RECEIVED
OCT 27 2017
City of Portland
Bureau of Planning and Sustainability

STU SMUCKER
2133 NW 33RD AVE.
PORTLAND, OREGON 97210
(503) 786-2810

October 27, 2017

Julie,
This was hand delivered at the front desk Friday 8/27 8:15 am.
Amanda Romero

HAND-DELIVERED

Portland Planning and Sustainability Commission
1900 SW 4th Ave., Ste. 7100
Portland, OR 97201

Re: Map Refinement Project Testimony regarding 2425 NW St. Helens Road

Dear Commissioners:

At the Map Refinement Project hearing on October 24, 2017, several Willamette Heights residents testified against removal of the buffer on the property located at 2425 NW St. Helens Road. Some of that testimony referred to engineering reports and documents contained in the 1991 Portland file number 91-00106 ZC (DLCD file number 018-91; adopted 5/2/1991) pertaining to the St. Helens Road property.

Attached please find:

1. John McDonald Engineering report dated 10/15/87;
2. John McDonald Engineering report dated 11/22/87;
3. John McDonald Engineering report dated 12/31/87;
4. John McDonald Engineering report dated 5/26/88;
5. Inter-Office Staff Response Form dated 7/17/89;
6. Portland Bureau of Planning "Request for Response" dated 7/10/89;
7. Roger Redfern, Geologist, Testimony dated 11/20/89;
8. Oregonian article entitled "NW Portland Residents Knock Warehouse Plan" dated 1/5/88;
9. Newspaper article entitled "Council Upholds Decision Against Truck-Fuel Center dated 2/7/90;
10. John McDonald Engineering report dated 11/2/89;
11. Chris Wrench Photo Evidence dated 11/29/89;
12. Building Permit Application dated 9/6/90; and
13. John McDonald Engineering report dated 12/6/89.

These documents detail the soil composition, ground water, topography, erosion issues and slope failure in connection with the St. Helens Road property. In connection with a proposed truck stop on the property, independent geologist Roger Redfern determined that "the proposed land use and land development appear to be inadequate to protect the proposed development and public."

He opined:

> "Slope failures are **almost certain** to occur as a result of the development as proposed, and such failure could be a hazard to life and private property (*emphasis added*)."

Notably, there are 11 private residential properties bordering 2425 NW St. Helens Road. In the past five years, the owners of those 11 properties paid $486,305 – almost half a million dollars -- in property taxes.[1]

I submit that the findings contained in the attached reports militate against removal of the buffer.

Thank you for your consideration.

Very truly yours,

Stu Smucker
SLS:6500
Enclosures

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[1] *See* tax assessments on www.portlandmaps.com for the following properties for years 2012 to 2016: 3485 NW THURMAN ST: $56,309; 3481 NW THURMAN ST: $50,637; 3469 NW THURMAN ST: $45,930; 3452 NW VAUGHN ST: $53,783; 3455 NW VAUGHN ST: $50,109; 3447 NW VAUGHN ST: $49,877; 3443 NW VAUGHN ST: $51,104; 2133 NW 33RD AVE: $29,763; 2146 NW 33RD AVE: $33,348; 2143 NW 32ND AVE: $60,113; and NW 32ND AVE: $5,332.

GT-001566

#6914

1/4 Sec 2825

JOHN McDONALD ENGINEERING
SOILS - CIVIL - GEOTECHNICAL
Ground-Penetrating RADAR
10116 S.E. STANLEY AVENUE
PORTLAND, OREGON 97222
(503) 774-0077

91-008360-LU

October 15, 1987

John R. Low Consulting Engineers, Inc.
1750 SW Skyline Boulevard
Portland, Oregon 97221

2425 NW St Helens Rd

SOILS INVESTIGATION AT TRUCK SITE ON ST. HELENS ROAD

1N1E29CA 1500

The proposed truck terminal would be located on the west side of NW St. Helens Road at roughly where NW 34th Avenue would intersect. The plans are to make a parking area and a building. The site now has a broad ridge of earth that rises up from the edge of the highway. Level space would be made by excavating this earth ridge. The purpose of this investigation is to allow recommendations to be made on retaining and protecting the resulting earth bank.

According to the published geology of the Portland area the earth ridge is composed of Troutdale Formation material. Troutdale material varies from cobblestone to sandstone, except that in the Tualatin Valley some clayey deposits are called Troutdale.

Preliminary excavation has exposed cutbanks that show hard, dry silt for the upper four or five feet, then layers of sand and silt, and then thick layers of sand soft enough to scoop out by hand. This does not agree with what Troutdale material is supposed to be. The Multnomah County Soil Survey shows Wauld very gravelly loam at this location, but this also does not agree with what was seen. The chances are that the on-site material is Recent Alluvium.

A shallow borehole was made on the hillslope above the preliminary excavation. It found 2½ feet of brown, dry silt, and then 1½ feet of mottled yellowish brown and pale brown fine sandy silt.An Iowa Borehole Shear Test was made at 4' depth on the hillslope above the preliminary excavation. This test uses a specialized apparatus that fits into the borehole to find the soil friction angle. Unfortunately, however, the soil was so hard that the teeth on the instrument could not penetrate properly and the results were unrealistically high.

Since the excavations will leave such high cutbanks, one hope would be to slope them back to a stable configuration, or slope them back from the top of a retaining wall. My opinion, however, is that some of the sand is so loose that, at any configuration, rain would rinse the sand down and cause the surface silt layers to collapse.

My recommendation would be to make an anchored gunite slope protection for a final cutbank slope of 2-vertical to 1-horizontal. Anchors of either #5 rebars driven to secure depth at 5-foot spacings, or utility pole screw anchors of 8" helix by 5' length installed at 7-spacings, would be used to hold a grid of #4 rebars and 6-by-6 wire mesh. The gunite would be 3" thick under the rebar grid and 5" thick overall.

If a retaining wall is used in conjunction with an anchored gunite slope protection, a flexible watertight membrane would have to be used for the transition from the wall to the gunite.

From the borehole findings, the near-surface mottled soil colors mean that a seasonal perched water table is present. This water would be detrimental to the gunite slope protection. Therefore, a cutoff trench would be needed above the cutbank area. The cutoff trench should be at least 3½ feet deep, be lined with nonwoven filter fabric, and be filled with rounded drain rock.

