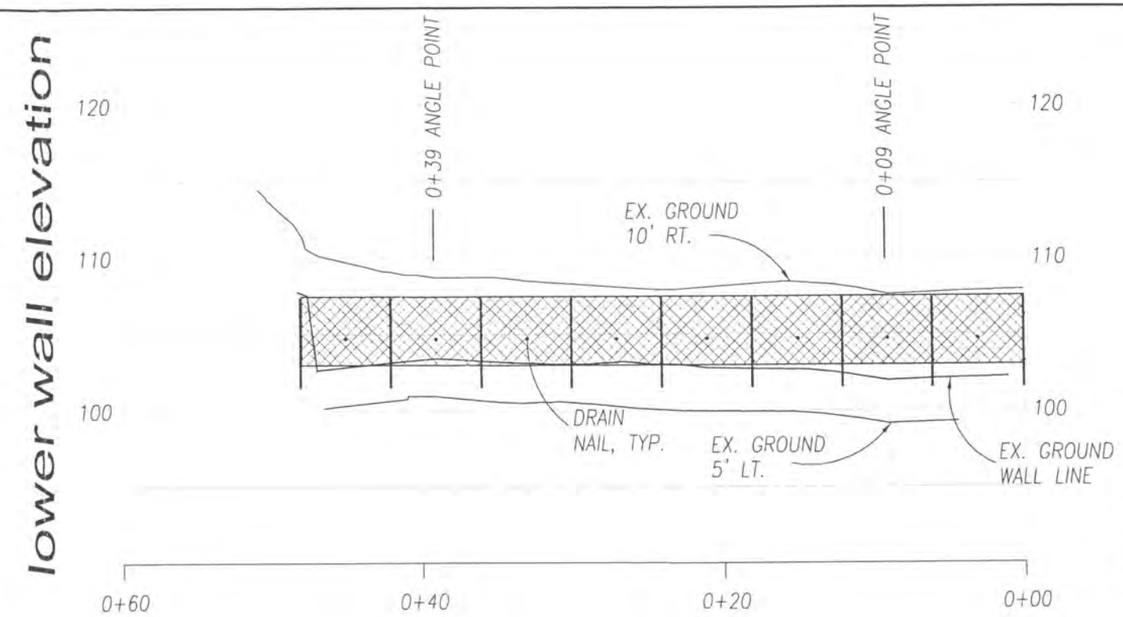
sheet 1 of 6

Robinson Residence
25129 8th Place S; Des Moines WA
Steep Slope Slide Repair and Stabilization

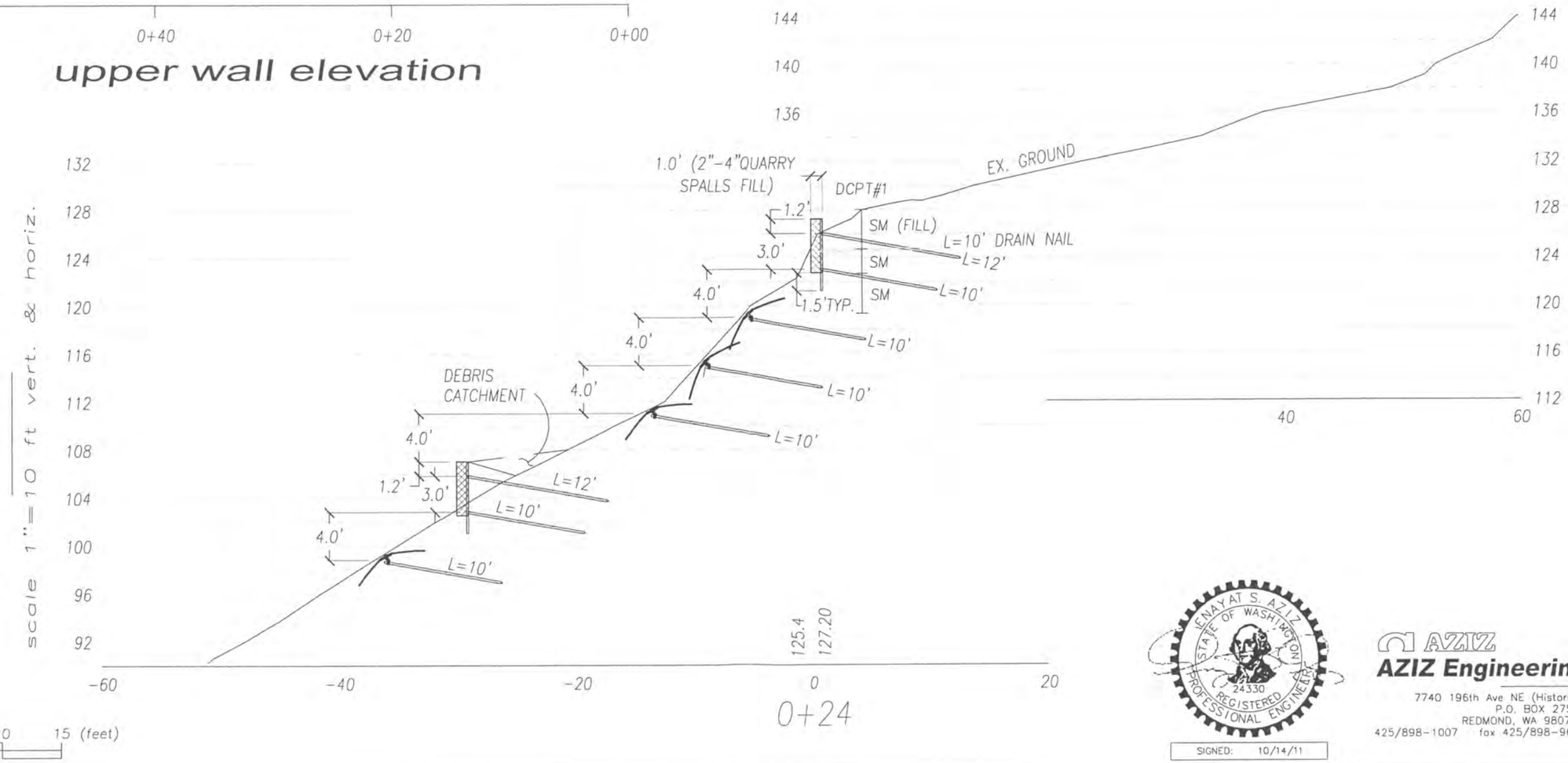
PROJECT No 431110 | DRAWING DATE 10/14/11 | SUBMITTED 10/17/11
9/19/2011 TOPOGRAPHY SURVEY BY GEODIMENSIONS, BELLEVUE WA; FURNISHED BY OWNER



upper wall elevation



lower wall elevation



soil nailing and spider slope typical section and wall elevation

PROJECT No 431110 | DRAWING DATE 10/14/11 | SUBMITTED 10/17/11

LIMITED TOPOGRAPHY SURVEY; ASSUMED DATUM

SIGNED: 10/14/11

AZIZ

AZIZ Engineering Company

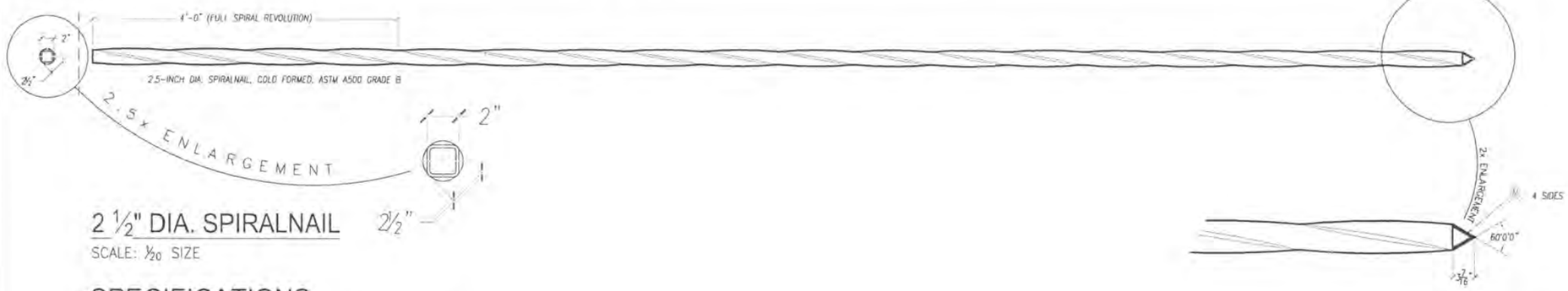
7740 196th Ave NE (Historic Red Brick Rd)
P.O. BOX 2758
REDMOND, WA 98073-2758
425/898-1007 fax 425/898-9699 info@aziznw.com

Robinson Residence

25129 8th Place S; Des Moines WA

Steep Slope Slide Repair and Stabilization

sheet 2 of 6



2 ½" DIA. SPIRALNAIL

SCALE: 1/20 SIZE

NOTE:

THE DRIVING END OF THE SPIRALNAIL IS FORMED INTO A WELED CONE, AS DELIVERED. DRIVING TIP MAY BE CUT OFF IN THE FIELD IF DIRECTED BY THE ENGINEER. THIS IS DETERMINED BASED ON THE LOCAL SOIL CONDITIONS.

SPECIFICATIONS and CONSTRUCTION NOTES

1. CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THESE, DRAWINGS, SPECIFICATIONS, AND CONSTRUCTION SEQUENCE, OR IN CONFORMANCE WITH CITY OF KENMORE STANDARDS AND STANDARD SPECIFICATIONS AS REQUIRED. ALL SPIRALNAIL WORK AND TESTING SHALL BE CONDUCTED BY, UNDER OBSERVATION OF, AND AS DIRECTED IN THE FIELD BY THE UNDERSIGNED GEOSTRUCTURES ENGINEER.

2. 2.5-INCH DIAMETER SPIRALNAILS® SHALL BE HILFIKER SHOP FABRICATED SQUARE-SECTION SPIRALLED STEEL TUBING (ASTM A500 GRADE B (42ksi, 0.218-INCH WALL THICKNESS) COLD FORMED FROM 2-INCH DIAMETER PIPE TO PRODUCE ONE COMPLETE SPIRAL TWIST PER EACH 4-ft TUBE LENGTH; WITH A SHOP WELDED CONE FORMED AT THE TIP. SPIRALNAIL AND ALL ITS COMPONENTS SHALL BE HOT-DIP GALVANIZED SOON AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 (AASHTO M-111) (2 OZ/SF MINIMUM COATING THICKNESS).

3. WALL FACING SHALL BE HILFIKER WIRETRUSS® CELLULAR SYSTEM USING 12" WIDE, 54" HIGH, 6-FT PILASTER SPACING SHOP-BENT WELDED WIRE PANELS, WITH INTERNAL STIFFENER PANELS BOUND BY SPIRAL BINDERS ON ALL CORNERS. THE WELDED WIRE PANELS FOR THE WIRETRUSS WALL SHALL BE 6"x12" w7.0xw3.5 60ksi (80ksi MAX) STEEL FABRICATED IN CONFORMACE WITH AASHTO M32, FABRICATED OF SMOOTH WIRE CONFORMING TO AASHTO M55. WIRE FOR THE SPIRAL BINDERS SHALL BE w4.5 SMOOTH. ALL COMPONENTS SHALL BE HOT-DIP GALVANIZED PER ASTM A123 (AASHTO M-111).

4. SLOPE FACING SHALL BE HILFIKER SPIDER® SYSTEM, 6-ft FLAT DIAMETER AS MEASURED TO LEG ENDS. SEE SHEET 7 FOR SPECIFICATIOS.

5. THE MANUFACTURER SHALL PROVIDE A CERTIFICATE OF COMPLIANCE FOR ALL FABRICATED WALL MATERIALS AND COMPONENTS TO HAVE BEEN FABRICATED AND TREATED AT THE TIME OF CONSTRUCTION MEETING THE REQUIREMENTS OF APPLICABLE ASTM AND AASHTO SPECIFIED STANDARDS HERE AND ELESEWHERE IN THE PLANS.

6. THE ENGINEER INTENDS TO LOAD TEST ONE SPIRALNAIL AFTER DRIVEN IN PLACE TO ASSURE ADEQUATE DESIGN YIELD STRENGTH AT A LOCATION TO BE SELECTED WHILE OBSERVING THE NAIL DRIVING RESISTANCE. ADDITIONAL SPIRALNAILS SHALL BE TESTED, AS DETERMINED BY THE ENGINEER IF SOIL TYPES ENCOUNTERED VARY FROM DESIGN. THE TESTING SHALL TAKE PLACE AT LEAST 24 HOURS AFTER THE SPIRALNAIL IS DRIVEN. THE LOAD TEST SHALL CONSIST OF SUSTAINED LOADS TO RESIDUAL DISPLACEMENT (TYPICALLY 10 MINUTES) APPLIED IN APPROXIMATELY 10 % INCREMENTS OF THE DESIGN YIELD STRENGTH (Fy) OF THE SPIRALNAIL. THE INCREMENTAL LOADING SHALL BE APPLIED UNTIL 150-PERCENT OF THE Fy IS ACHIEVED OR UNTIL PULLOUT FAILURE IS GENERATED. FAILURE OCCURS WHEN A STRAIN DEFLECTION GREATER THAN 2.0 INCH IS OBSERVED OVER A 10-MINUTE PERIOD UNDER THE MAXIMUM SUSTAINED LOAD. IN CASE OF FAILURE, THE ADJACENT NAILS SHALL BE TESTED UNDER MAX LOAD WHILE THE ENGINEER REEVALUATE SOIL NAILING DESIGN. TESTING SHALL BE IN ACCORDANCE WITH THE CURRENT TESTING PROCEDURE AND USING THE APPARATUS SUPPLIED BY THE SPIRALNAIL MANUFACTURER. THE LOAD TESTING APPARATUS SHALL BE IN CUSTODY OF THE GEOSTRUCTURES ENGINEER.

7. QUARRY SPALLS FOR FILLING THE WIRETRUSS CELLS (SEE TYPICAL SECTIONS) SHALL BE 2-INCH TO 4-INCH HARD, SOUND, DURABLE BROKEN ROCK FREE FROM FRACTURES, SEEMS, CRACKS AND OTHER DEFECTS TENDING TO DESTROY ITS RESISTANCE TO WEATHERING. QUARRY SPALLS SHALL BE IN CONFORMANCE WITH SECTION 2-09.3(1)C OF THE WSDOT STANDARD SPECIFICATIOS.

8. BACKFILL BEHIND THE WIRETRUSS FACING CELLS (SEE TYPICAL SECTIONS) SHALL BE CRUSHED SURFACING BASE COURSE (CSBC) MEETING THE REQUIREMENTS OF SECTION 9-03.9(3) OF THE WSDOT STANDARD SPECIFICATIONS.

DRIVING HAMMER, CONTROLS AND PULLOUT TESTER ARE AVAILABLE FROM THE SUPPLIER; LIGHT-WEIGHT DRIVING HAMMER IS AVAILABLE FROM OMEGA CONTRACTORS IN REDMOND WA. THE INSTALLER SHALL PROVIDE HYDRAULIC POWER AND THE HOISTING SYSTEM SUCH AS A SUITABLE EXCAVATOR OR CRANE. CONTACT THE SUPPLIER BELOW TO COORDINATE THE HAMMER WEIGHT, MINIMUM HYDRAULIC POWER SUPPLY AND FITTING SIZES. SPIRALNAIL®, SEATTLE SPIDER®, AND WIRETRUSS WALL SYSTEM ARE MANUFACTURERED BY:

HILFIKER RETAINING WALLS
3900 BROADWAY
EUREKA, CA 95502
(800) 762-8962 | (707) 443-2891 FAX
www.HILFIKER.COM

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REDMOND, WA 98073-2758
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Robinson Residence; 25129 8th Place South

Slide Repair and Slope Stabilization; Des Moines WA

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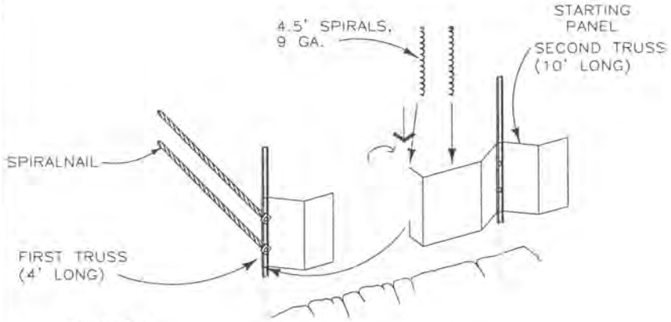
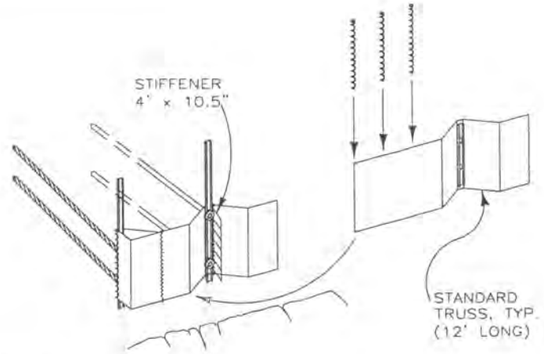


STEP 1

PLACE STARTING TRUSS PANEL ON ALIGNMENT IN FRONT OF EX. WIRE WALL AS DIRECTED BY THE ENGINEER.

PLACE THE PILASTER CHANNEL AGAINST THE EDGE OF THE TRUSS PANEL ON ALIGNMENT AND DRIVE THE CHANNEL INTO THE GROUND UNTIL THE TOP OF CHANNEL IS TO TOP OF WALL GRADE. DRIVE THE BOTTOM ROW SPIRALNAIL THROUGH THE CHANNEL HOLE INTO THE WIRE WALL.