In my opinion the gunite slope protection would make a satisfactory retaining system for the cutbank.

Very truly yours,

REGISTERED PROFESSIONAL ENGINEER 5657
OREGON
JULY 8 1966
JOHN K. McDONALD

John K. McDonald

#6914
1/4 Sec 2825

JOHN McDONALD ENGINEERING
SOILS - CIVIL - GEOTECHNICAL
Ground-Penetrating RADAR
10116 S.E. STANLEY AVENUE
PORTLAND, OREGON 97222
(503) 774-0077

November 22, 1987

John R. Low Consulting Engineers, Inc.
1750 SW Skyline Boulevard
Portland, Oregon 97221

ANALYSIS OF EARTH CUTBANKS AT EXISTING FTL, INC., TERMINAL

It is understood that the cutbanks were made quite recently at 2425 NW St. Helens Road. No vegetation has had time to start growing. At the initial inspection, clay soils appeared to be present at the base of the westernmost part of the cutbank area. However, a closer look shows the soil to be silt in sloping layers with rusty coatings.

The surface slopes and the slopes of exposed layers and cracked surfaces were measured. Most of the exposed layers and cracked surfaces were in the range of 50 to 55 degrees, while the surface slopes varied from 55 degrees to vertical. The attached article, "Slope Angles in Friable Loess", from the May, 1968 Journal of Geology sets forth a basis for various failure angles in these soils. The overall idea is that a small amount of soil cohesive strength is needed to allow a soil to stand on slopes steeper than the soil friction angle. However, soil cohesion is a tenuous concept that sometimes is merely the result of soil capillary forces and that often is not a permanent property of the soil. A theoretical basis is presented that allows the next failure slope to be predicted once the soil friction angle and the existing slope angle are known.

Following this reasoning it can be seen that for a vertical slope behind a retaining wall the next failure surface comes at 45 degrees plus half the soil friction angle. Prior to finding this artical, there was no basis on which to predict the next failure surface once the soil surface had been cut back to, or more than to, this 45 plus half the friction angle, and the friction angle itself appeared to be the next failure surface. Therefore, using the reasoning of this article, which also is shown in the latest edition of "Soil Engineering" by Spangler and Handy, the use of anchors to hold a gunite slope protection can be calculated.

The attached calculation sheets show three of the range of cutbank slopes present at the terminal. The needed soil cohesion for various assumed soil friction angles is calculated and the most reasonable set of values that can be depended upon is C of 100 psf and 35 degree friction angle. For design a safety factor of 1.3 is applied to both values and the total anchor force needed is calculated for the example slopes. That is, my opinion is that the slopes are not permanently stable as is, and that some sort of protection is needed.

In order to go further with design, suitable anchors and method of installing them have to be decided upon, and a pull test on an installed anchor has to be made.

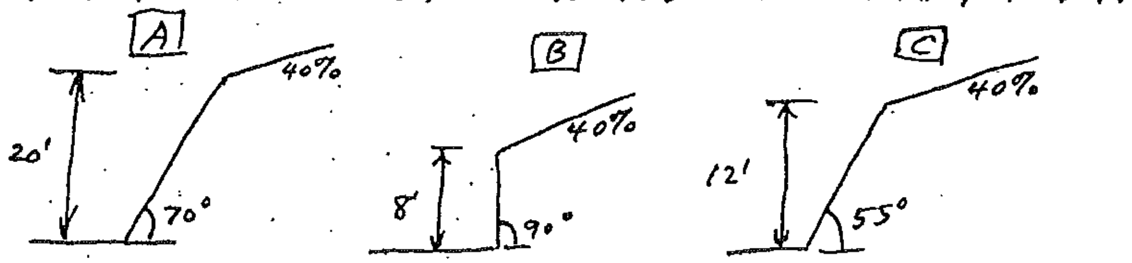
This analysis does not seem to be applicable to exposed sand surfaces that do not have cohesive strength. It is recommended that one or more boreholes be made in the new part of the site to see whether the sand changes to silt back at the proposed limits of cut. If it does not, the only way to proceed is to think about over-excavating and backfilling with layers of filter fabric at intervals.

Very truly yours,

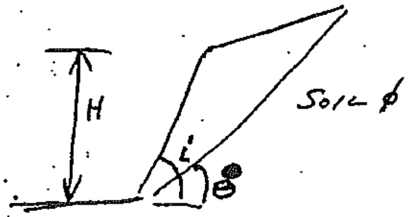
REGISTERED PROFESSIONAL ENGINEER
5657
John K. McDonald
OREGON
JULY 8 19[illegible]
JOHN K. McDONALD

JOHN McDONALD ENGINEERING
10116 S.E. STANLEY AVE.
PORTLAND, OREGON 97222

RANGE OF CUTBANKS NOTED AT EXISTING BLDG.



SPANGLER + HANDY FORMULA



SOIL COHESION

$$C_d = \frac{\gamma H\left(1 - \cos(i - \phi)\right)}{4 \sin i \cos \phi}$$

FOR [A] $C_d = \frac{100(20)(1 - \cos(70° - 35°))}{4 \sin \cos 35} = 117$ PSF

FOR $\phi = 32°$ = 133 PSF
FOR $\phi = 28°$ = 155 PSF

FOR [B] $C_d =$ FOR $\phi = 35°$ = 104
$\phi = 32°$ = 111
$\phi = 28°$ = 120

FOR [C] $C_d =$ FOR $\phi = 35°$ = 27 PSF
$\phi = 28°$ = 45 PSF

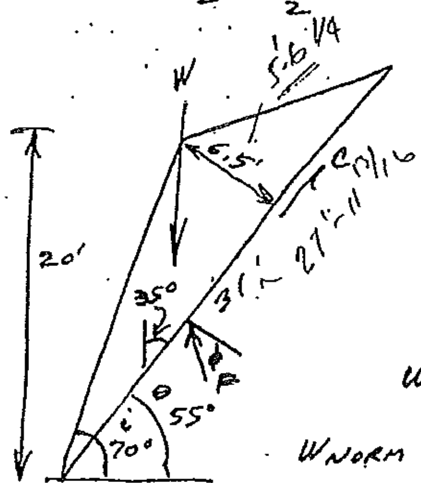
FOR DESIGN, COUNT ON $100 = C$, $35° = \phi$
FOR SAFETY FACTOR OF 1.3 USE $C = 75$, $\phi = 28°$ ← 60
53

NOV. 16, 1981 — 13

JOHN McDONALD ENGINEERING
10116 S.E. STANLEY AVE.
PORTLAND, OREGON 97222

FOR [A], NEXT FAILURE SURFACE IS AT

$\theta = \frac{i}{2} + \frac{\phi}{2}$, $\frac{70}{2} + \frac{35}{2} = 52.5°$ - Say 55°



1' WIDE SLICE

$W = (100)(\frac{31}{2})(6.5) =$ ~~2000~~ 10075 #

$W_{NORM} =$ ~~2000~~ 10075 Sin ~~55°~~ 35° = 5780

W TANG = ~~2000~~ 10075 Cos 35° = 8250

F = 5780 tan 28° = 3070

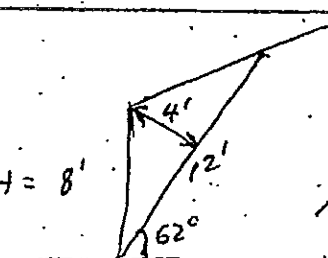
C = (75)(31) = 2330

TOTAL RESISTANCE 5400

WE NEED 8250 − 5400 = 2850 #

PROVIDE BY FRICTION $\frac{2850}{\tan 28°}$ = 5360 # NORMAL FORCE FROM SOIL ANCHORS

FOR [B]



$\frac{90}{2} + \frac{35}{2} = 62°$

$W = \frac{12}{2} \times 4 \times 100 = 2400$

NORM = 2400 Cos 28° = 2120

TANG. = 2400 Sin 28 = 1130

F = 1130 tan 28° = 600

C = 12(75) = 900

1500

NEED 2120 − 1500 = 620

$\frac{620}{\tan 28°}$ = 1170 # NORMAL FORCE FROM ANCHORS

JOHN McDONALD ENGINEERING
10116 S.E. STANLEY AVE.
PORTLAND, OREGON 97222

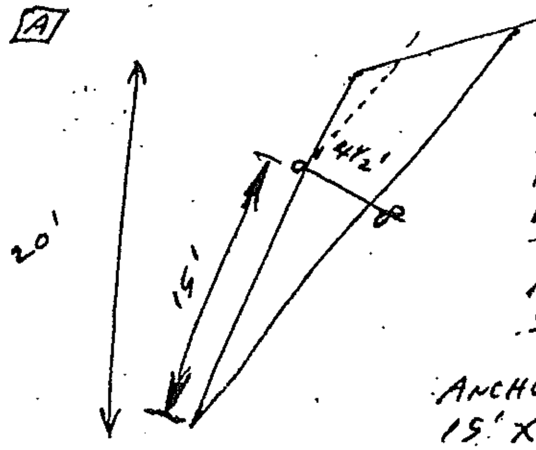
FIND ANCHOR FORCE

Dry Copy for [illegible]

$$P_{ULT.} = K_1 \gamma B N_\gamma + C N_c + \gamma D N_q$$
$$= (0.3)(100)(\tfrac{1}{2}')(10) + 75(22) + (100)(10)(15)$$
$$= 150 + 1650 + 15000$$
$$= 16{,}800$$

SO, 5500# SHOULD BE ABLE TO BE DEPENDED UPON

FOR [A]



ANCHORS CAN ONLY PROTECT TO WHERE FAILURE PLANE IS 4½' DEEP.

NEW FAILURE PLANE WOULD START ABOVE THIS POINT

ANCHORS THEN CAN ONLY PROTECT 15' X 1' OR 15 FT^2 SO ANCHORS NEED TO BE SPACED ON 3'-10" CENTERS EACH WAY

FOR [B] ENTIRE FACE CAN BE PROTECTED BY 5' ANCHORS

$1170\# = 1' \times 8' \quad \frac{5500}{1170} = 4.7 \times 8 = 37.6\,ft^2$

SO ONE ANCHOR AT 6' SPACING EACH WAY

FOR [C] REQUIREMENTS ARE SMALL - USE ONE ANCHOR SPACED AT 8' EACH WAY

JOHN McDONALD ENGINEERING
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(503) 774-0077

#6914
1/4 Sec 2825

December 31, 1987

John R. Low Consulting Engineers, Inc.
1750 SW Skyline Boulevard
Portland, Oregon 97221

ADDITIONAL SOILS INVESTIGATION AT FTL, INC. SITE

My initial investigation letter of October 15, 1987 pointed out that there was supposed to be Troutdale Formation material on the site but that most of what was exposed was a soft sand. A letter of November 22, 1987 analyzed the existing earth cutbanks near the present terminal building and concluded that there was a practical design basis for an anchored gunite slope protection, but that this was not applicable to the soft sands that had been exposed at the adjoining new site. Additional boreholes have been made to determine the extent of the soft sands.

The attached Exploration Sketch shows where the boreholes were made. Iowa Borehole Shear Tests were made in the boreholes. The findings were:

Borehole #2

0 to 1'	Brown silt
1 to 3'	Silt, mottled brown and strong brown colors
3 to 11'	Trend to silty fine sand, strong brown color and then trend to yellowish brown
11 to 13'	Clayey silt, brown and strong brown mottles
13 to 13½'	Stopped on weathered gravel, strong brown color.

The Iowa test at 6½' depth showed zero cohesion and a soil friction angle of 32.7 degrees.

Borehole #3 was made next to the excavated bank just below where BH #1 was made (as reported in the October 15, 1987 letter.)

0 to 7'	Exposed brown and mottled silt in cutbank
7 to 18'	Exposed soft coarse sand in cutbank
18 to 22'	Clayey silt, mottled strong brown and grayish brown colors
22'	Stopped on weathered gravel, strong brown color.

The Iowa test showed 230 pounds per square foot of cohesion and a soil friction angle of 28.9 degrees.