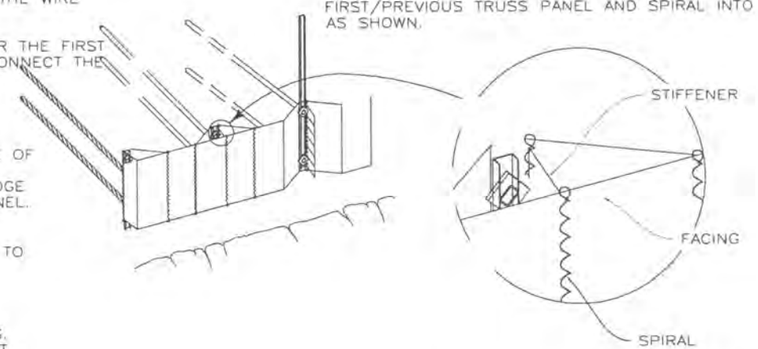
PLACE THE FIRST TRUSS PANEL OVER THE FIRST TRUSS USING SPIRAL BINDERS TO CONNECT THE MATS AS SHOWN.



STEP 2

BEFORE DRIVING THE SPIRALNAIL INTO PLACE, ATTACH STIFFENER BESIDE THE CHANNEL WITH A SPIRAL BINDER.

PLACE THE STANDARD TRUSS PANEL OVER THE FIRST/PREVIOUS TRUSS PANEL AND SPIRAL INTO PLACE AS SHOWN.

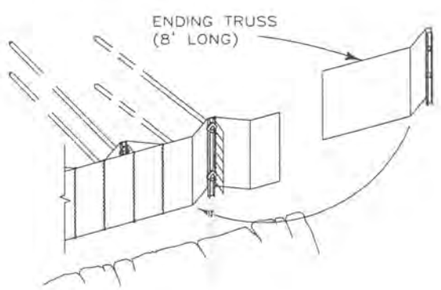


STEP 3

USING SPIRAL BINDERS, JOIN LEADING EDGE OF STANDARD TRUSS TO PREVIOUS TRUSS, TO FRONT EDGE OF STIFFENER AND TO THE EDGE OF THE BEND IN THE PREVIOUS TRUSS PANEL. THE SPIRAL BINDERS WILL BE 2' APART.

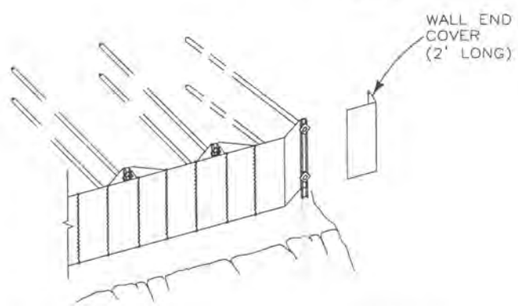
SEE DETAIL FOR JOINING STIFFENER PANEL TO THE TRUSS PANEL.

FILL THE COMPLETED WIRE TRUSS FACING SYSTEM WITH 2" TO 4" QUARRY SPALLS. REPEAT STEPS 2 & 3 UNTIL ENDING TRUSS. SEE STEP 4 FOR ENDING TRUSS PLACEMENT.



STEP 4

PLACE ENDING PANEL OVER THE FINAL STANDARD TRUSS PANEL. SPIRAL BIND TO PREVIOUS MAT AND TO STIFFENER. DRIVE SPIRALNAIL INTO PLACE.



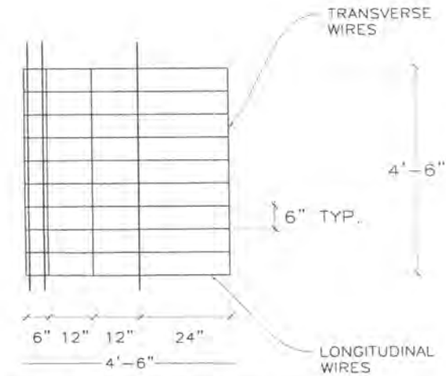
STEP 5

PLACE COVER OVER ENDING TRUSS PANEL AND SPIRAL BIND INTO PLACE.

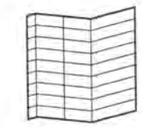
STEP 6

START THE SECOND AND THIRD ROWS OF PANELS USING THE PROCEDURE OUTLINED IN STEPS 1 THRU 5 OR AS SPECIFIED FOR INDIVIDUAL WALL.

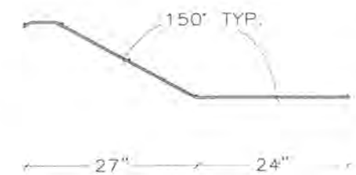
CONSTRUCTION SEQUENCE



WIRE MAT SIZE AND SPACING
NOT TO SCALE

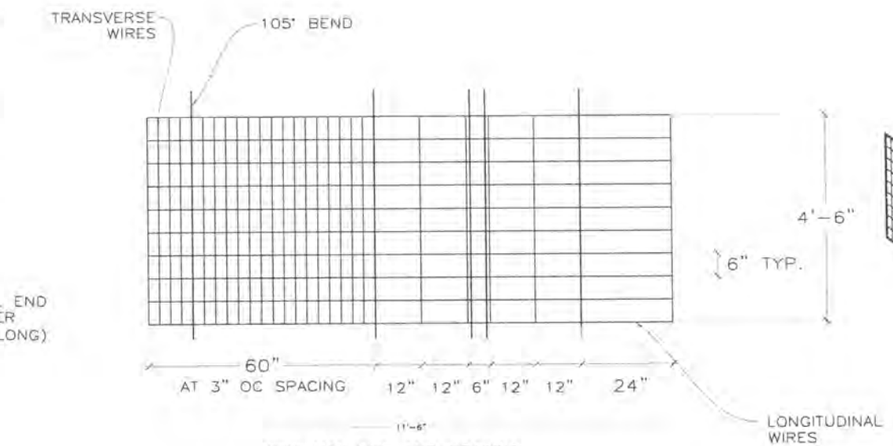


ISOMETRIC VIEW
FIRST TRUSS

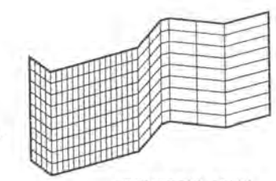


BENDING DETAILS
SCALE: 1"=24"

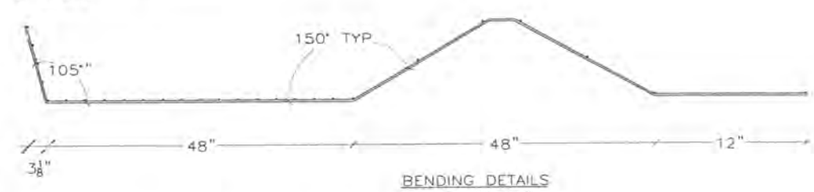
STARTING TRUSS PANEL



WIRE MAT SIZE AND SPACING
NOT TO SCALE



ISOMETRIC VIEW
SECOND TRUSS



BENDING DETAILS
SCALE: 1"=24"

FIRST TRUSS PANEL

NOTE: CONSTRUCTION SEQUENCE ABOVE IS FOR REVIEW AND ORIENTATION PURPOSES. ENGINEER WILL PROVIDE TECHNICAL ASSISTANCE DURING THE CONSTRUCTION. DO NOT ATTEMPT WALL CONSTRUCTION IN ABSENCE OF UNDERSIGNED ENGINEER.

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6-ft pilaster spacing wiretruss paneling construction sequence & shop details

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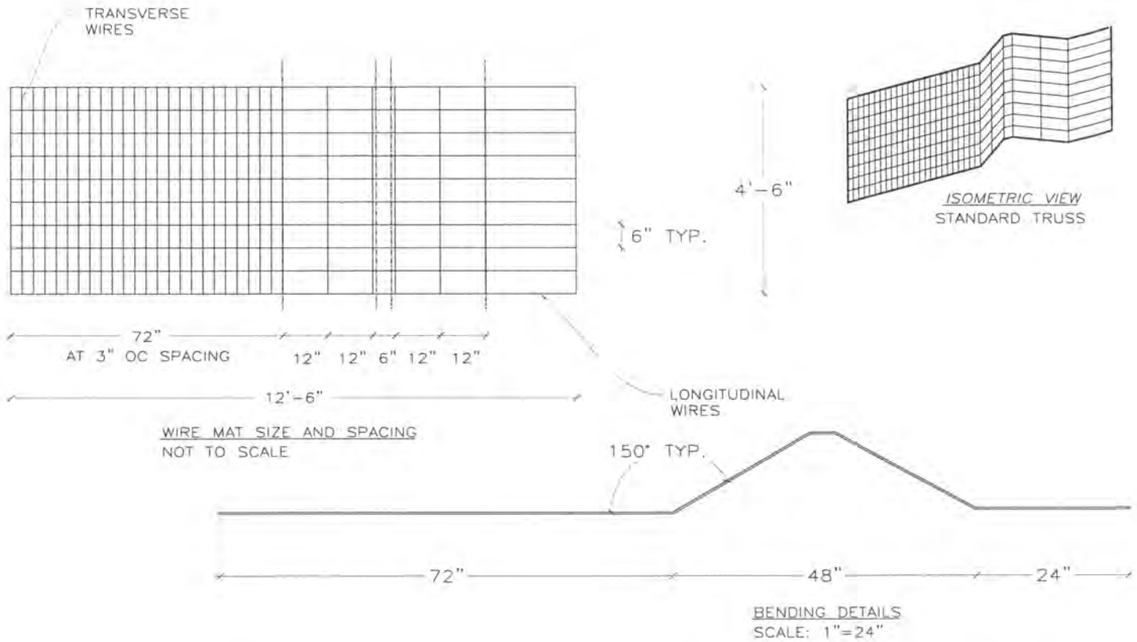
425/898-1007 fax 425/898-9699 info@aziznw.com

Spiralnail Wiretrus Wall System

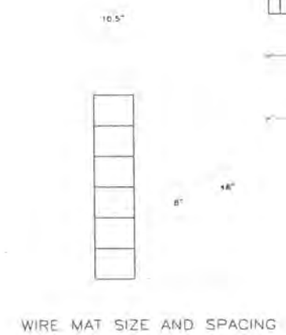
Robinson Residence Slide Repair /Stabilization - Des Moines, Washington

sheet 5 of 6

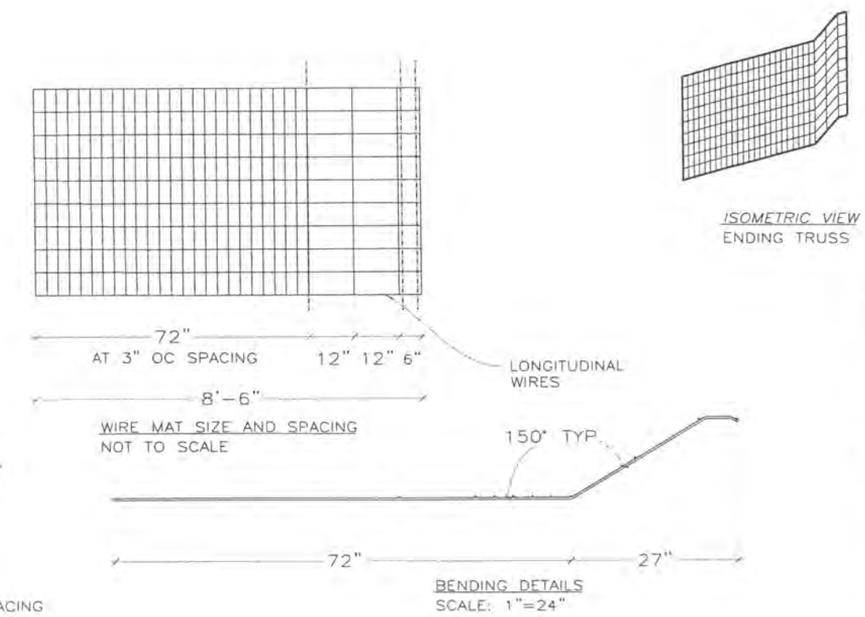
PROJECT No 431110 | DRAWING DATE 10//14/11 | SUBMITTED 10/17/11



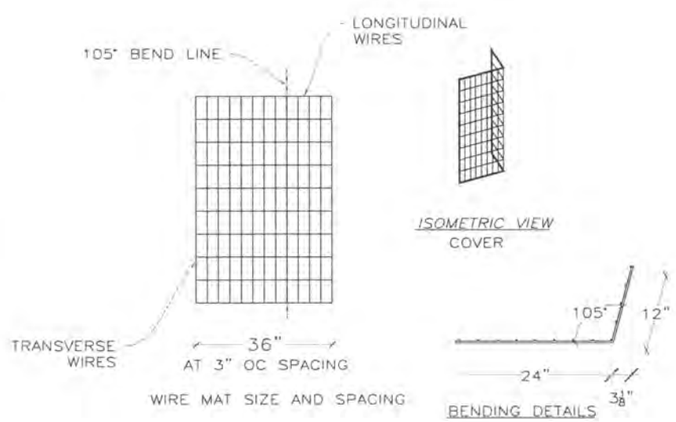
STANDARD TRUSS PANEL



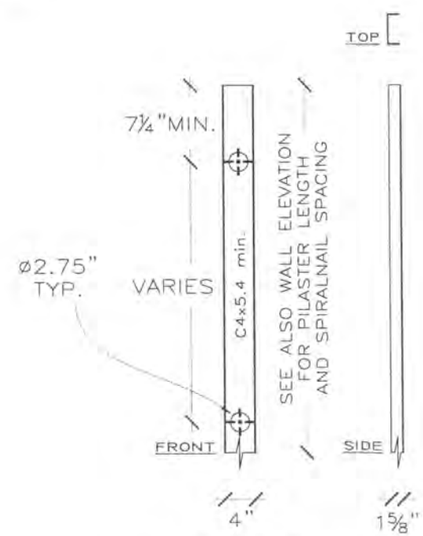
STIFFENER



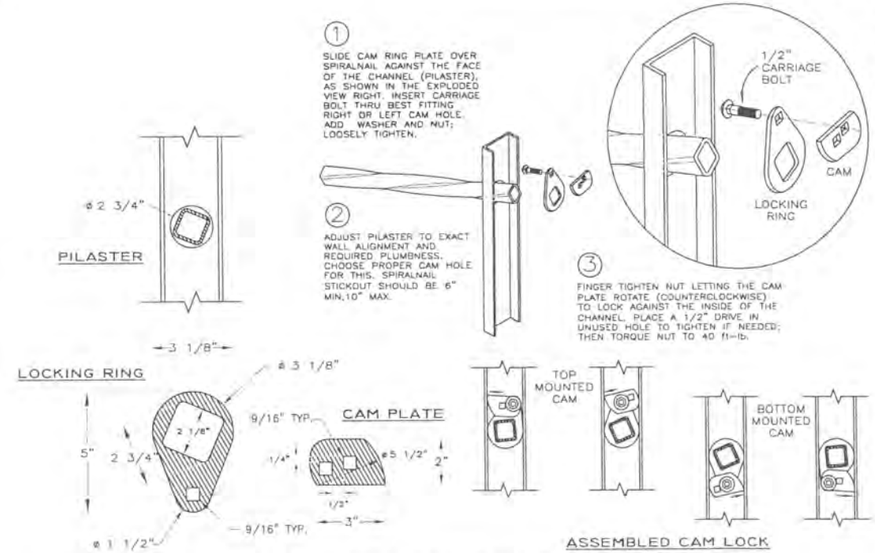
ENDING TRUSS PANEL



COVER PANEL



PILASTER CHANNEL



CAM LOCK ASSEMBLY

6-ft pilaster spacing wiretruss paneling shop details

Spiralnail Wiretrus Wall System

Robinson Residence Slide Repair /Stabilization - Des Moines, Washington

sheet 6 of 6

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PO Box 44840
Tacoma, WA 98448
Telephone: 253-537-9400
Fax: 253-537-9401

BORING NUMBER B-1

Figure A-2

CLIENT Jimmie Robinson c/o Mike Carlson Excavation
PROJECT NAME DesMoines Landslide Evaluation
PROJECT NUMBER T11027
PROJECT LOCATION Des Moines, Washington
DATE STARTED 4/15/11 **COMPLETED** 4/15/11
GROUND ELEVATION ____ **HOLE SIZE** 3/4"
DRILLING CONTRACTOR Davies Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING —
LOGGED BY DAR **CHECKED BY** ____
AT END OF DRILLING ---
NOTES ____
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY LENGTH (in)	N VALUE	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0	SS S-1	12	2-2-2 (4)	ML		(ML) Brown silt with sand (medium stiff, moist)(Fill)
2.5						
	SS S-2	7	2-3-6 (9)	SM		(SM) Brown silty sand with gravel (loose, moist)(Fill)
8.0						
10	SS S-3	12	10-11-12 (23)	SM		(SM) Brown silty sand with gravel (medium dense, moist)(Glacial Till)
	SS S-4	14	16-32-22 (54)			Grades to mottled and dense
16.0						
20	SS S-5	0	13-20-30 (50)	ML		(ML) Brown silt with sand (dense, moist)
21.0						
	SS S-6	18	17-26-35 (61)	SM		(SM) Brown silty fine-medium sand (very dense, moist)
27.0						
30	SS S-7	18	17-29-28 (57)	SP-SM		(SP-SM) Brown fine-medium sand with silt and gravel (very dense, moist)
	SS S-8	15	17-15-19 (34)			Grades to without gravel
37.0						
40	SS S-9	0	7-7-8 (15)	SM		(SM) Brown silty fine-medium sand with gravel (medium dense, moist)(Till)
42.0						
	SS S-10	44	6-12-14 (26)	SP-SM		(SP-SM) Brown fine-medium sand with silt and gravel (medium dense, moist)
47.0						
50	SS S-11	0	10-22-29 (51)	SM		(SM) Brown silty fine sand with occasional gravel (dense, moist)
51.0						

Bottom of borehole at 51.0 feet.