In my opinion the weathered gravel and the overlying clayey silt are the Troutdale Formation. The sand and the silt on top of it are Recent Alluvium. The presence of the stronger soils at the base of the proposed earth cuts means that, in my opinion, anchored gunite slope protection can be used in place of retaining walls. The concession to the presence of the sands would be that all of the anchor loads would have to be founded in the Troutdale Formation soils.

SLOPE STABILITY CONSIDERATIONS

For other clients I have previously investigated Tax Lots 176, 179, 180, 174, and 173. As part of those investigations, which extend back almost nine years, inquiries were made of long-time neighborhood residents regarding historical landslides. A landslide in 1956 was reported to have originated on the uphill side of Thurman Street. It damaged several houses there, took out half of Thurman Street, dropped the uphill level of Tax Lot 174 about ten feet, and caused a mudflow down the ravine on Tax Lot 173. As remedies, a groundwater drainage system was installed above the houses and a catch basin was installed there on Thurman Street. No other problems were reported.

A reconnaisance of the hillslope above the FTL site has been made. The outlet of the ravine on Tax Lot 173 is right behind the existing FTL terminal building and cobbles and mixed soils are visible in the exposed cutbank. On walking up the ravine, hummocks and blocks of soil are present and the water flow, apparently from the Thurman Street catch basin, is running on top of the Troutdale material.

Along the entire rest of the hillslope above the FTL site the ground is at about a 35 percent to 40 percent slope with no irregularities except for ravines that have been caused by water coming off Thurman. No leaning or curved evergreen trees were noted. A very old cat trail that runs along the old DLC survey line was all overgrown with vegetation but showed no signs of cutbank failure or general movement.

The friction angle of the soil measured in Borehole #2 would support a surface slope of 64 percent if the soil were dry, but only 35 to 40 percent with groundwater at the soil surface and flowing parallel to the slope. The mottled colors of the surface layer of silt indicate a seasonal perched water table. This water table so close to the soil surface has over the ages gradually shaped the land to the steepest stable slope. My opinion is that the slope above the FTL site is stable.

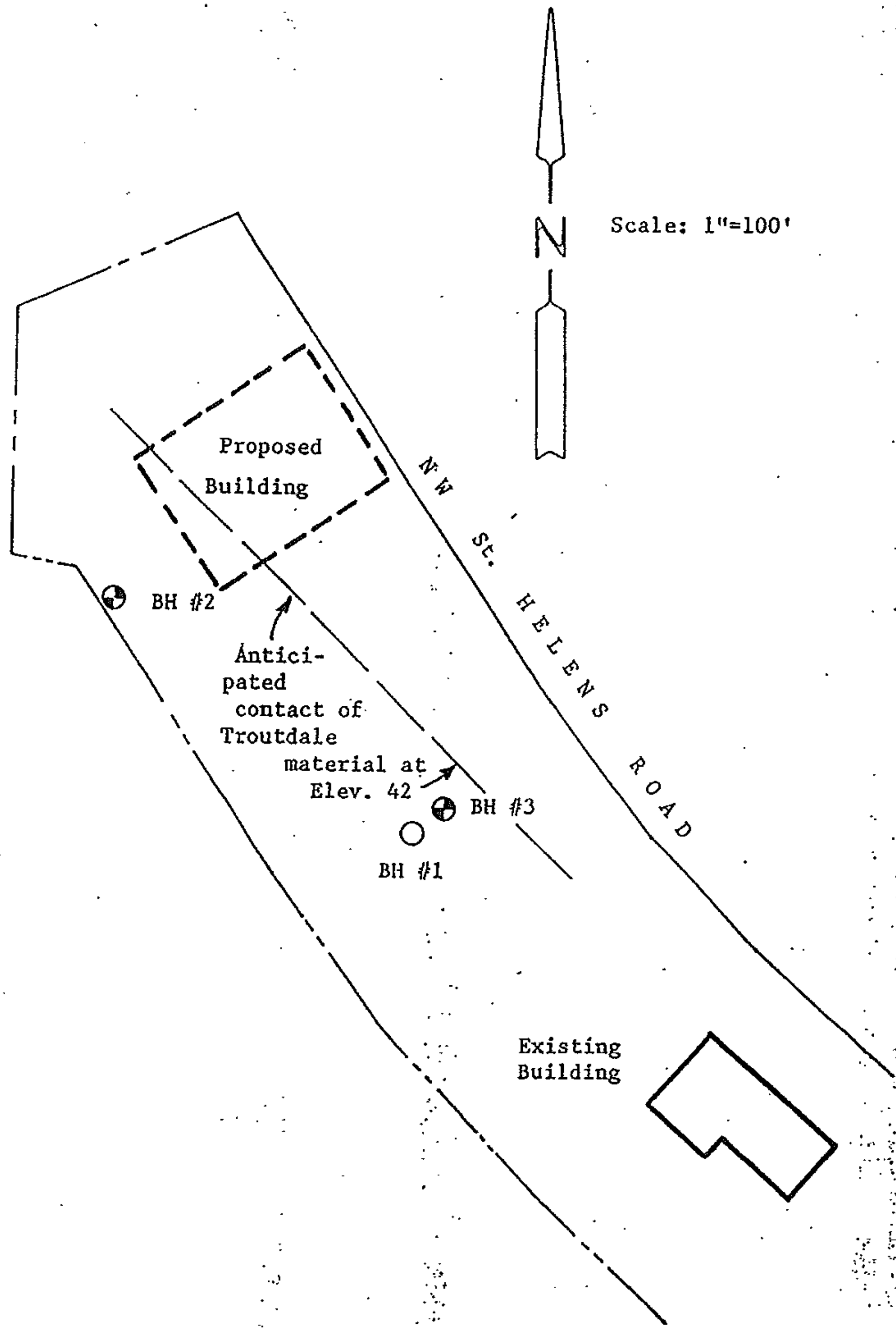
As noted, the site soils increase in strength with depth. Therefore, in my opinion, there is no danger that excavations at the toe of the slope, on the FTL site, will de-stabilize the slope.

In summary, stronger soils have been found at depth on the site that will allow the use of anchored gunite slope protection. A landslide study has found the slope to be stable in general and found the one known instability to have originated far up the slope and to have been compensated for.

Very truly yours,

John K. McDonald

REGISTERED PROFESSIONAL ENGINEER 5657
OREGON
JULY 8 1966
JOHN K. McDONALD



EXPLORATION SKETCH

FTL, Inc. Site

December 31, 1987

John McDonald Engineering

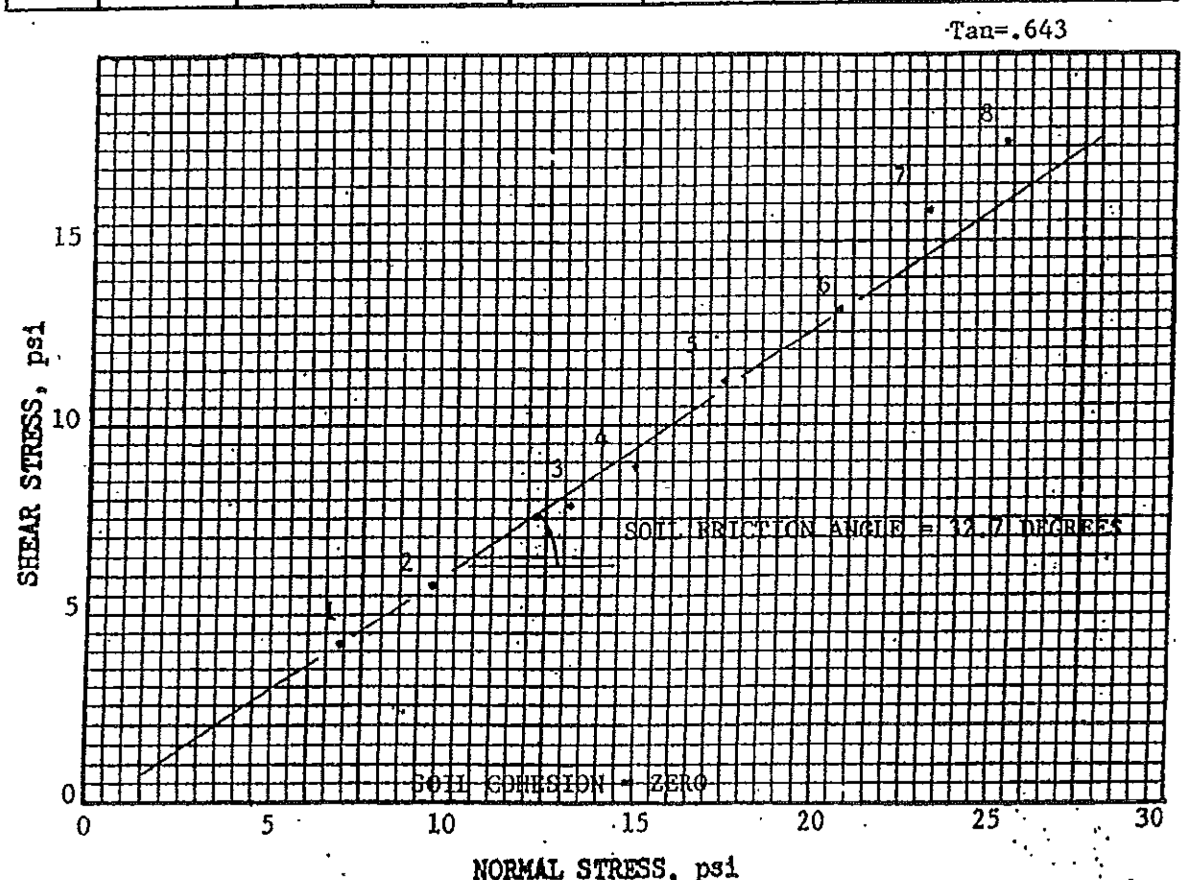
IOWA BORE HOLE SHEAR

Location FTL Truck Site Borehole #2 Date December 30, 1987

Depth 6½' Horizon ______ Tested by J.K. McDonald

Description Yellowish brown silty fine sand

Point No.	Normal Stress Gauge	σ_n	Shear Stress Gauge	τ_{max}	Cons. Time	Remarks
1	26.5	6.9	18.0	4.2	10 min.	
2	36.0	9.4	23.5	5.7	5	
3	50.0	13.1	32.0	7.8	5	
4	57.5	15.0	36.0	8.9	5	
5	67.5	17.5	44.5	11.2	5	
6	79.0	20.6	51.0	13.1	5	
7	89.5	23.1	61.5	15.8	5	
8	99.5	25.4	69.0	17.7	5 min.	