GENERAL BH / TP / WELL - GINT US.GDT - 5/6/11 11:01 - C:\DOCUMENTS AND SETTINGS\COMPAQ_ADMINISTRATOR\DESKTOP\T11027 ROBINSON, JIMMIE.GPJ

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

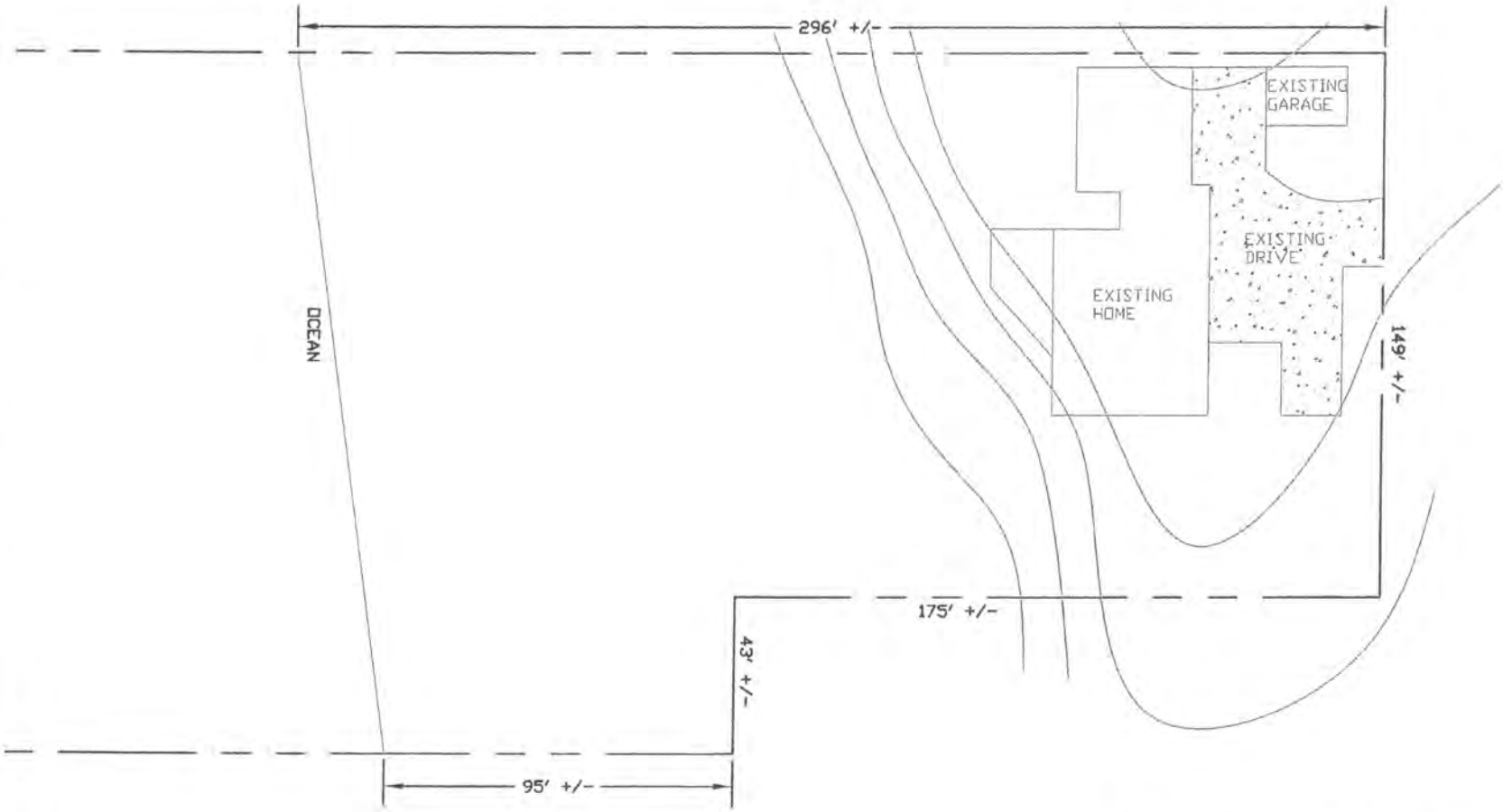
	Modified California	RV	R-Value
	Split Spoon	SA	Sieve Analysis
	Pushed Shelby Tube	SW	Swell Test
	Auger Cuttings	TC	Cyclic Triaxial
	Grab Sample	TX	Unconsolidated Undrained Triaxial
	Sample Attempt with No Recovery	TV	Torvane Shear
CA	Chemical Analysis	UC	Unconfined Compression
CN	Consolidation	(1.2)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

SOIL CLASSIFICATION CHART AND KEY TO TEST DATA

Figure A-1

E3RA

LGD A NNNN02 GINT US LAB.GPJ 11/4/05



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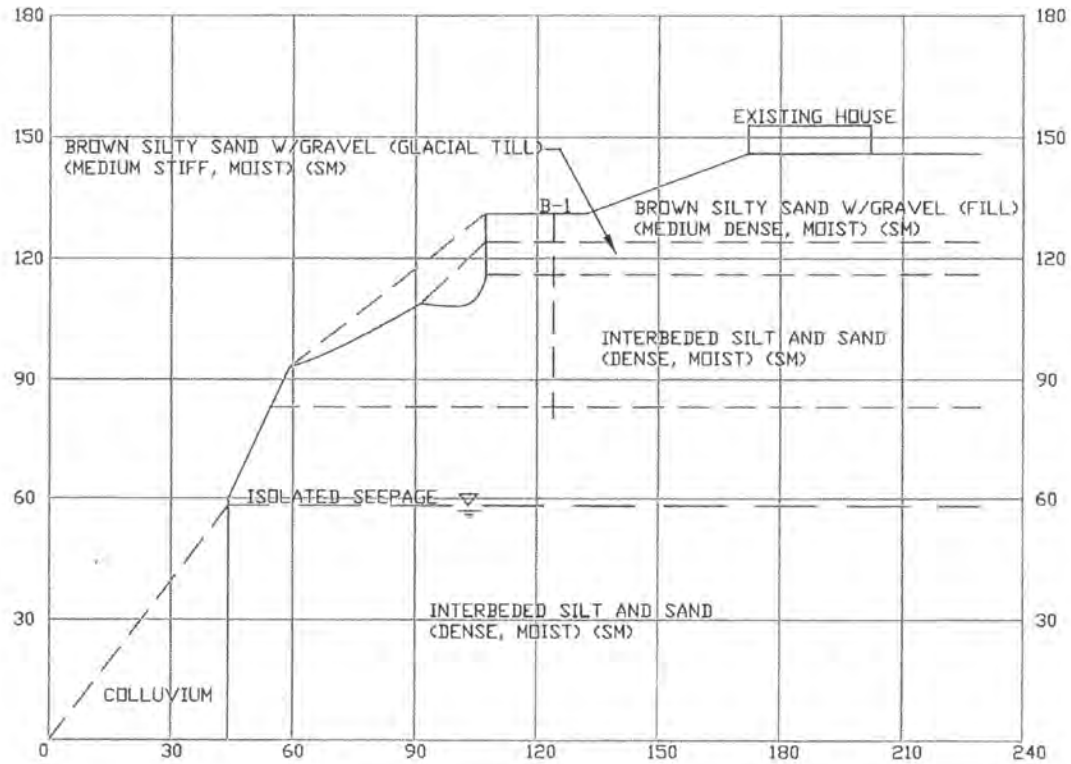
PROJECT:	Landslide Evaluation Des Moines, Washington	
SHEET TITLE:	Site and Exploration Plan	
DESIGNER: CRL		JOB NO. T11027
DRAWN BY: CRL		SCALE: 1" = 30'
CHECKED BY: JEB		FIGURE: 2
DATE: Mar. 9, 2010		FILE: T11027.dwg



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DESIGNER: CRL		JOB NO. T11027
DRAWN BY: CRL		SCALE: 1" = 30'
CHECKED BY: JEB		FIGURE: 3
DATE: Mar. 9, 2010		FILE: T11027.dwg

CLOSURE

The conclusions and recommendations presented in this letter are based, in part, on our interpretations and assumptions regarding subsurface conditions; therefore, if variations in the site conditions are observed at a later time, we may need to modify this letter to reflect those changes.

Respectfully submitted,

E3RA, Inc.

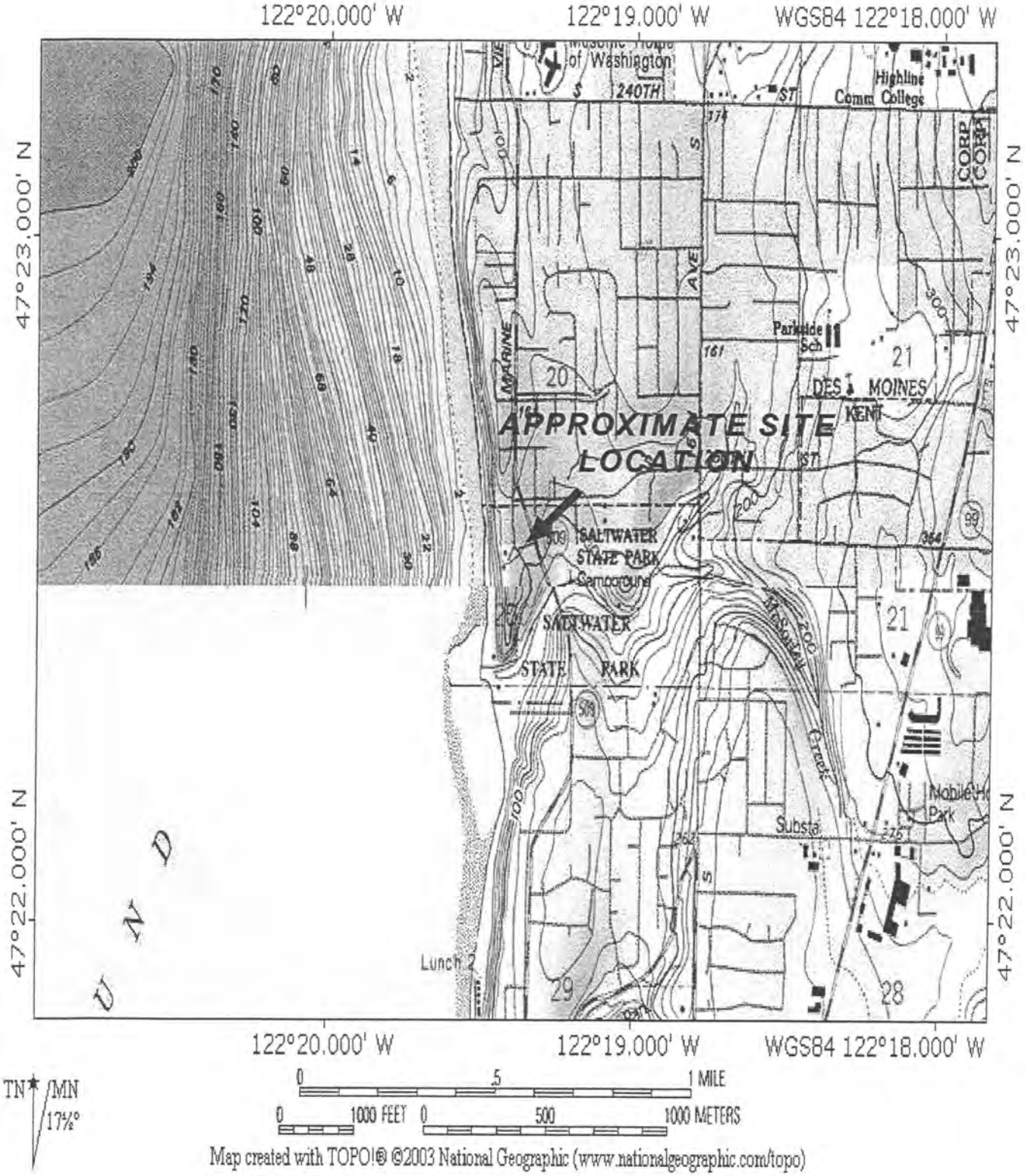
David Rupert
Staff Geologist

James E. Brigham P.E.
Principal Engineer

JEB:dj
TACO\\Tacoma-server\c\JOB FILES\2011 JOB FILESS\T11027 ROBINSON, JIMMIE\Robinson Geotechnical Evaluation Landslide Letter.doc

Attachments: Figure 1 Topographic and Location Map
Figure 2 Site and Exploration Plan
Figure 3 Site Profile
Soils Classification Chart
Boring Log B-1

Two Copies Submitted



Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)

E3RA, Inc. **P.O Box 44840** **Tacoma, WA 98448**	25129 8TH PL S TOPOGRAPHIC AND LOCATION MAP DES MOINES, WASHINGTON	**FIGURE 1** **T11027**

Surface water sheet flow would have also contributed to the saturation as the majority of the landscaped portion of the site, above the slide would and continues to drain to the slide location.

SLOPE REPAIR

The first step in repairing the slope failure will be to address the sites drainage; specifically, any and all drains that are located within the slide zone and/or drain to the slide zone. The drains should be identified as to their source and should either be tight-lined to or near the base of the slope, re-routed to a suitable and positive discharge location away from the slope, or should be abandoned all together if practical.

The lower portion of the slide zone, the area below the head scarp and above the vertical bluff, remains unstable and also has very poor access with respect to machinery. Despite the poor access, this area will require some minor grading and re-vegetating. We recommend that tiers, troughs or depressions that have resulted from the soil movement be graded such that no water is allowed to collect. If practical, we recommend that areas in excess of a 2:1 (H:V) slope, be graded to 2:1 (H:V) or as close as is possible to 2:1 (H:V). For some areas in this zone, it may be more practical to armor the exposed slope face with quarry spalls. In the event that quarry spalls are used to armor portions of the slope, we recommend using 4 inch x 8 inch or larger spalls. Re-vegetation should be performed under the direction of an experienced Landscape Design professional. We recommend that whatever type of vegetation is used, consideration as to a vigorous and fast growing ground cover should be addressed as soon as the grading and drainage repair has been generally completed.

In order to provide stability to the upper portion of the failure, we recommend construction of a single or tiered block or crib lock retaining wall system employing reinforced backfill. Due to the variable and unstable soil conditions, we additionally recommend constructing a pin pile supported grade beam to provide foundational support for retaining wall(s). It appears that some tree removal will be necessary to accommodate this type of repair. If at all possible, the tree root ball should remain in-place. In the event that the stump/root ball is within the wall alignment, it will likely require complete removal.

In the event that slope repairs will include construction of block or crib lock wall(s), supported on pin pile grade beam(s), E3RA, Inc. can provide a cost estimate for a complete wall design.

our method of analysis and present our results.

Method of Analysis

Slope stability analyses typically involve five basic slope parameters: (1) location and shape of the potential failure surface, (2) internal friction angle of the various soils, (3) cohesion of the various soils, (4) density of the various soils, and (5) location of the piezometric groundwater surface. Once all five parameters have been estimated, the critical slip surface and associated safety factor of a given slope can be calculated. A critical slip surface is defined as the most likely surface along which a soil mass will slide, and a safety factor is defined as the ratio of the sum of all moments resisting slope movement versus the sum of all moments tending to cause slope movement. Consequently, a slope that possesses a safety factor of 1.0 is on the verge of sliding, whereas a slope with a safety factor greater than 1.0 has some resistance to sliding. According to standard geotechnical engineering practice, a static safety factor of 1.50 and a seismic safety factor of 1.10 are considered the desirable minimum values for most slopes, but 1.25 and 1.01, respectively, are often regarded as acceptable values.

Slope stability conditions for the project site were analyzed by means of Bishop Circular Analysis. All calculations were performed by means of the computer program WINSTABLE.

Our conservatively estimated values of internal friction angle, cohesion, and density for each soil layer are listed in Table 1. To model the foundation load applied by a future house, located 10 feet from the top of slope, we applied a vertical force of 2000 pounds per square foot area loading.

TABLE 1
Properties Of On-Site Soils Used For Slope Stability Analysis

Soil Type	Density (pcf)	Cohesion (pcf)	Internal Friction Angle (degrees)
Slide Debris	100	0	28
Glacial Till	130	2000	40
Fill Material	115	0	15
Overridden Outwash	120	1500	40

Our analysis yielded a Seismic Factor of Safety of 1.12 and a Static Factor of Safety of 1.51.

CONCLUSIONS AND RECOMMENDATIONS

Based on our observations of the surface and subsurface conditions with respect to the recent landslide, it is our opinion that the landslide occurred due to landscape grading performed at the southwest corner of the site and poor drainage. The undisturbed slope at the northwest corner of the site remains intact and appears to generally be in a stable condition.

CAUSE OF SLOPE FAILURE

The factors that contributed to the slope failure include the grading performed on the face of the steep slope, poorly compacted fill materials used to construct the terraces, and a poorly constructed drainage system observed within the landslide area. The landslide trigger appears to be due to saturated conditions that resulted from extended periods of wet weather. Additionally, the flat portions of the terraces likely collected surface runoff from above and appears to have infiltrated this material into the soils below.