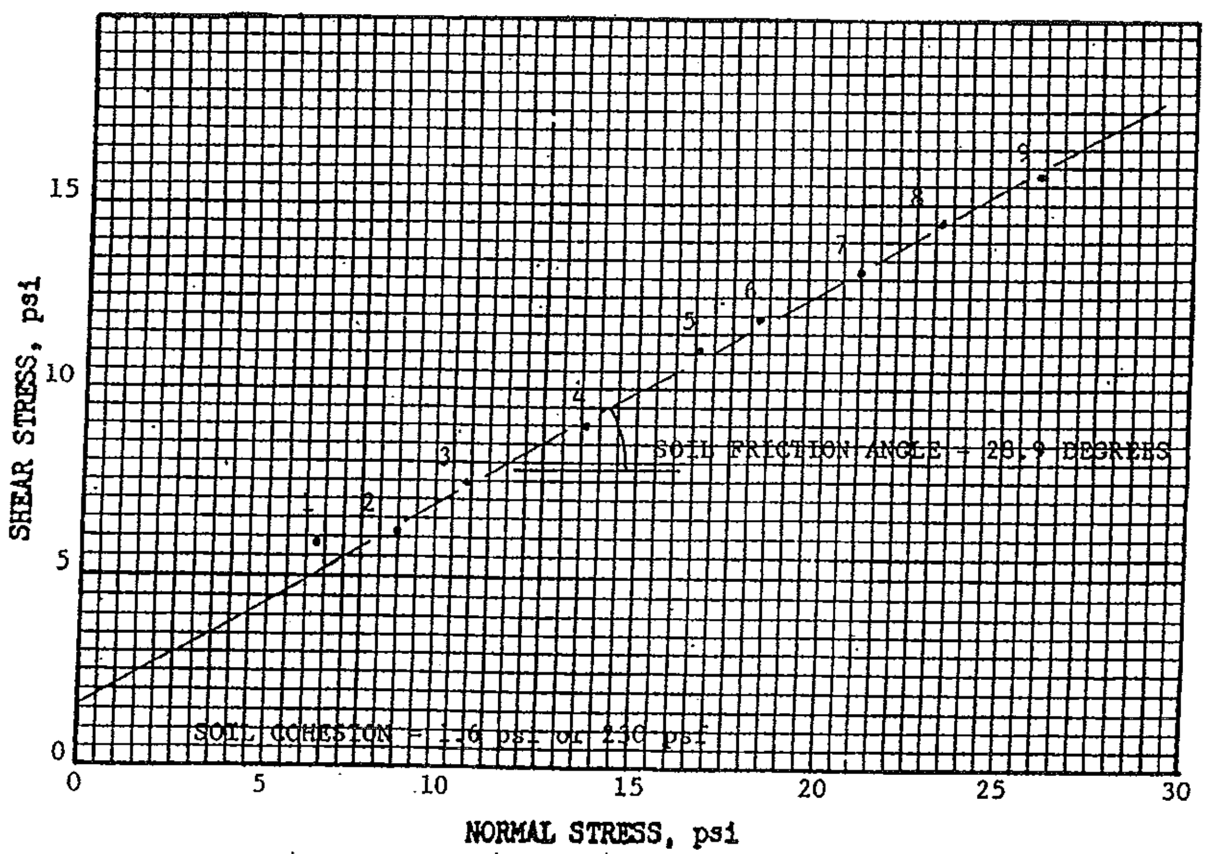
IOWA BORE HOLE SHEAR

Location FTL Truck Site Borehole #3 **Date** December 30, 1987

Depth 21' **Horizon** ______ **Tested by** J.K. McDonald

Description Clayey silt, mottled strong brown and grayish brown

Point No.	Normal Stress		Shear Stress		Cons. Time	Remarks
	Gauge	σ_n	Gauge	τ_{max}		
1	23.5	6.2	24.5	5.9	10 min.	
2	32.5	8.5	25.5	6.1	5	
3	39.5	10.4	30.5	7.5	5	
4	51.5	13.6	36.5	9.0	5	
5	63.0	16.6	44.0	11.1	5	
6	70.0	18.2	46.5	11.9	5	
7	80.5	21.0	52.5	13.2	5	
8	89.5	23.1	57.5	14.5	5	
9	99.0	25.8	61.5	15.7	5 min.	



\# 6914

1/4 Sec 2825

JOHN McDONALD ENGINEERING
SOILS - CIVIL - GEOTECHNICAL
Ground-Penetrating RADAR
10116 S.E. STANLEY AVENUE
PORTLAND, OREGON 97222
(503) 774-0077

May 26, 1988

John R. Low Consulting Engineers, Inc.
1750 SW Skyline Boulevard
Portland, Oregon 97221

SLOPE RECOMMENDATION FOR FTL, INC., SITE

Alternate ways of dealing with the sloping ground at the site on St. Helens Road have been investigated, including retaining walls and protection of steepened slopes. Another alternative is to provide the maximum steepness of slope without using a retaining wall.

From the previous soil investigation reports the soil consists of a silty surface layer, then sand, then clayey silt derived from the Troutdale Formation, and finally the Troutdale Formation itself. The surface silt has frictional and cohesive strength but also contains a seasonal perched water table. The sand has only frictional strength, while the clayey silt has both frictional and cohesive strength. The Troutdale Formation is too strong to test with in-place field equipment.

It was previously recommended that a cutoff trench be made behind the top of any cut that is made in the slope, in order to collect any perched water. Beyond that, a slope of 60 percent, or one-vertical to 1.67-horizontal, would provide a safety factor for the sand, in that this slope is flatter than the friction angle of the sand, plus the surface silt would provide a protective capping to resist erosion. The clayey silt is calculated to be able to stand 174 feet high on this slope, so there is a safety factor there. The Troutdale Formation makes up about a third of the total height of the resulting slope so, all in all, my opinion is that a cutslope of 60 percent would be stable.

Very truly yours,

REGISTERED PROFESSIONAL ENGINEER 5682 OREGON JULY 8 1956 JOHN K. McDONALD

John K. McDonald

INTER-OFFICE STAFF RESPONSE FORM
FOR
PLANNING/ZONING 'REQUEST FOR RESPONSE'

1/4 Sec 2825

DATE 7-17-89

REQUEST FOR RESPONSE NO. [redacted]

TO: FREEMAN

FROM: CKS RETURN TO: CKS BY 8-3-89

RESPOND TO THE QUESTION(S) BELOW. PROVIDE YOUR NAME AND PHONE NUMBER AFTER YOUR RESPONSE. ROUTE IF APPLICABLE.

Appl 6914

This appears to be for the same work That we issued permit 88-102141 (appl. #6914). Rough excavation work had begun, They were caught, told to get a permit. They got a permit but never completed the work. The hillside has been excavated but retaining structures have not been constructed.

John Low did original design. John McDonald was geotechnical consultant.

No. this is to the south!

b-1-3
3789

CITY OF

PORTLAND, OREGON

BUREAU OF PLANNING

Earl Blumenauer, Commissioner
Norman A. Abbott, AICP, Director
1220 S.W. 5th, Room 1002
Portland, Oregon 97204-1966
(503) 796-7700

Current Planning | Housing | Long Range Planning and Urban Design | Land Use Permits

Date: 7/10/89

REQUEST FOR RESPONSE

TO: Government Agencies and Neighborhood Associations

FROM: Current Planning Section
Bureau of Planning

STAFF: Laurie Wall
PHONE EXT. 7809
PRE-APP. NO: na

SUBJECT: CASE FILE NO. CU 64-89

A public hearing will be held to consider the following request on 8/28 or29.

Representative: John R. Low Consulting Engineers, Inc.
1750 SW Skyline Boulevard
Portland, OR 97221 297-3786

Owner(s)/Applicant(s): Wayne A. Scott
11310 S Macksburg Rd
Canby, OR 97012 1-266-4898

Land-Use Review: Industrial Excavation (Type II)

Location: 2425 NW St Helens Road

Neighborhood: Northwest Industrial

Legal Description: Tax Lot 18, SW 1/4 Section 29, 1N 1E

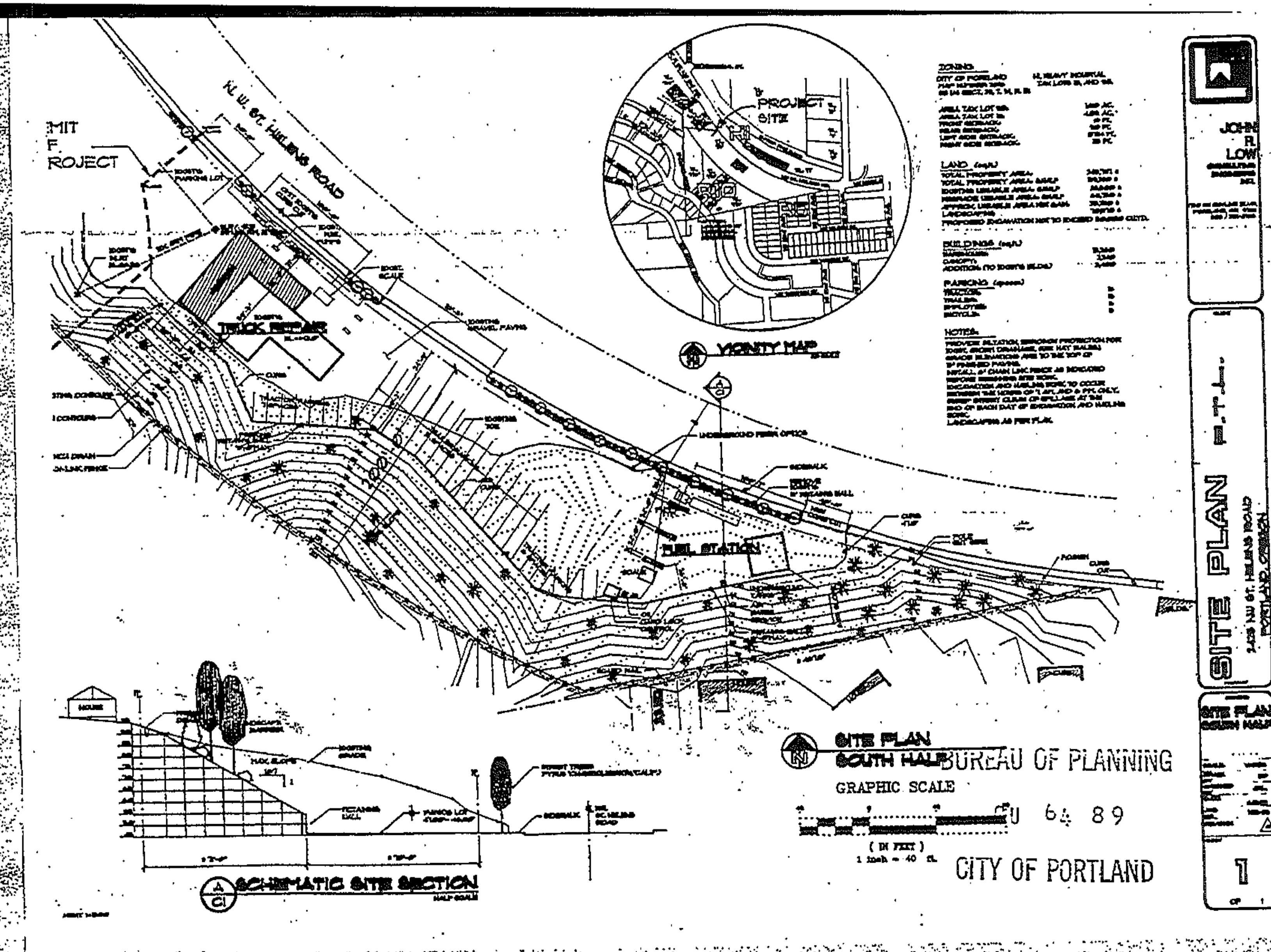
Quarter Section: 2825

Zones/Designations: HI, Heavy Industrial

8.7.89
Check w/ Glen Pierce re: old landslide

Description of Plan: The applicants propose to excavate the hillside along the southwest side of St. Helens Road to create: 1) maneuvering area around existing truck repair building, 2) a site for a fueling station, and 3) parking areas for trucks and trailers in conjunction with the terminal at the north end of the property. The site created will be level with the existing NW St. Helens Road and will be paved. The volume of excavation is not to exceed 50,000 cubic yards according to the plans. The existing slope is to be reshaped from a 4:1 to a 60% slope and invloves the installation of retaining structures at the base of the slope. The applicants propose to landscape and restore the newly cut slope. They indicate that the contractor will sweep the affected roadway at the end of each day to remove dirt. A 6-foot tall chain link fence along the southwest property line, bordering on the residential zone, will safeguard against children playing in the hazardous area. Construction operations will be limited to the hours of 7am to 6pm. The applicant states that the noise generated will be negligible when compared to ambient noise existing on and around NW St. Helens Road.

We are interested in any impact this request would have relating to your field of expertise and would appreciate agency review before 8/8/89 Neighborhood associations may respond any time within 30 days of the date of this memorandum. If you need additional information regarding this request, please call the staff person noted above.



MIT
F
ROJECT
N. W. ST. HELENS ROAD
TRUCK REPAIR
VICINITY MAP
PROJECT
SITE
FUEL STATION
SCHEMATIC SITE SECTION
HALF SCALE
SITE PLAN
SOUTH HALF
GRAPHIC SCALE
(IN FEET)
1 inch = 40 ft.
BUREAU OF PLANNING
U 64 89
CITY OF PORTLAND
SITE PLAN
2425 NW ST. HELENS ROAD
PORTLAND, OREGON
JOHN
R.
LOW
1

Received 11.29.89
WBK

ROGER A. REDFERN
CONSULTING GEOLOGIST

1701 S.E. LADD AVENUE
PORTLAND, OREGON 97214
(503) 233-2011

TESTIMONY OF ROGER A. REDFERN BEFORE THE CITY OF PORTLAND HEARINGS OFFICER REGARDING CU 64-89- FTL SITE, 2425 N.W. ST. HELENS ROAD, PORTLAND, OREGON, NOVEMBER 20, 1989

INTRODUCTION

I am an independent consulting geologist specializing in the fields of engineering geology, environmental geology and coastal processes. I have attained a Bachelor of Science degree in geology from the University of Oregon and a Master of Science degree in geology from Portland State University. I have been consulting for 18 years and specializing in landslides for 20 years.