3.0 SUBSURFACE CONDITIONS

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

3.1 Soil Conditions

Our auger boring exploration was located just above the slide head scarp and near the southwest corner of the site. The exploration revealed that a significant amount of fill material was placed near this portion of the site. We encountered about 7 feet of fill that consists of 2 ½ feet of silt with sand in a soft to medium stiff condition. Underlying the silt, we encountered about 4 to 5 feet of additional fill consisting of silty sand with gravel in a loose condition to a depth of about 7 feet. Underlying the fill, we encountered glacial till consisting of silty sand with gravel in a medium dense to dense condition to a depth of about 16 feet. This layer appears to represent the native or existing soil horizon. Underlying the glacial till, we encountered interbedded glacial outwash deposits consisting of silt and/or sand with varying amounts of silts and gravel in a dense condition to a depth of about 34 feet. At about 37 feet below the ground surface, we encountered a medium dense zone within the glacial outwash deposits. At about 47 feet below the ground surface, we encountered glacial till in dense condition for the remaining depth of the exploration. The exploration was terminated at a depth of about 51 ½ feet.

The attached exploration log provides a detailed description of the soil strata encountered in our subsurface explorations. A site profile is presented as Figure 3.

3.2 Groundwater Conditions

At the time of our subsurface exploration, April 15, 2011, we observed no groundwater within the terminal depth of the exploration. However, we observed groundwater seepage at 3 isolated locations on the face of the near vertical portion of the slope. The seepage appears to daylight just above the contact between the lower glacial till layer and the lower, near vertical and interbedded outwash deposits. The distribution of the seepages is aligned directly below the recent landslide.

At all times of the year groundwater levels would likely fluctuate in response to precipitation patterns, off-site construction activities, and site utilization.

3.3 Seismic Conditions

Based on our analysis of subsurface exploration logs and our review of published geologic maps, we interpret the on-site soil conditions to correspond with a seismic site class C, as defined by Table 1615.1.5 of the 2009 *International Building Code (IBC)*.

3.4 Liquefaction Potential

Liquefaction is a sudden increase in pore water pressure and a sudden loss of soil shear strength caused by shear strains, as could result from an earthquake. Research has shown that saturated, loose sands with a fines (silt and clay) content less than about 20 percent are most susceptible to liquefaction. Our on-site subsurface exploration revealed that the silt content of site soils is generally too high or the soils are in too dense of a condition to liquefy easily.

3.5 Slope Stability Analysis

In order to establish an appropriate repair program for the slope located at the southwest corner of the project site, we analyzed the slope stability under selected conditions. The following sections describe

The specific number and locations of our explorations were selected in relation to the existing site features, under the constraints of surface access, underground utility conflicts, and budget considerations. We estimated the relative location of each exploration. Consequently, the locations depicted on Figure 2 should be considered accurate only to the degree permitted by our data sources and implied by our measuring methods.

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

2.1 Auger Boring Procedures

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

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

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

SUBSURFACE EXPLORATIONS

Our exploratory methods for observation of subsurface soil conditions consisted of an auger boring. A geologist from our firm advanced the hand auger and logged the subsurface conditions.

1.1 Slope and Landslide Conditions

During our reconnaissance of the project site on April 15th, 2011, we observed that a translational landslide had occurred at the southwest corner of the site. Based on conversations with the owner, Jimmie Robinson, we understand that in the year 1990 landscape grading performed on the southwestern corner of the site. This grading included three terraces and a walking path to allow access to each terrace. The terraces were constructed with short rockery walls placed against the cuts, with manicured lawns planted in between the walls. We expect that this grading involved some cutting and filling onto the face of the steep slope.

We understand and infer from adjacent grades that, below the landscaped area, the slope prior to the slide graded down steeply at about 70 percent and then became near-vertical down to the beach. The near vertical portion was about 60 feet above the beach elevation and appears to represent a contact between medium dense to dense glacial deposits and the underlying over-ridden and dense inter-bedded glacial outwash deposits.

The slide appears to have begun up slope and near the crest, with the landscaping fill portion experiencing the initial failure, translating down and advancing across the steep slopes below, bringing surface material down to the beach.

Currently, there is about an 8 to 10 foot head scarp near the southwest corner of the site. Below the head scarp are the hummocky remains of the terraces, grading down about 70 feet at about 60 to 70 percent to the dense outwash contact and near vertical, lower portion of the slope.

Within the slide debris and exposed at the slide face, we observed what appear to be drainage pipes. The pipes are in various conditions ranging from intact to completely destroyed. We observed perforated flexible pipe fastened to perforated rigid pipes with duct tape presumably to aid in draining one of the short rockeries. Above the failure, we observed flexible pipe that daylights briefly near the crest of the slope. We expect that the pipe drains either the rockeries above or perhaps the roof down spouts of the existing house.

The slide has left a large slide debris deposit on the beach. The deposit consists of somewhat intact blocks of glacial till and large amounts of unconsolidated outwash silt, sand and gravel.

2.0 EXPLORATORY METHODS

We explored surface and subsurface conditions at the project site on April 15, 2011. Our exploration program comprised the following elements:

- A surface reconnaissance of the site;
- One geotechnical auger boring (designated B-1), advanced onsite;
- A review of published geologic and seismologic maps and literature.

Figure 2 depicts the approximate relative location of our auger boring exploration. The following text sections describe the procedures used for auger borings.

PO Box 44840
Tacoma, WA 98448
253-537-9400
253-537-9401 Fax

E3RA

June 3, 2011
T11027

Jimmie Robinson
25129 8th Place South
Des Moines, WA 98198
c/o Carlson Excavation
PO Box 699
Duvall, WA 98109

Attn: Mike Carlson

Subject: **Geotechnical Evaluation Landslide Letter**
Robinson Residence
25129 8th Place South
Des Moines, Washington

Dear Mr. Carlson:

E3RA is pleased to submit this *Geotechnical Evaluation Landslide Letter* for your project site located at 25129 8th Place South in Des Moines, Washington. The purpose of our evaluation is to address a landslide that has occurred near the southwest corner of the property.

Our scope of work is limited to subsurface and surface observations, geotechnical research, and letter preparation. This letter has been prepared for the exclusive use of Jimmie Robinson and his consultants, for specific application to this project, in accordance with generally accepted geotechnical practice.

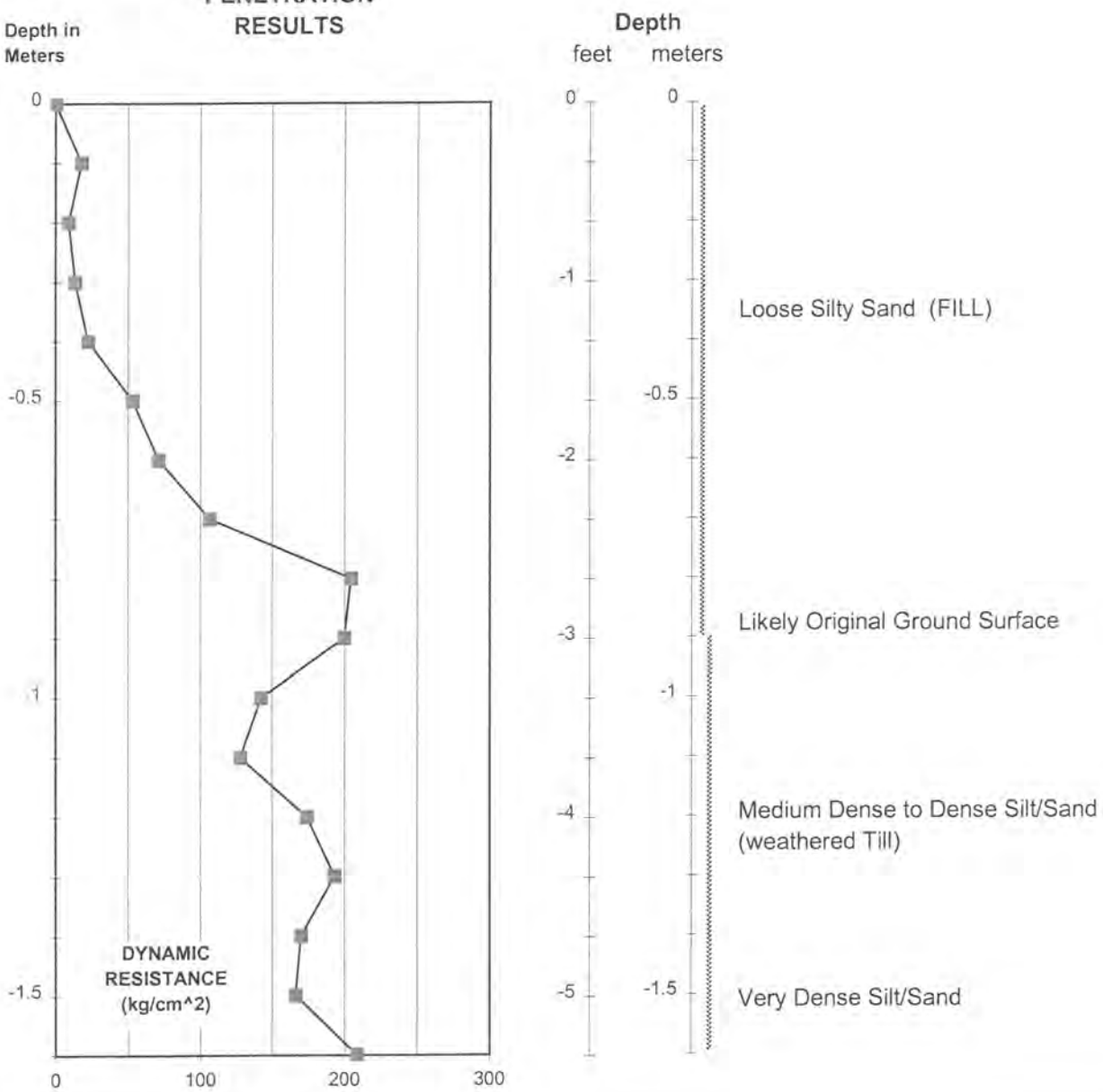
1.0 SITE AND PROJECT DESCRIPTION

The project site is located on the east bank of Puget Sound, at 25129 8th Place South in Des Moines, Washington, as indicated on Figure 1. The property has high bank water front along the west side. The lot is rectangular in shape and encompasses about 37,800 square feet or 0.87 acres. Currently a two story single family residence is located near the east-central side of the lot. The western or backyard portion of the property consists of several short rockery walls, planting beds and manicured lawn.

The site is generally flat on the eastern side of the site. The western side of the site grades down gently at about 10 percent for about 55 to 70 feet from the western side of the single family residence to a terraced portion of the yard. We observed that the landscaping above the terraced portion of the site is graded so that surface area is sloped in large part directly to the southwest corner of the site. From the western edge of the landscaping, an undisturbed, steep slope grades down at about 50 to 70 percent to the lower and near vertical portion of the slope. The near-vertical and lowest section of the slope toes at the beach. We estimate that the near vertical portion of the slope is about 60 feet in height. The total slope has relief of about 135 feet from the crest down to the toe or beach elevation of the slope.

Robinson Residence, Des Moines WA	Project No: 431110	Surface Elev: 130.0
Test Location: **Top of Upper Slide Scarp 8' back**	DCPT No: THREE	Tested By: EA, JB
Geotech. Engineer: E S Aziz	Test Date : 31-Aug-11	Calc. By: ESA

DYNAMIC CONE PENETRATION RESULTS



Inferred densities based on Triggs, et al. 1992; A Portable Dynamic Penetrometer for Geotechnical Investigations. (Available from AZIZ Engineering Company upon request)

Condition shown represent our observations at the time and location of the field work, modifications based on lab tests, analysis, and geological and engineering judgement. These conditions may not exist at other times and locations, even in close proximity. This information was gathered as part of our investigation, and we are not responsible for any use or interpretation of the information by others.

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AZIZ Engineering Company

DYNAMIC CONE PENETRATION TEST LOCATION No 3

WILDCAT ADHESION CONE LOG

PROJECT NUMBER: 431110
DATE STARTED: 8/31/11
DATE COMPLETED: 8/31/11

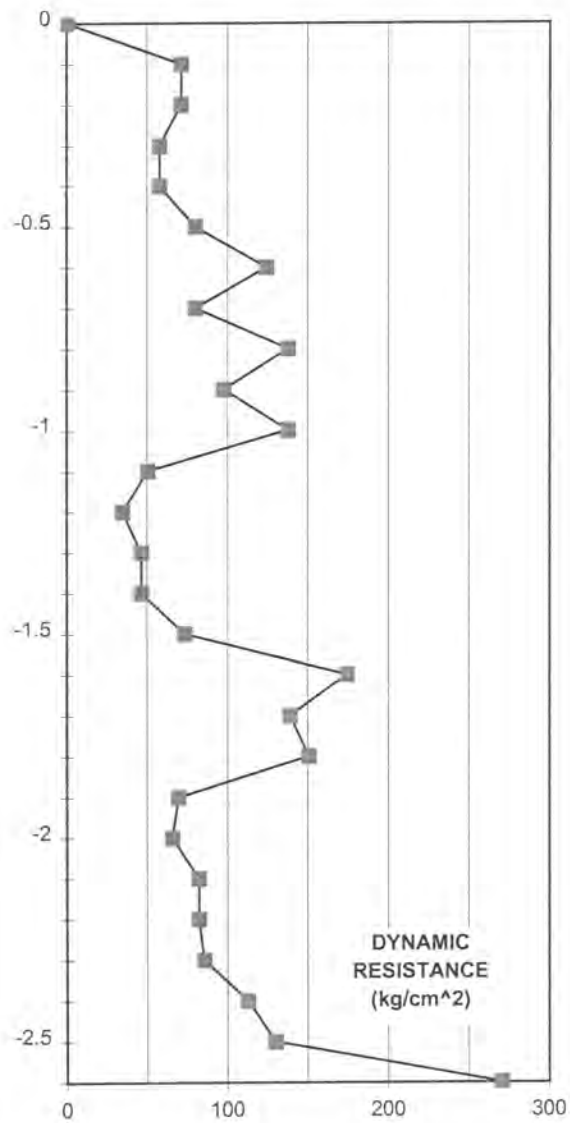
HOLE #: ACPT #2, 8' behind upper scarp
CREW: ES Aziz & Justin Byrd
PROJECT: Robinson Residence
25129 - 8th Place S
Des Moines, WA 98198

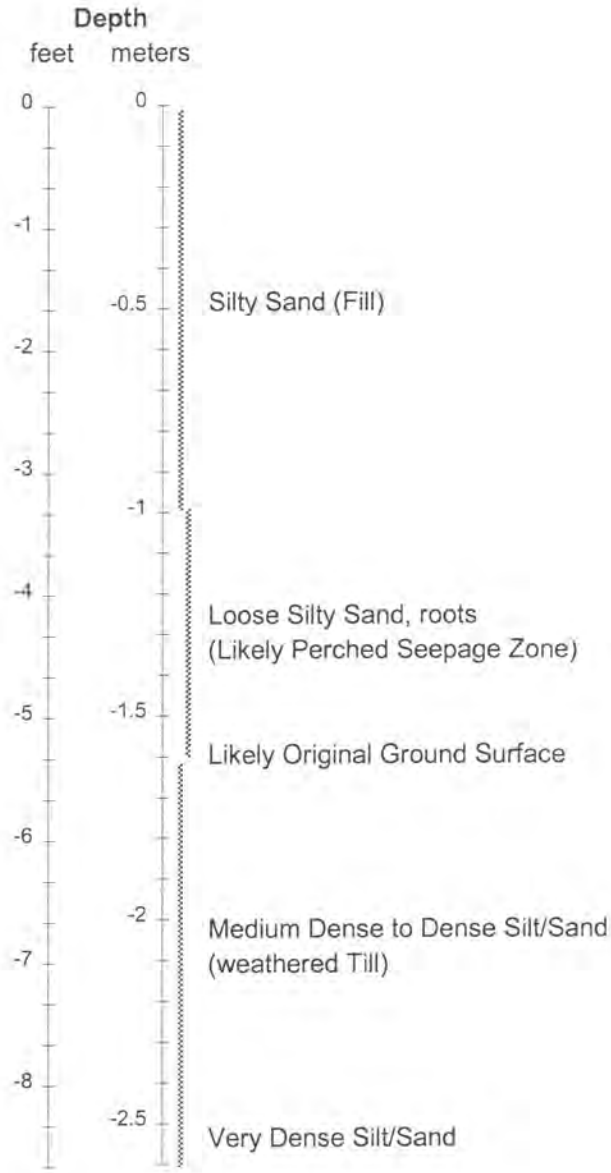
SURFACE ELEVATION: 128.5
WATER ON COMPLETION: No Water
HAMMER WEIGHT: 35 lbs.
CONE AREA: 10 sq. cm

DEPTH m	DEPTH ft	BLOWS PER 10 cm	SLEEVE TORQUE ft.-lbs.	ADHESION Kg/cm²	CONE RESISTANCE Kg/cm²	ADHESION RATIO %	GRAPH OF CONE RESISTANCE 0 50 100 150	N'	INFERRED SOIL DESCRIPTION
		4			18		•••••	3	
		7			31		••••••••	5	(soil profile exposed at
	1 ft	12			53		••••••••••••••••	10	upper scarp)
		12	5	1.21	53	2.26	••••••••••••••••	10	LOOSE GRANULAR
		12			53		••••••••••••••••	10	(tan silty sand, mottled)
	2 ft	16	8	1.81	71	2.54	••••••••••••••••••••	13	MEDIUM DENSE SILT
		9			40		••••••••••••	7	
		2			9		••	1	(roots, likely slip plane)
	3 ft	21	8	1.81	93	1.94	••••••••••••••••••••••••••	17	MEDIUM DENSE GRANULAR
1 m		39			173		••	25+	
		54	35	8.44	208	4.05	••	25+	DENSE SILT
	4 ft	74	25	6.03	286	2.11	••	25+	VERY DENSE GRANULAR
		84	30	7.23	324	2.23	••	25+	VERY DENSE GRANULAR
		90			347		••	25+	(refusal)
	5 ft								
	6 ft								Note: Descriptions in upper case are computed from field measurements. See Zimmerman Chart attached.
2 m									
	7 ft								
	8 ft								
	9 ft								
3 m	10 ft								
	11 ft								
	12 ft								
4 m	13 ft								

Robinson Residence, Des Moines WA	Project No: 431110	Surface Elev: 127.0
Test Location: **Top of Upper Slide Scarp 8' back**	DCPT No: One	Tested By: EA, JB
Geotech. Engineer: E S Aziz	Test Date : 31-Aug-11	Calc. By: ESA

DYNAMIC CONE PENETRATION RESULTS





Inferred densities based on Triggs, et al. 1992; A Portable Dynamic Penetrometer for Geotechnical Investigations.
(Available from AZIZ Engineering Company upon request)

Condition shown represent our observations at the time and location of the field work, modifications based on lab tests, analysis, and geological and engineering judgement. These conditions may not exist at other times and locations, even in close proximity. This information was gathered as part of our investigation, and we are not responsible for any use or interpretation of the information by others.

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DYNAMIC CONE PENETRATION TEST LOCATION No 1

design of the walls for site class D, based on the USGS seismic hazards maps. This is conservative because the wiretruss wall structures are flexible and can accommodate with little deformation as much as 3-inches of movement during earthquake motions with free-drainage. For such high-tolerance systems in cyclic loading, the pseudo-static Mononobe and Okabe approach is typically applied to obtain the horizontal seismic acceleration coefficient K_h as dampened by 3-inch maximum displacement manifesting insignificant structural damage that can be easily rehabilitated.

I trust the above is sufficient for your present considerations and permit applications as necessary. I am available for any questions or comments at your convenience.

Sincerely,

AZIZ Engineering Company

Enayat S. Aziz, P.E., L.E.G.
Geostructures Engineer
and Engineering Geologist

definition of the upper soils density and consistency. See the logs of dynamic and adhesion cone penetration tests attached. The results are in general agreement with the soil profile depicted in June 2011 report (figure 3); however, our analyses resulted in different design strength parameters for these soils. These upper soils are comprised of loose silty sand fill near the present ground surface, underlain by loose to medium dense sand/silt most likely weathered foundation soils. These are susceptible to soil creep over the slope and debris ruptures when saturated in confined enclosures. The underlying foundation soils are comprised of glacially consolidated dense sand with silt interbeds, the full profile of which is exposed along the beach, including the seepage zone and its full depth – see the enclosed photograph taken from the beach this summer.

Based on the above geotechnical engineering exploration and analyses, we recommend a compound reinforcement/confinement/drainage system starting in the upper slide scarp, then over the existing slope where the slide occurred, with a similar secondary system in the lower slide scarp near the top of the very steep slopes. These are shown in our construction plans, as a lower free-draining retaining wall, a mid-slope reinforced steepened slope and an upper retaining wall below the existing lawn. The latter wall incorporates a row of perforated spiralnails to enhance the subdrainage – See sheets 1 and 2.

We recommend the spiralnail wall system for this repair project for several reasons. This is a soil reinforcement system that can provide a dual task as a drainage system, confining and reinforcing the soils while providing subdrainage with perforated spiralnails and free-drainage through a rock filled (using 2" to 4" quarry spalls) welded wire wall called wiretruss wall. It can be constructed in difficult access sites using manual and lightweight equipment. There are many local examples, local operators with local spiralnail experience and specialized lightweight equipment in the Puget Sound area. And finally, there will be little ground disturbance over the existing slopes using this system.

The design stability analysis report for the proposed spiralnail wall and slope reinforcement is attached. The design parameters used in this analysis are based on the results of our subsurface exploration above and soil reinforcement geometry. We have estimated the seismic site response on the order of 0.2g applied to our

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October 17, 2011

Project No. 431110

Jimmie and Valorie Robinson
25129 8th Place South
Des Moines, WA 98198

Geotechnical Engineering Short Report
for Slide Evaluation and Stabilization
At 25129 8th Place South
Des Moines, Washington

Dear Mr. and Mrs. Robinson:

This letter presents the results of our recent subsurface exploration and geotechnical engineering analyses for stabilization of the subject steep slope slide zone, situated in the southwesterly side of the property at the top of the waterfront steep slopes. The slide extends south beyond this property into the neighboring park property. Our scope of services encompasses supplementary subsurface exploration of this site, geotechnical engineering stability analyses, design and construction plans for the stabilization measures, and construction phase observations and technical assistance. You have furnished a previous geotechnical report, prepared in June 2011 by E3RA of Tacoma, that you had commissioned earlier this year. You have provided this for our use in design considerations as necessary.

The slide event followed record heavy rainfall in winter and early spring of 2011, widely reported in the media as record breaking, resulting in significant surface runoff and seepage outflow within the slide zone that is visible over the lower steep slopes to date. The site location, conditions last April, and available history are also described in the June 2011 geotechnical letter. The slide zone is situated downslope of the residence lawn above the natural shoreline cliffs occurring upslope of Saltwater State Park. Presently, the slide has generated vertical drop of approximately 6 feet over a distance of approximately 25 feet at its upper scarp; and its primary tension crack continues northerly for some distance fronting three very mature conifer trees at mid property. From our discussions, apparently most of the slide activity within your property is relatively recent, preceded by a smaller slide within the park property to the south. I understand the landscape grading above the slide zone was completed in 1990 and included construction of terraced rockeries and the associated cut and fill placement. Remnants of some rockeries and drainage pipes are exposed within the slide zone. At the time of our visits, the slide zone was covered with weighted plastic sheets anchored over the surface as a temporary erosion control measure.

Our subsurface exploration also incorporates the June 2011 geotechnical exploration work at the subject site mentioned above (copy attached). That report was focused on a traditional pin pile wall repair concept that relies on bearing soils, concluding that this was a translation slide. We disagree with their assessment in this regard. Our approach is reinforcement (strengthening) and freedrainage confinement of the existing soils. Our study shows that local soil saturation in a confined zone open on one side to the steep slopes led to local soil rupture, leaving the upslope soils unsupported and subjected to spalling in shallow blocks generating the colluvium below the slope. We have supplemented the single boring in that earlier exploration effort with two dynamic cone and one adhesion cone penetration tests. These are shown in our stabilization plans (see sheet 1). These together with our close examination of the soils exposed over the slide zone were tailored for better

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425/ 898-1007 • fax 425/ 898-9699 • info@aziznw.com • www.aziznw.com

2.5-inch diameter Spiralnail

Spiralnail is extruded square-section spiraled structural steel tubing (ASTM A500 grade A, 0.218-inch wall thickness) cold formed from extra strong steel pipe to produce one complete spiral twist per each 4-ft tube length; with a welded cone formed at the tip. Spiralnail is rated nominally 42-ksi (min) steel after cold forming. Nailhead connectors shall be external double-grip encased spin-lock system or welded eye. Spider legs shall be grade 60, ½-inch deformed bar. All nail components are hot-dip galvanized (2.0 oz./SF, 3.4 mils, ASTM A-123) (605 g/m^2). Any damage done to the galvanization prior to installation shall be repaired using Formula A-9-73 galvanizing repair paint.

END

Corrosion Protection:

Hot Dip Galvanized after fabrication, all components
Galvanized coating 2 oz/sf (thickness 3.4 mils)
Spiralnail: 2.5in dia.,42ksi steel; area=1.48si; eqv bar dia=1.37in
Trinity Cage Welded Wire w7.0 long., w3.5 transv.
Backfill ph Design Range: 5.0 to 10.0
Backfill Resistivity Design Limit: 3,000 Ohm-Cm or greater
Backfill Chlorides Level: 200 PPM, max.
Backfill Sulfates Level: 1000 PPM, max.
Backfill Sulphides Level: 300 PPM, max
Design Life: 75 Years (ASTM A-123)
55% of yield stress allowed at 75 years
100% of yield stress allowed at 100 years

Seismic Loads:

Nail Stress: 75% of yield max.

CORROSION ALLOWANCE FOR
2.5in-dia HOT DIP GALVANIZED SPIRALNAIL:

Summary:
Zinc Life: 16 (2 oz/sf)
Steel Life: 59 years
Steel loss / life = 56 mils
Reduced cross section area = 1.35 sq.in.
Required area = 0.743 sq.in.
Required diameter at 75 = 0.973 in.
Remaining diam. for loss at 75 = 0.341 in.

Complete Service Life = 142 years

Steel Loss: 59*0.47*2= 56 mils (non-aggressive ground <3000 ohm-cm)
Reduction in Steel Area = (1.37-0.056)^2*Pi/4= 1.35 si
Required Steel Area at 75-yrs = 55%*42*1.35/42ksi = .743 si,
eqv diameter = (.743*4/Pi)^1/2 = 0.973 in at 75-yrs
Diam. still remaining for loss @ 75 yrs =
1.37-0.056-0.973= 0.341
Estimated Time to Complete Loss =
[0.341/(2*0.47mils)]+75=400+ yrs for 2.5" Spiralnail

--------- REINFORCEMENT PARAMETERS ---------

Number of Reinforcement Levels	=	3
Horizontal Spacing	=	6.0 ft
Yield Stress of Reinforcement	=	23.0 ksi
Diameter of Grouted Hole	=	2.5 in
Punching Shear	=	30.0 kips

---------- (Varying Reinforcement Parameters) ---------

Level	Length (ft)	Inclination (degrees)	Vertical Spacing (ft)	Bar Diameter (in)	Bond Stress Factor
1	10.0	10.0	1.0	1.37	1.00
2	10.0	10.0	4.0	1.37	1.00
3	10.0	10.0	4.0	1.37	1.00

DEPTH BELOW WALL TOE (ft)	MINIMUM SAFETY FACTOR	DISTANCE BEHIND WALL TOE (ft)	LOWER FAILURE PLANE ANGLE (deg)	LOWER FAILURE PLANE LENGTH (ft)	UPPER FAILURE PLANE ANGLE (deg)	UPPER FAILURE PLANE LENGTH (ft)
Toe	1.13	35.9	22.1	27.1	43.5	14.9

Reinf. Stress at Level 1 = 1.800 Ksi (Pullout controls...)
2 = 5.156 Ksi (Pullout controls...)
3 = 0.000 Ksi (Pullout controls...)

1.00	1.10	55.0	15.8	45.7	48.5	16.6

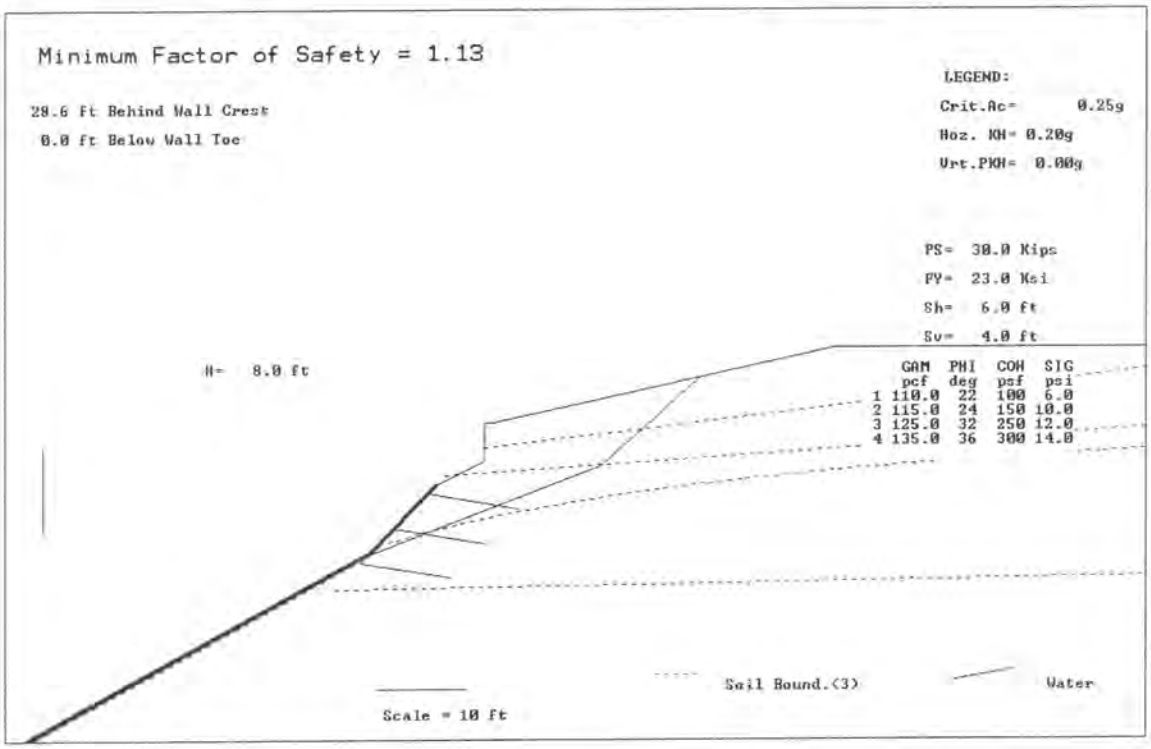
Reinf. Stress at Level 1 = 0.000 Ksi
2 = 2.198 Ksi (Pullout controls...)
3 = 0.000 Ksi (Pullout controls...)

2.00	1.10	45.4	24.3	29.9	34.1	22.0

Reinf. Stress at Level 1 = 0.112 Ksi (Pullout controls...)
2 = 3.015 Ksi (Pullout controls...)
3 = 5.919 Ksi (Pullout controls...)

```
*********************************************************************
*                 For Factor of Safety = 1.0                        *
*          Maximum Average Reinforcement Working Force:             *
*                       1.726 Kips/level                            *
*********************************************************************
```

2) Seismic Loads Case (K_h=0.20) –
(see geotechnical engineering short report, site response estimate)



--------- EARTHQUAKE ACCELERATION ---------

Horizontal Earthquake Coefficient = 0.20 (a/g)
Vertical Earthquake Coefficient = 0.00

--------- WATER SURFACE ---------

The Water Table is defined by three coordinate points.

X(1)-Coordinate = 4.10 ft Y(1)-Coordinate = 2.00 ft
X(2)-Coordinate = 15.00 ft Y(2)-Coordinate = 4.70 ft
X(3)-Coordinate = 30.00 ft Y(3)-Coordinate = 7.30 ft

--------- SEARCH LIMIT ---------

The Search Limit is from 0.0 to 55.0 ft

NOT TO LIMIT the search of failure planes
to specific nodes.

---------- (Varying Reinforcement Parameters) ---------

Level	Length (ft)	Inclination (degrees)	Vertical Spacing (ft)	Bar Diameter (in)	Bond Stress Factor
1	10.0	10.0	1.0	1.37	1.00
2	10.0	10.0	4.0	1.37	1.00
3	10.0	10.0	4.0	1.37	1.00

DEPTH BELOW WALL TOE (ft)	MINIMUM SAFETY FACTOR	DISTANCE BEHIND WALL TOE (ft)	LOWER FAILURE PLANE ANGLE (deg)	LOWER FAILURE PLANE LENGTH (ft)	UPPER FAILURE PLANE ANGLE (deg)	UPPER FAILURE PLANE LENGTH (ft)
Toe	1.73	35.9	22.1	27.1	43.5	14.9

Reinf. Stress at Level 1 = 1.800 Ksi (Pullout controls...)
2 = 5.156 Ksi (Pullout controls...)
3 = 0.000 Ksi

1.00	1.73	55.0	15.8	45.7	48.5	16.6

Reinf. Stress at Level 1 = 0.000 Ksi
2 = 2.198 Ksi (Pullout controls...)
3 = 0.000 Ksi

2.00	1.63	45.4	24.3	29.9	34.1	22.0

Reinf. Stress at Level 1 = 0.112 Ksi (Pullout controls...)
2 = 3.015 Ksi (Pullout controls...)
3 = 5.919 Ksi (Pullout controls...)

```
*****************************************************************
*                 For Factor of Safety = 1.0                    *
*          Maximum Average Reinforcement Working Force:         *
*                      0.000 Kips/level                         *
*****************************************************************
```

--------- SURCHARGE ---------

There is NO SURCHARGE imposed on the system.

- -------- OPTION #1 ---------

Factored Punching shear, Bond & Yield Stress are used.

--------- SOIL PARAMETERS ---------

Soil Layer	Unit Weight (Pcf)	Friction Angle (Degree)	Cohesion Intercept (Psf)	Bond* Stress (Psi)	Coordinates of Boundary XS1 (ft)	YS1 (ft)	XS2 (ft)	YS2 (ft)
1	110.0	22.0	100.0	6.0	0.0	0.0	0.0	0.0
2	115.0	24.0	150.0	10.0	15.5	12.7	23.5	13.7
3	125.0	32.0	250.0	12.0	15.5	9.7	20.2	10.0
4	135.0	36.0	300.0	14.0	0.0	-4.0	60.0	-3.0

* Bond Stress also depends on BSF Factor, enabled.
- Upper Wall considered as unreinforced topography.

--------- WATER SURFACE ---------

The Water Table is defined by three coordinate points.

X(1)-Coordinate = 4.10 ft Y(1)-Coordinate = 2.00 ft
X(2)-Coordinate = 15.00 ft Y(2)-Coordinate = 4.70 ft
X(3)-Coordinate = 30.00 ft Y(3)-Coordinate = 7.30 ft

--------- SEARCH LIMIT ---------

The Search Limit is from 0.0 to 55.0 ft

NOT TO LIMIT the search of failure planes
to specific nodes.

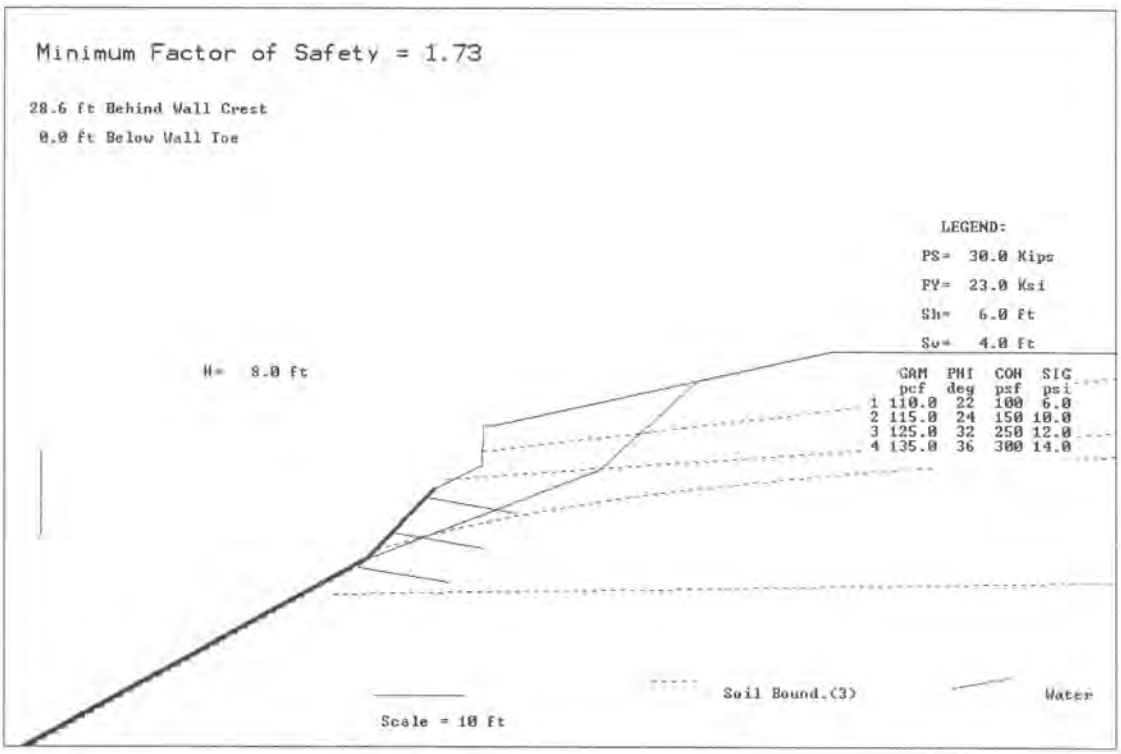
--------- REINFORCEMENT PARAMETERS ---------

Number of Reinforcement Levels = 3
Horizontal Spacing = 6.0 ft
Yield Stress of Reinforcement = 23.0 ksi
Diameter of Grouted Hole = 2.5 in
Punching Shear = 30.0 kips

Plan Typical Section Steepened Slope (See Wall Layout Plan Sheet 1)

Summary of Results:

1) Static Loads Case



--------- WALL GEOMETRY ---------

Vertical Wall Height	=	8.0 ft	
Wall Batter	=	42.5 degree	
		Angle (Deg)	Length (Feet)
First Slope from Wallcrest.	=	28.1	5.8
Second Slope from 1st slope.	=	89.0	4.5
Third Slope from 2nd slope.	=	0.0	1.0
Fourth Slope from 3rd slope.	=	13.1	38.0

--------- SLOPE BELOW THE WALL ---------

First Slope Angle below Toe.	=	30.0 degrees
First Slope Distance from Toe.	=	60.0 ft
Second Slope Angle.	=	0.0 degrees
Second Slope Distance from Toe.	=	0.0 ft
Vertical Depth of Search.	=	2.0 ft
Number of Searches below wall Toe.	=	2

--------- REINFORCEMENT PARAMETERS ---------

Number of Reinforcement Levels	=	3
Horizontal Spacing	=	6.0 ft
Yield Stress of Reinforcement	=	23.0 ksi
Diameter of Grouted Hole	=	2.5 in
Punching Shear	=	30.0 kips

---------- (Varying Reinforcement Parameters) ---------

Level	Length (ft)	Inclination (degrees)	Vertical Spacing (ft)	Bar Diameter (in)	Bond Stress Factor
1	12.0	10.0	1.1	1.37	1.00
2	10.0	10.0	3.0	1.37	1.00
3	10.0	10.0	4.0	1.37	1.00

DEPTH BELOW WALL TOE (ft)	MINIMUM SAFETY FACTOR	DISTANCE BEHIND WALL TOE (ft)	LOWER FAILURE PLANE ANGLE (deg)	LOWER FAILURE PLANE LENGTH (ft)	UPPER FAILURE PLANE ANGLE (deg)	UPPER FAILURE PLANE LENGTH (ft)
Toe	1.68	40.0	7.7	20.2	50.6	31.5

Reinf. Stress at Level 1 = 0.605 Ksi (Pullout controls...)
2 = 5.328 Ksi (Pullout controls...)
3 = 0.000 Ksi (Pullout controls...)

2.00	1.13	40.0	31.9	33.0	44.1	16.7

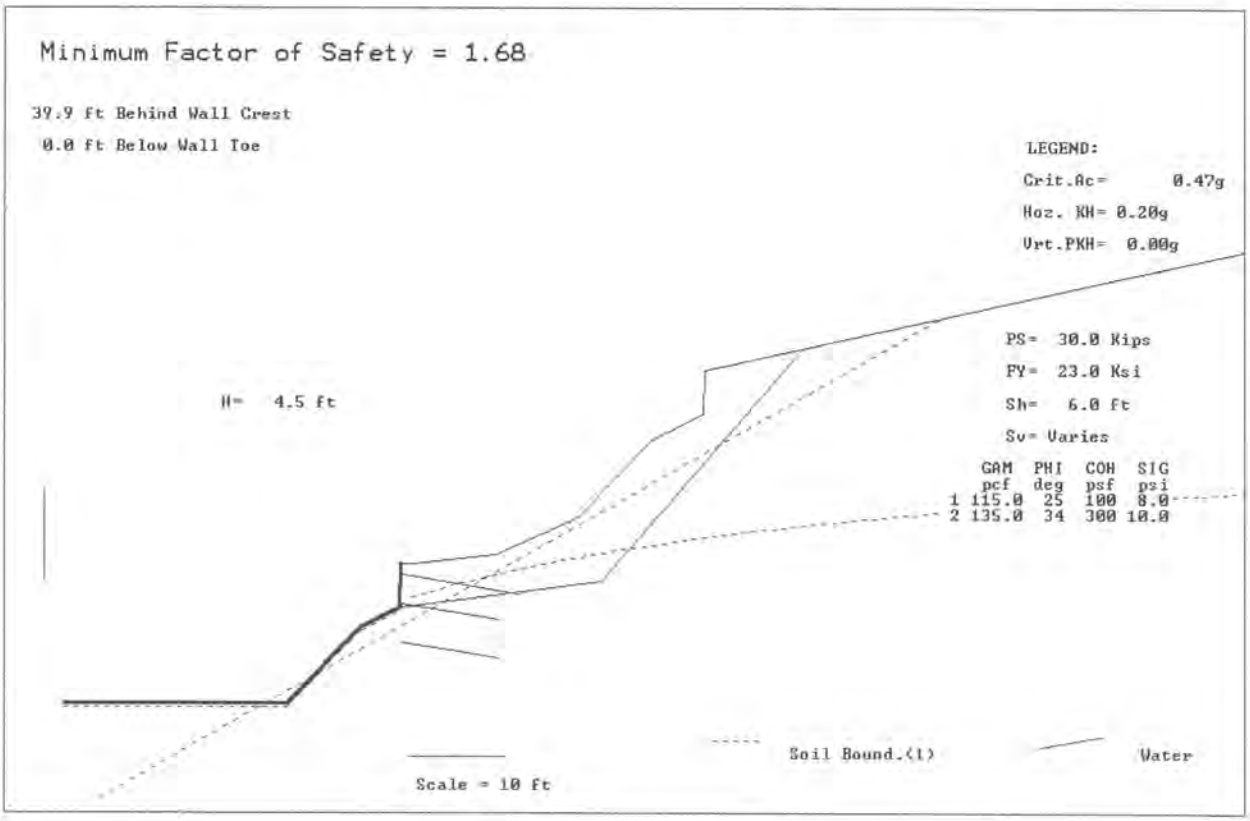
Reinf. Stress at Level 1 = 3.288 Ksi (Pullout controls...)
2 = 4.435 Ksi (Pullout controls...)
3 = 0.000 Ksi (Pullout controls...)

4.00	1.37	40.0	17.2	20.9	51.2	31.9

Reinf. Stress at Level 1 = 0.000 Ksi
2 = 0.529 Ksi (Pullout controls...)
3 = 5.834 Ksi (Pullout controls...)

```
*****************************************************************
*                For Factor of Safety = 1.0                     *
*         Maximum Average Reinforcement Working Force:          *
*                     2.400 Kips/level                          *
*****************************************************************
```

2) Seismic Loads Case (K_h=0.20) –
(see geotechnical engineering short report, site response estimate)



--------- EARTHQUAKE ACCELERATION ---------

Horizontal Earthquake Coefficient = 0.20 (a/g)
Vertical Earthquake Coefficient = 0.00

--------- WATER SURFACE ---------

The Water Table is defined by three coordinate points.

X(1)-Coordinate = 4.10 ft Y(1)-Coordinate = 2.00 ft
X(2)-Coordinate = 15.00 ft Y(2)-Coordinate = 4.70 ft
X(3)-Coordinate = 30.00 ft Y(3)-Coordinate = 7.30 ft

--------- SEARCH LIMIT ---------

The Search Limit is from -10.0 to 40.0 ft

NOT TO LIMIT the search of failure planes
to specific nodes.

---------- (Varying Reinforcement Parameters) ---------

Level	Length (ft)	Inclination (degrees)	Vertical Spacing (ft)	Bar Diameter (in)	Bond Stress Factor
1	12.0	10.0	1.1	1.37	1.00
2	10.0	10.0	3.0	1.37	1.00
3	10.0	10.0	4.0	1.37	1.00

DEPTH BELOW WALL TOE (ft)	MINIMUM SAFETY FACTOR	DISTANCE BEHIND WALL TOE (ft)	LOWER FAILURE PLANE ANGLE (deg)	LOWER FAILURE PLANE LENGTH (ft)	UPPER FAILURE PLANE ANGLE (deg)	UPPER FAILURE PLANE LENGTH (ft)
Toe	2.30	40.0	7.7	20.2	50.6	31.5

Reinf. Stress at Level 1 = 0.605 Ksi (Pullout controls...)
2 = 5.328 Ksi (Pullout controls...)
3 = 0.000 Ksi

2.00	1.66	40.0	31.9	33.0	44.1	16.7

Reinf. Stress at Level 1 = 3.288 Ksi (Pullout controls...)
2 = 4.435 Ksi (Pullout controls...)
3 = 0.000 Ksi

4.00	1.90	40.0	21.2	25.7	53.6	27.0

Reinf. Stress at Level 1 = 0.000 Ksi
2 = 1.336 Ksi (Pullout controls...)
3 = 5.905 Ksi (Pullout controls...)

```
*********************************************************************
*                 For Factor of Safety = 1.0                        *
*          Maximum Average Reinforcement Working Force:             *
*                      0.000 Kips/level                             *
*********************************************************************
```

--------- SURCHARGE ---------

There is NO SURCHARGE imposed on the system.

--------- OPTION #1 ---------

Factored Punching shear, Bond & Yield Stress are used.

--------- SOIL PARAMETERS ---------

Soil Layer	Unit Weight (Pcf)	Friction Angle (Degree)	Cohesion Intercept (Psf)	Bond* Stress (Psi)	Coordinates of Boundary XS1 (ft)	YS1 (ft)	XS2 (ft)	YS2 (ft)
1	115.0	25.0	100.0	8.0	0.0	0.0	0.0	0.0
2	135.0	34.0	300.0	10.0	0.0	-2.0	10.0	4.0

* Bond Stress also depends on BSF Factor, enabled.
- Upper Slope Reinforcement Ignored for conservative analysis.

--------- WATER SURFACE ---------

The Water Table is defined by three coordinate points.

X(1)-Coordinate = 4.10 ft Y(1)-Coordinate = 2.00 ft
X(2)-Coordinate = 15.00 ft Y(2)-Coordinate = 4.70 ft
X(3)-Coordinate = 30.00 ft Y(3)-Coordinate = 7.30 ft

--------- SEARCH LIMIT ---------

The Search Limit is from -10.0 to 40.0 ft

NOT TO LIMIT the search of failure planes
to specific nodes.

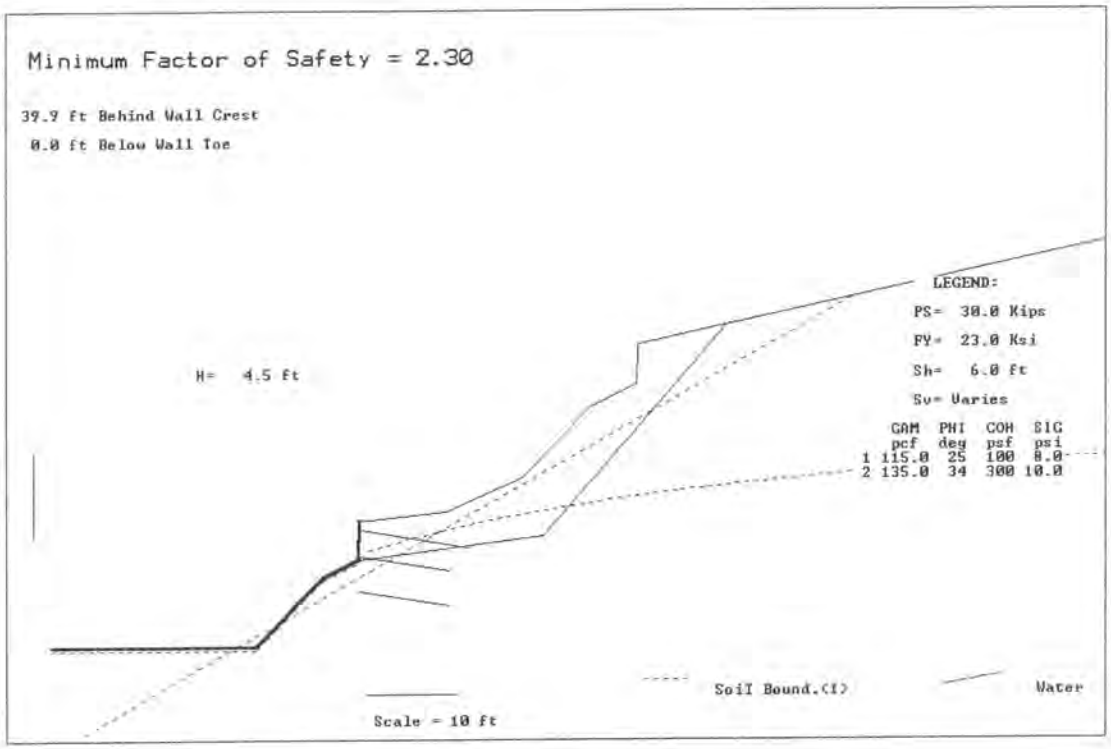
--------- REINFORCEMENT PARAMETERS ---------

Number of Reinforcement Levels = 3
Horizontal Spacing = 6.0 ft
Yield Stress of Reinforcement = 23.0 ksi
Diameter of Grouted Hole = 2.5 in
Punching Shear = 30.0 kips

Plan typical Section Lower Wall (See Wall Layout Plan Sheet 1)

Summary of Results:

1) Static Loads Case



--------- WALL GEOMETRY ---------

Vertical Wall Height	=	4.5 ft	
Wall Batter	=	1.0 degree	
		Angle (Deg)	Length (Feet)
First Slope from Wallcrest.	=	0.0	1.0
Second Slope from 1st slope.	=	6.8	8.5
Third Slope from 2nd slope.	=	25.9	9.0
Fourth Slope from 3rd slope.	=	47.5	11.0
Fifth Slope from 3rd slope.	=	28.1	5.8
Sixth Slope from 3rd slope.	=	89.0	4.5
Seventh Slope Angle.	=	13.1	

--------- SLOPE BELOW THE WALL ---------

First Slope Angle below Toe.	=	28.1 degrees
First Slope Distance from Toe.	=	4.5 ft
Second Slope Angle.	=	47.5 degrees
Second Slope Distance from Toe.	=	11.0 ft
Vertical Depth of Search.	=	4.0 ft
Number of Searches below wall Toe.	=	2

--------- REINFORCEMENT PARAMETERS ---------

Number of Reinforcement Levels	=	2
Horizontal Spacing	=	6.0 ft
Yield Stress of Reinforcement	=	23.0 ksi
Diameter of Grouted Hole	=	2.5 in
Punching Shear	=	30.0 kips

---------- (Varying Reinforcement Parameters) ---------

Level	Length (ft)	Inclination (degrees)	Vertical Spacing (ft)	Bar Diameter (in)	Bond Stress Factor
1	12.0	10.0	1.1	1.37	1.00
2	10.0	10.0	3.0	1.37	1.00

DEPTH BELOW WALL TOE (ft)	MINIMUM SAFETY FACTOR	DISTANCE BEHIND WALL TOE (ft)	LOWER FAILURE PLANE ANGLE (deg)	LOWER FAILURE PLANE LENGTH (ft)	UPPER FAILURE PLANE ANGLE (deg)	UPPER FAILURE PLANE LENGTH (ft)
Toe	2.02	40.0	5.4	28.1	41.2	15.9

Reinf. Stress at Level 1 = 0.000 Ksi
2 = 6.482 Ksi (Pullout controls...)

2.00	2.06	40.0	12.2	28.6	37.1	15.0

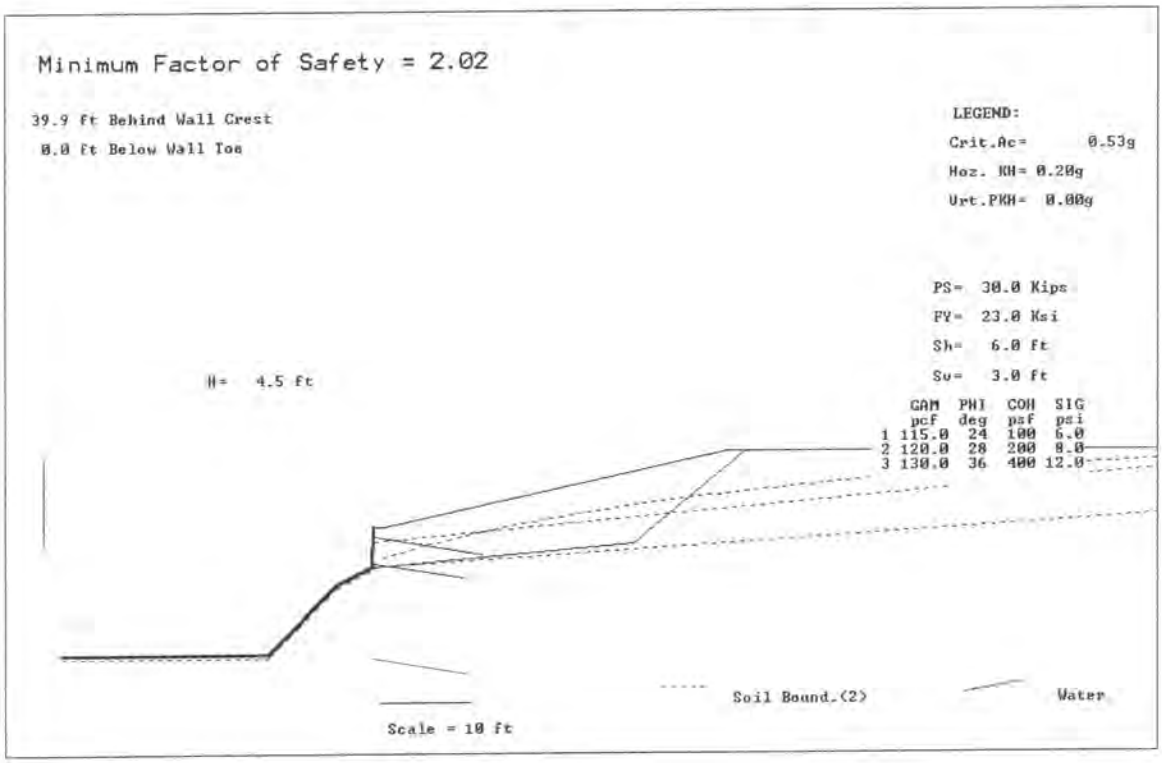
Reinf. Stress at Level 1 = 0.000 Ksi
2 = 2.908 Ksi (Pullout controls...)

4.00	1.80	40.0	17.0	29.3	35.5	14.7

Reinf. Stress at Level 1 = 0.000 Ksi
2 = 0.563 Ksi (Pullout controls...)

```
*********************************************************************
*                 For Factor of Safety = 1.0                        *
*          Maximum Average Reinforcement Working Force:             *
*           0.000 Kips/level (stable when not saturated)            *
*********************************************************************
```

2) Seismic Loads Case (K_h=0.20) –
(see geotechnical engineering short report for site response estimate)



--------- EARTHQUAKE ACCELERATION ---------

Horizontal Earthquake Coefficient = 0.20 (a/g)
Vertical Earthquake Coefficient = 0.00

--------- WATER SURFACE ---------

The Water Table is defined by three coordinate points.

X(1)-Coordinate = 4.10 ft Y(1)-Coordinate = 2.00 ft
X(2)-Coordinate = 15.00 ft Y(2)-Coordinate = 4.70 ft
X(3)-Coordinate = 30.00 ft Y(3)-Coordinate = 7.30 ft

--------- SEARCH LIMIT ---------

The Search Limit is from -10.0 to 40.0 ft

NOT TO LIMIT the search of failure planes
to specific nodes.

--------- REINFORCEMENT PARAMETERS ---------

Number of Reinforcement Levels	=	2
Horizontal Spacing	=	6.0 ft
Yield Stress of Reinforcement	=	23.0 ksi
Diameter of Grouted Hole	=	2.5 in
Punching Shear	=	30.0 kips

---------- (Varying Reinforcement Parameters) ---------

Level	Length (ft)	Inclination (degrees)	Vertical Spacing (ft)	Bar Diameter (in)	Bond Stress Factor
1	12.0	10.0	1.1	1.37	1.00
2	10.0	10.0	3.0	1.37	1.00

DEPTH BELOW WALL TOE (ft)	MINIMUM SAFETY FACTOR	DISTANCE BEHIND WALL TOE (ft)	LOWER FAILURE PLANE ANGLE (deg)	LOWER FAILURE PLANE LENGTH (ft)	UPPER FAILURE PLANE ANGLE (deg)	UPPER FAILURE PLANE LENGTH (ft)
Toe	4.06	40.0	6.2	24.1	33.3	19.1
Reinf. Stress at Level 1 = 0.000 Ksi 2 = 6.524 Ksi (Pullout controls...)						
2.00	3.50	40.0	4.3	20.1	34.2	24.2
Reinf. Stress at Level 1 = 0.000 Ksi 2 = 0.251 Ksi (Pullout controls...)						
4.00	2.86	40.0	15.9	12.5	26.1	31.2
Reinf. Stress at Level 1 = 0.000 Ksi 2 = 0.249 Ksi (Pullout controls...)						

```
*********************************************************************
*                 For Factor of Safety = 1.0                        *
*          Maximum Average Reinforcement Working Force:             *
*                      0.000 Kips/level                             *
*         (non-reinf slope is stable when not saturated)            *
*********************************************************************
```

--------- SLOPE BELOW THE WALL ---------

First Slope Angle below Toe. = 28.1 degrees
First Slope Distance from Toe. = 4.5 ft
Second Slope Angle. = 47.5 degrees
Second Slope Distance from Toe. = 11.0 ft
Vertical Depth of Search. = 4.0 ft
Number of Searches below wall Toe. = 2

--------- SURCHARGE ---------

There is NO SURCHARGE imposed on the system.

--------- OPTION #1 ---------

Factored Punching shear, Bond & Yield Stress are used.

--------- SOIL PARAMETERS ---------

Soil Layer	Unit Weight (Pcf)	Friction Angle (Degree)	Cohesion Intercept (Psf)	Bond* Stress (Psi)	Coordinates of Boundary XS1 (ft)	YS1 (ft)	XS2 (ft)	YS2 (ft)
1	115.0	24.0	100.0	6.0	0.0	0.0	0.0	0.0
2	120.0	28.0	200.0	8.0	1.6	3.0	20.2	4.8
3	130.0	36.0	400.0	12.0	0.0	0.0	20.2	1.4

* Bond Stress also depends on BSF Factor, enabled.
- Effect of lower reinforced slope is ignored in this iteration.

--------- WATER SURFACE ---------

The Water Table is defined by three coordinate points.

X(1)-Coordinate = 4.10 ft Y(1)-Coordinate = 2.00 ft
X(2)-Coordinate = 15.00 ft Y(2)-Coordinate = 4.70 ft
X(3)-Coordinate = 30.00 ft Y(3)-Coordinate = 7.30 ft

--------- SEARCH LIMIT ---------

The Search Limit is from -10.0 to 40.0 ft

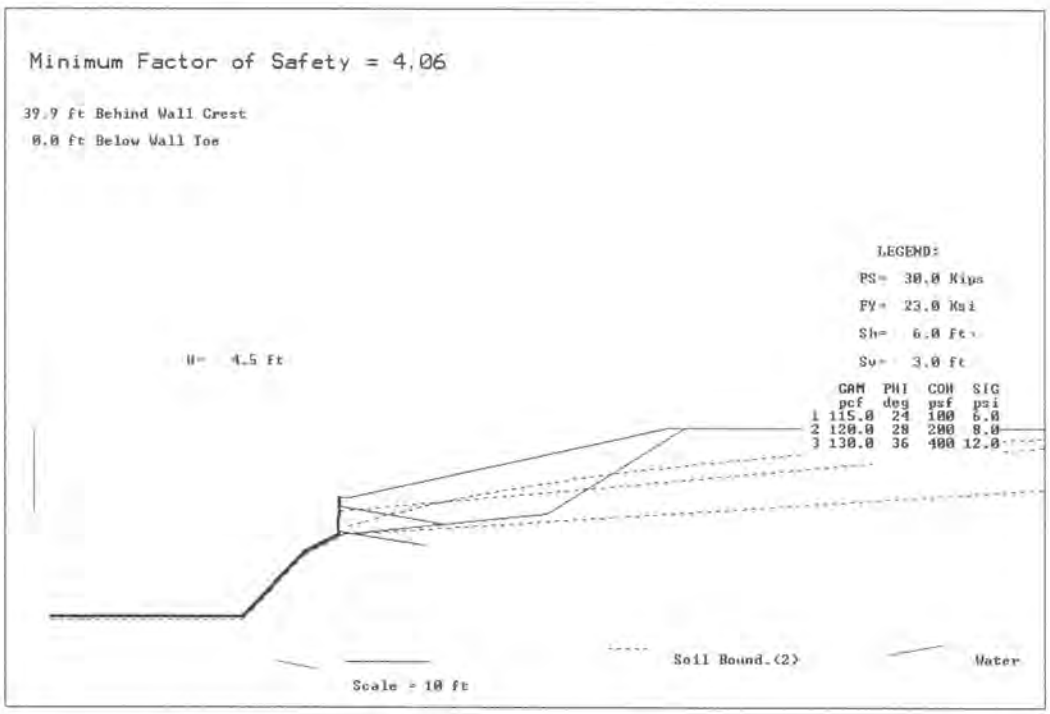
NOT TO LIMIT the search of failure planes
to specific nodes.

```
*************************************************
*            AZIZ Engineering Company           *
*         Using Caltrans SNAILZ win v4.1        *
*          25129 8th Pl S, Des Moines WA        *
*       Slide Repair & Slope Stabilization      *
*    Spiralnail Structural Earth Wall & Slope   *
*                 for Homeowners                *
*                                               *
* Date: 10-17-2011                              *
*************************************************
```

Plan Typical Section, Upper Wall (See Wall Layout, Plan Sheet 1)

Summary of Results:

1) Static Loads Case



Project Identification - 43110 Robinson Residence Slope Stabilization

--------- WALL GEOMETRY ---------

Vertical Wall Height	=	4.5 ft	
Wall Batter	=	1.0 degree	
		Angle (Deg)	Length (Feet)
First Slope from Wallcrest.	=	0.0	1.0
Second Slope from 1st slope.	=	13.1	38.0

Robinson Residence
25129 8th Place S; Slide Repair and Stabilization
Des Moines, Washington

October 17, 2011

STABILITY ANALYSIS

of Spiralnail Wiretruss Wall and Spider Slope
Structural Earth System

SIGNED: 10/17/2011

for

Jimmie and Valorie Robinson
Homeowners

AZIZ
AZIZ Engineering Company
7740 196th Ave NE
Redmond, WA 98053
(425)898-1007 (425)898-9699 fax

AZIZ Engineering Company

SERVING THE NORTHWEST & ALASKA SINCE 1984
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geostructures
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Project No. 431110

October 20, 2011

Jimmie and Valorie Robinson
25129 8th Place South
Des Moines, WA 98198

Reference: 25129 8th Place South, Des Moines WA – Slide Repair and Slope Stabilization

Dear Mr. and Mrs. Robinson:

This letter responds to the City of Des Moines Shoreline Master Program and the State Environmental Policy Act (WAC 197-11-880) requirements, establishing the need for urgently needed slide repair and stabilization at your subject residence, on an emergency basis, before the onset of winter storms and the corresponding rise in groundwater seepage conditions. Inclement weather in the Puget Sound area historically begins in November. Our recent geotechnical engineering report – submitted to the City for the necessary permits as a part of our carefully planned proposed mitigation measures for the subject slope stabilization – has reasonably established the existence of subsurface and topographic conditions prone to imminent slide events and soil rupture flow occurrences threatening your property and residence, as well as the adjoining properties and the beach area below. The latest landslide event took place last winter/spring. It has taken this long to complete the engineering and planning tasks ready for installation of the necessary mitigation measures. This construction should take place immediately while the perched groundwater is low and a few, but sufficient, weeks of relatively dry season still remain. This is to thwart imminent danger to your property of a larger landslide during the soon to arrive inclement weather.

Alternatively, the covering of slide area for erosion protection over the winter does not prevent the buildup of perched groundwater conditions from upslope very likely to cause more soil ruptures and slides in the upcoming winter/spring. With this approach, more damage is to be expected within and beyond the current slide zone, already weakened by that slide event, potentially extending into the adjoining properties. Other methods involve very heavy equipment risky to operate near the steep slopes this late in the season. The risk of no action, or minimal action, is too great.

The methods we have proposed, driven soil nailing with integral facing systems replacing rockeries that were destroyed by the previous slide, involve low impact but rapid construction techniques estimated to take approximately 10 workdays. Moreover, this system can be easily removed, fully or partially, and replaced with a better method if necessary. Our plans and specifications require the presence of a geotechnical engineer for directions and technical assistance throughout the construction. Based on our substantial design and construction experience in these systems, we are confident that successful completion of the proposed measures at this site can be achieved in two to three weeks with proper construction management engineering directions and technical assistant that we believe will be present.

I trust the above is sufficient for the regulatory considerations. I am available for any questions or comments as needed.

Sincerely,

AZIZ Engineering Company

Enayat S. Aziz, P.E., L.E.G.
Geostructures Engineer
and Engineering Geologist

10/20/2011

State of Washington
Engineering Geologist
2502
Licensed Geologist
Enayat S. Aziz

7740 196th Avenue NE (Historic Red Brick Road) • P.O. Box 2758 • Redmond, WA 98073-2758 (Street 98053-4710)
425/ 898-1007 • fax 425/ 898-9699 • info@aziznw.com • www.aziznw.com

By initialing here, I state that I have the authority to grant access to the property. I also give my consent to the permitting agencies entering the property where the project is located to inspect the project site or any work related to the project. _____ (initial)

JIMMIE D. ROBINSON	Jimmie D Robinson	10/31/11
Applicant Printed Name	Applicant Signature	Date

11b. Authorized Agent Signature [help]

I certify that to the best of my knowledge and belief, the information provided in this application is true, complete, and accurate. I also certify that I have the authority to carry out the proposed activities and I agree to start work only after all necessary permits have been issued.

Mike Carlson	[illegible]	10-31-11
Authorized Agent Printed Name	Authorized Agent Signature	Date

11c. Property Owner Signature (if not applicant). [help]
Not required if project is on existing rights-of-way or easements.

I consent to the permitting agencies entering the property where the project is located to inspect the project site or any work. These inspections shall occur at reasonable times and, if practical, with prior notice to the landowner.

JIMMIE D. ROBINSON	Jimmie D Robinson	10/31/11
Property Owner Printed Name	Property Owner Signature	Date

18 U.S.C §1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly falsifies, conceals, or covers up by any trick, scheme, or device a material fact or makes any false, fictitious, or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious, or fraudulent statement or entry, shall be fined not more than $10,000 or imprisoned not more than 5 years or both.

If you require this document in another format, contact The Governor's Office of Regulatory Assistance (ORA). People with hearing loss can call 711 for Washington Relay Service. People with a speech disability can call (877) 833-6341.
ORA publication number: ENV-019-09

☐ This project is exempt (choose type of exemption below).

☐X Categorical Exemption. Under what section of the SEPA administrative code (WAC) is it exempt?

Emergency Exemption for Landslide Stabilization before onset of inclement weather.

☐ Other: _____

☐ SEPA is pre-empted by federal law.

10b. Indicate the permits you are applying for. (Check all that apply.) [help]

LOCAL GOVERNMENT

Local Government Shoreline permits:

☐ Substantial Development ☐ Conditional Use ☐ Variance

☐X Shoreline Exemption Type (explain): Emergency

Other city/county permits:

☐ Floodplain Development Permit ☐ Critical Areas Ordinance

STATE GOVERNMENT

Washington Department of Fish and Wildlife:

☐ Hydraulic Project Approval (HPA) ☐ Fish Habitat Enhancement Exemption

Washington Department of Ecology:

☐ Section 401 Water Quality Certification

Washington Department of Natural Resources:

☐ Aquatic Resources Use Authorization

FEDERAL GOVERNMENT

United States Department of the Army permits (U.S. Army Corps of Engineers):

☐ Section 404 (discharges into waters of the U.S.) ☐ Section 10 (work in navigable waters)

United States Coast Guard permits:

☐ General Bridge Act Permit ☐ Private Aids to Navigation (for non-bridge projects)

Part 11–Authorizing Signatures

Signatures are required before submitting the JARPA package. The JARPA package includes the JARPA form, project plans, photos, etc. [help]

11a. Applicant Signature (required) [help]

I certify that to the best of my knowledge and belief, the information provided in this application is true, complete, and accurate. I also certify that I have the authority to carry out the proposed activities, and I agree to start work only after I have received all necessary permits.

I hereby authorize the agent named in Part 3 of this application to act on my behalf in matters related to this application. _____ (initial)

- **If yes**, attach it to your JARPA package.

☐ Yes ☐X No

9k. Name each species listed under the federal Endangered Species Act that occurs in the vicinity of the project area or might be affected by the proposed work. [help]

None known.

9l. Name each species or habitat on the Washington Department of Fish and Wildlife's Priority Habitats and Species List that might be affected by the proposed work. [help]

None.

Part 10–SEPA Compliance and Permits

Use the resources and checklist below to identify the permits you are applying for.

- Online Project Questionnaire at http://apps.ecy.wa.gov/opas/.
- Governor's Office of Regulatory Assistance at (800) 917-0043 or help@ora.wa.gov.
- For a list of agency addresses to send your application, click on the "where to send your completed JARPA" at http://www.epermitting.wa.gov.

10a. Compliance with the State Environmental Policy Act (SEPA). (Check all that apply.) [help]

- For more information about SEPA, go to www.ecy.wa.gov/programs/sea/sepa/e-review.html.

☐ A copy of the SEPA determination or letter of exemption is included with this application.

☐ A SEPA determination is pending with _____ (lead agency). The expected decision date is _____.

☐ I am applying for a Fish Habitat Enhancement Exemption. (Check the box below in 10b.) [help]

9c. What U.S. Geological Survey Hydrological Unit Code (HUC) is the project in? [help]

- Go to http://cfpub.epa.gov/surf/locate/index.cfm to help identify the HUC.

17110019 Puget Sound

9d. What Water Resource Inventory Area Number (WRIA #) is the project in? [help]

- Go to http://www.ecy.wa.gov/services/gis/maps/wria/wria.htm to find the WRIA #.

WRIA #15

9e. Will the in-water construction work comply with the State of Washington water quality standards for turbidity? [help]

- Go to http://www.ecy.wa.gov/programs/wq/swqs/criteria.html for the standards.

☐ Yes ☐ No ☐X Not applicable

9f. If the project is within the jurisdiction of the Shoreline Management Act, what is the local shoreline environment designation? [help]

- If you don't know, contact the local planning department.
- For more information, go to: http://www.ecy.wa.gov/programs/sea/sma/laws_rules/173-26/211_designations.html.

☐ Rural ☐X Urban ☐ Natural ☐ Aquatic ☐ Conservancy ☐ Other _____

9g. What is the Washington Department of Natural Resources Water Type? [help]

- Go to http://www.dnr.wa.gov/BusinessPermits/Topics/ForestPracticesApplications/Pages/fp_watertyping.aspx for the Forest Practices Water Typing System.

☐X Shoreline ☐ Fish ☐ Non-Fish Perennial ☐ Non-Fish Seasonal

9h. Will this project be designed to meet the Washington Department of Ecology's most current stormwater manual? [help]

- **If no**, provide the name of the manual your project is designed to meet.

☐X Yes ☐ No

Name of manual:

9i. If you know what the property was used for in the past, describe below. [help]

9j. Has a cultural resource (archaeological) survey been performed on the project area? [help]

8f. For all activities identified in 8e., describe the source and nature of the fill material, amount (in cubic yards) you will use, and how and where it will be placed into the waterbody. [help]

No fill to be placed in the water body.

8g. For all excavating or dredging activities identified in 8e., describe the method for excavating or dredging, type and amount of material you will remove, and where the material will be disposed. [help]

No excavation; no dredging.

Part 9–Additional Information

Any additional information you can provide helps the reviewer(s) understand your project. Complete as much of this section as you can. It is ok if you cannot answer a question.

9a. If you have already worked with any government agencies on this project, list them below. [help]

Agency Name	Contact Name	Phone	Most Recent Date of Contact
The City of Des Moines	Jason Sullivan	(206) 870-6551	25 Oct 2011
		( )	
		( )	

9b. Are any of the wetlands or waterbodies identified in Part 7 or Part 8 on the Washington Department of Ecology's 303(d) List? [help]

- **If yes,** list the parameter(s) below.
- If you don't know, use Washington Department of Ecology's Water Quality Assessment tools at: http://www.ecy.wa.gov/programs/wq/303d/.

☐X Yes ☐ No

proposed slope stabilization measures are to retain further slide debris comprised of non-native plants and angular rocks in place, while allowing natural drainage and subdrainage to follow its original path.

8b. Will your project impact a waterbody or the area around a waterbody? [help]

☐ Yes ☐X No

8c. Have you prepared a mitigation plan to compensate for the project's adverse impacts to non-wetland waterbodies? [help]

- **If yes**, submit the plan with the JARPA package and answer 8d.
- **If No, or Not applicable,** explain below why a mitigation plan should not be required.

☐ Yes ☐X No ☐ Not applicable

The project is comprised of soil reinforcement, retention and drainage filtration system designed to confine and stabilize the steep slope in place. It requires very little disturbance of the existing slopes.

8d. Summarize what the mitigation plan is meant to accomplish. Describe how a watershed approach was used to design the plan.

- If you already completed 7g., you do not need to restate your answer here. [help]

The stabilization plan concept is to stabilize the slope without resorting to heavy concrete piles or structures, and without altering or concentrating existing natural surface and subsurface drainage. This is done using driven soil nailing technology to reinforce (strengthen) and confine the soils in place utilizing freedraining non-rigid facing systems to allow secured growth of the natural vegetation. This systems allows rapid construction using very light weight equipment.

8e. Summarize impact(s) to each waterbody in the table below. [help]

Activity (clear, dredge, fill, pile drive, etc.)	Waterbody name[1]	Impact location[2]	Duration of impact[3]	Amount of material to be placed in or removed from waterbody	Area (sq. ft. or linear ft.) of waterbody directly affected
Soil nail driving & slope facing assembly	Puget Sound	Distant, greater than 100'	3 weeks	None	None

[1] If no official name for the waterbody exists, create a unique name (such as "Stream 1") The name should be consistent with other documents provided.
[2] Indicate whether the impact will occur in or adjacent to the waterbody. If adjacent, provide the distance between the impact and the waterbody and indicate whether the impact will occur within the 100-year flood plain.
[3] Indicate the days, months or years the waterbody will be measurably impacted by the work. Enter "permanent" if applicable.

Activity (fill, drain, excavate, flood, etc.)	Wetland Name[1]	Wetland type and rating category[2]	Impact area (sq. ft. or Acres)	Duration of impact[3]	Proposed mitigation type[4]	Wetland mitigation area (sq. ft. or acres)

[1] If no official name for the wetland exists, create a unique name (such as "Wetland 1"). The name should be consistent with other project documents, such as a wetland delineation report.
[2] Ecology wetland category based on current Western Washington or Eastern Washington Wetland Rating System. Provide the wetland rating forms with the JARPA package.
[3] Indicate the days, months or years the wetland will be measurably impacted by the activity. Enter "permanent" if applicable.
[4] Creation (C), Re-establishment/Rehabilitation (R), Enhancement (E), Preservation (P), Mitigation Bank/In-lieu fee (B)

Page number(s) for similar information in the mitigation plan, if available: _____

7i. For all filling activities identified in 7h., describe the source and nature of the fill material, the amount in cubic yards that will be used, and how and where it will be placed into the wetland. [help]

N/A

7j. For all excavating activities identified in 7h., describe the excavation method, type and amount of material in cubic yards you will remove, and where the material will be disposed. [help]

N/A

Part 8–Waterbodies (other than wetlands): Impacts and Mitigation

In Part 8, "waterbodies" refers to non-wetland waterbodies. (See Part 7 for information related to wetlands.) [help]

☐X Check here if there are waterbodies on or adjacent to the project area. (If there are none, skip to Part 9.)

8a. Describe how the project is designed to avoid and minimize adverse impacts to the aquatic environment. [help]

The project is separated from the beach area by existing cliffs and steep slopes. As designed, the

7b. Will the project impact wetlands? [help]

☐ Yes ☒ No ☐ Don't know

7c. Will the project impact wetland buffers? [help]

☐ Yes ☒ No ☐ Don't know

7d. Has a wetland delineation report been prepared? [help]

- **If yes**, submit the report, including data sheets, with the JARPA package.

☐ Yes ☒ No

7e. Have the wetlands been rated using the Western Washington or Eastern Washington Wetland Rating System? [help]

- **If yes**, submit the wetland rating forms and figures with the JARPA package.

☐ Yes ☒ No ☐ Don't know

7f. Have you prepared a mitigation plan to compensate for any adverse impacts to wetlands? [help]

- **If yes**, submit the plan with the JARPA package and answer 7g.
- **If No, or Not applicable,** explain below why a mitigation plan should not be required.

☐ Yes ☒ No ☐ Not applicable

7g. Summarize what the mitigation plan is meant to accomplish, and describe how a watershed approach was used to design the plan. [help]

7h. Use the table below to list the type and rating of each wetland impacted; the extent and duration of the impact; and the type and amount of mitigation proposed. Or if you are submitting a mitigation plan with a similar table, you can state (below) where we can find this information in the plan. [help]

See the construction plans, including construction sequence, as submitted to the City of Des Moines.

6e. What are the start and end dates for project construction? (month/year) [help]

- If the project will be constructed in phases or stages, use JARPA Attachment D to list the start and end dates of each phase or stage.

Start date: As soon As Possible End date: Nov 30, 2011 ☐ See JARPA Attachment D

6f. Describe the purpose of the project and why you want or need to perform it. [help]

See the geotechnical engineering report as submitted to the City of Des Moines.

6g. Fair market value of the project, including materials, labor, machine rentals, etc. [help]

$40,000

6h. Will any portion of the project receive federal funding? [help]

- **If yes**, list each agency providing funds.

☐ Yes ☐X No ☐ Don't know

Part 7–Wetlands: Impacts and Mitigation

☐ Check here if there are wetlands or wetland buffers on or adjacent to the project area.
(If there are none, skip to Part 8.) [help]

7a. Describe how the project has been designed to avoid and minimize adverse impacts to wetlands. [help]

☐X Not applicable

Part 6–Project Description

6a. Summarize the overall project. You can provide more detail in 6d. [help]

Please see the project plans and geotechnical engineering report, as submitted to the City of Des Moines.

6b. Indicate the project category. (Check all that apply) [help]

- ☐ Commercial
- ☐X Residential
- ☐ Institutional
- ☐ Transportation
- ☐ Recreational
- ☐ Maintenance
- ☐ Environmental Enhancement

6c. Indicate the major elements of your project. (Check all that apply) [help]

☐ Aquaculture	☐ Culvert	☐ Float	☐ Road
☐ Bank Stabilization	☐ Dam / Weir	☐ Geotechnical Survey	☐ Scientific Measurement Device
☐ Boat House	☐ Dike / Levee / Jetty	☐ Land Clearing	☐ Stairs
☐ Boat Launch	☐ Ditch	☐ Marina / Moorage	☐ Stormwater facility
☐ Boat Lift	☐ Dock / Pier	☐ Mining	☐ Swimming Pool
☐ Bridge	☐ Dredging	☐ Outfall Structure	☐ Utility Line
☐ Bulkhead	☐ Fence	☐ Piling	
☐ Buoy	☐ Ferry Terminal	☐ Retaining Wall (upland)	
☐ Channel Modification	☐ Fishway		

☐X Other: Landslide repair & stabilization, encompassing 2 wire-caged rock retaining walls less than 4.5' high.

6d. Describe how you plan to construct each project element checked in 6c. Include specific construction methods and equipment to be used. [help]

- Identify where each element will occur in relation to the nearest waterbody.
- Indicate which activities are within the 100-year flood plain.

5m. Describe how the property is currently used. [help]

Landscaped single family residence

5n. Describe how the adjacent properties are currently used. [help]

Similar.

5o. Describe the structures (above and below ground) on the property, including their purpose(s). [help]

Two-story wood frame single family home.

5p. Provide driving directions from the closest highway to the project location, and attach a map. [help]

The property is situated near the entrance to Saltwater State Park at 8th Place South (off of Marine View Drive) in Des Moines WA.

5e. Provide the section, township, and range for the project location. [help]

¼ Section	Section	Township	Range

5f. Provide the latitude and longitude of the project location. [help]

- Example: 47.03922 N lat. / -122.89142 W long. (NAD 83)

5g. List the tax parcel number(s) for the project location. [help]

- The local county assessor's office can provide this information.

256080-6120-03

5h. Contact information for all adjoining property owners. (If you need more space, use JARPA Attachment C.) [help]

Name	Mailing Address	Tax Parcel # (if known)
State Park	25205 8th PL South Desmoines 98198	
Matt and Shirley	25121 8th PL South Desmoines Wa. 98198	

5i. List all wetlands on or adjacent to the project location. [help]

Not known to exist

5j. List all waterbodies (other than wetlands) on or adjacent to the project location. [help]

Puget Sound waterfront

5k. Is any part of the project area within a 100-year flood plain? [help]

☐ Yes ☒ No ☐ Don't know

5l. Briefly describe the vegetation and habitat conditions on the property. [help]

The property is a single family residence, with landscaping to the edge of westerly facing steep slopes. Prior to a landslide in 2010, the upper part of the steep slopes has been partially landscaped with rockeries, short retaining walls and ornamental planting, as well several mature conifers. The upper steep slopes lead to very steep cliffs at least 20-ft or greater in height below. The property encompasses the gravelly beach area below.

3c. City, State, Zip			
Duvall, WA 98019			
3d. Phone (1)	**3e.** Phone (2)	**3f.** Fax	**3g.** E-mail
(206) 730-8249	(425) 788-4887	( )	bethanykcarlson@aol.com

Part 4–Property Owner(s)

Contact information for people or organizations owning the property(ies) where the project will occur. [help]

☐ Same as applicant. (Skip to Part 5.)

☐ Repair or maintenance activities on existing rights-of-way or easements. (Skip to Part 5.)

☐ There are multiple property owners. Complete the section below and fill out JARPA Attachment A for each additional property owner.

4a. Name (Last, First, Middle) and Organization (if applicable)			
Jimmie D and Valorie Robinson			
4b. Mailing Address (Street or PO Box)			
25129 – 8th Place South			
4c. City, State, Zip			
Des Moines, WA 98198			
4d. Phone (1)	**4e.** Phone (2)	**4f.** Fax	**4g.** E-mail
(253) 732-0261	(253) 732-0262	( )	

Part 5–Project Location(s)

Identifying information about the property or properties where the project will occur. [help]

☐ There are multiple project locations (e.g., linear projects). Complete the section below and use JARPA Attachment B for each additional project location.

5a. Indicate the type of ownership of the property. (Check all that apply.) [help]

☐ State Owned Aquatic Land (If yes or maybe, contact the Department of Natural Resources (DNR) at (360) 902-1100)
☐ Federal
☐ Other publicly owned (state, county, city, special districts like schools, ports, etc.)
☐ Tribal
☐X Private

5b. Street Address (Cannot be a PO Box. If there is no address, provide other location information in 5p.) [help]

25129 – 8th Place South

5c. City, State, Zip (If the project is not in a city or town, provide the name of the nearest city or town.) [help]

Des Moines, WA 98198

5d. County [help]

King

2010
WASHINGTON STATE
Joint Aquatic Resources Permit Application (JARPA) Form[1]

US Army Corps of Engineers
Seattle District

AGENCY USE ONLY

Date received:

Agency reference #: _____

Tax Parcel #(s): _____

USE BLACK OR BLUE INK TO ENTER ANSWERS IN WHITE SPACES BELOW.

LUA 2011-0034

Part 1–Project Identification

1. Project Name (A name for your project that you create. Examples: Smith's Dock or Seabrook Lane Development) [help][2]
Robinson Residence; 25129 8th Place South; Des Moines WA

Part 2–Applicant

The person or organization responsible for the project. [help]

2a. Name (Last, First, Middle) and Organization (if applicable)			
Jimmie D Robinson			
2b. Mailing Address (Street or PO Box)			
25129 8th Place South			
2c. City, State, Zip			
Des Moines WA 98198			
2d. Phone (1)	**2e.** Phone (2)	**2f.** Fax	**2g.** E-mail
(253) 732-0261	(253) 732-0262	( )	

Part 3–Authorized Agent or Contact

Person authorized to represent the applicant about the project. (Note: Authorized agent(s) must sign 11b. of this application.) [help]

MIKECC E91906

3a. Name (Last, First, Middle) and Organization (if applicable)
Carlson, Mike
3b. Mailing Address (Street or PO Box)
P.O. Box 699

[1] Additional forms may be required for the following permits:

- If your project may qualify for Department of the Army authorization through a Regional General Permit (RGP), contact the U.S. Army Corps of Engineers for application information (206) 764-3495.
- If your project might affect species listed under the Endangered Species Act, you will need to fill out a Specific Project Information Form (SPIF) or prepare a Biological Evaluation. Forms can be found at http://www.nws.usace.army.mil/PublicMenu/Menu.cfm?sitename=REG&pagename=mainpage_ESA
- If you are applying for an Aquatic Resources Use Authorization you will need to fill out and submit an Application for Authorization to Use State-Owned Aquatic Lands form to DNR, which can be found at http://www.dnr.wa.gov/Publications/aqr_use_auth_app.doc
- Not all cities and counties accept the JARPA for their local Shoreline permits. If you think you will need a Shoreline permit, contact the appropriate city or county government to make sure they will accept the JARPA.

[2] To access an online JARPA form with [help] screens, go to http://www.epermitting.wa.gov/site/alias__resourcecenter/jarpa_jarpa_form/9984/jarpa_form.aspx .
For other help, contact the Governor's Office of Regulatory Assistance at 1-800-917-0043 or help@ora.wa.gov.