I have investigated the slope stability of the entire Portland area for the planning and building bureaus of the City of Portland. I have conducted similar regional studies for Multnomah County, Lane County, Lincoln County, the City of Gladstone, and the City of Lake Oswego. The Building Bureau of the City of Portland continues to use my mapping of general slope stability in determining the need for further investigation in areas proposed for development. I have also conducted numerous site-specific slope stability studies for land parcels ranging from a few thousand square feet to several hundred acres in size.

I have been retained by neighbors to conduct an independent investigation of the subject site and the development proposed for the site.

My investigation of the subject site consisted of a review of publications on the geology and soils of the region of the site. I also reviewed two reports by John McDonald Engineering (December 31, 1987 and November 2, 1989) before conducting my field investigation. Prior to the hearing on November 20, 1989 I reviewed four other reports by Mr. McDonald dated October 15, 1987, November 22, 1987, May 26, 1988, and October 24, 1988. I also reviewed site development plans prepared by Mr. John R. Low, Consulting Engineer (May 5, 1989).

I conducted an examination and interpretation of topographic mapping of the site (scale: 1 inch = 100 feet) and a site-specific investigation of the subject property and surrounding area on November 18 and 19, 1989.

FINDINGS

This site is geologically complex and many questions remain in the mind of Mr. McDonald (personal communication) and in my own mind regarding the origin and age of some of the geologic units. The reasons for this complexity include the geologic history and past landsliding and stream erosion.

There is basalt of the Columbia River Basalt Group exposed to the west of the site, and this basalt also occurs under the site at an unknown depth.

A geologic fault, known as the Portland Hills fault or a splinter of that fault, probably occurs between the site and the exposed basalt to the west. This fault is thought to plunge under the site at an unknown depth.

The Troutdale Formation probably occurs under this site and over the underlying basalt. In the Portland basin this formation is typically composed of conglomerate (consolidated sand and gravel) and sandstone with local occurrences of siltstone. Conglomerate was supposedly exposed on the northern portion of this site in a previous excavation. However, that exposure is now under a fill, and it is not possible to confirm the identification by Mr. McDonald. There are other possible interpretations. Some of the silt found in borings and in the previous excavation on this site may or may not be part of the Troutdale Formation.

Subsequent faulting and stream and river erosion produced an eroded surface on the Troutdale Formation on which unconsolidated silt and sand has been deposited. The sand could be a deposit of the ancient, cataclysmic Missoula floods or of the Willamette River when the river was at a higher level. Given the position of the sand and similar deposits to the east and southeast, I believe that this deposit is a product of the Missoula floods.

The unconsolidated silt is texturally similar to the Portland Hills silt. John McDonald states that this silt is the result of erosion of Portland Hills silt from above the property and deposition on the site. Slope failures known as debris torrents could explain silt deposits in some locations but cannot explain all of the deposits. It is possible that some of the silt is Portland Hills silt that survived the Missoula floods or that have moved to their present position as a result of massive landslides (discussed in a following portion of my testimony).

Following deposition of the unconsolidated silt and sand there has been erosion by streams from the hillside to the west, erosion by the Willamette River on the east when it was in a different course, and deposition of debris-torrent sediment in the stream valleys.

SLOPE FAILURE

The term slope failure is a general term that encompasses failures that might be slides, flows, or falls of weakened or overly steep material.

Debris-torrent failures have been mentioned previously. These failures are sometimes referred to as mudflows. Debris failures are known to have originated on slopes above this site and flowed down the drainages on the site. There is evidence on the site of at least one slope failure that could have created a debris-type failure, but it is not possible to make a direct link because of subsequent erosion. Future debris failures will inevitably occur on this site or in upland areas west of the site and then impact the site.

Many slope failures were found on this site and on adjacent property in my investigation. The majority of these failures are classified as landslides. With the limited time available it was not possible to make confident identifications on all of these existing failures. Where there was significant evidence those slides have been mapped (see the attached map).

What is evidence that slide is ancient and not merely inactive?

The mapped slides include a massive, ancient landslide that includes the southern portion of the subject property, as well as a large developed area to the south and southeast. This slide probably resulted from erosion by the ancestral Willamette River or in the Missoula flood. Ancient landslides are generally defined as failures that are prehistoric or failed more than 100 years ago.

Two smaller, but still large, ancient landslides were found and mapped at the northern portion of the subject site. These slides have very strong (and definitive) topographic characteristics and are probably more recent than the massive slide area noted above. This slide was probably originally caused by erosion by the Willamette River at the toe (base) of the slope. Subsequent failure of a portion of the toe of the ancient landslides is suggested by old topographic mapping, but the slide area has been altered by excavation on the northern portion of the subject site and by excavation and building placement on the adjoining property to the north. The building to the north has been protected by a large retaining wall. That wall appears to adequately replace the failure resisting function of the portion of the toe of the ancient slide that was removed. Without this retaining wall the excavation for the building could have reactivated at least part of the ancient slide.

At the southern end of the subject property there is a landslide mapped as recent. The strong topographic features of this slide and the presence of a recently constructed retaining wall at the base of the slide are evidence of the recency of failure. This slide appears to have been caused by the removal of the toe of the slope (possibly a pre-existing landslide) by excavation for S.W. St. Helens Road.

There is a landslide mapped in the central portion of the southern half of this site. This slide is marked with a question mark (?) because of conflicting evidence regarding the age of failure. The topography of the upper portion of the slide indicates that it is ancient or at least inactive, but the presence of cross-slope valleys on the northern portion of the slide area indicate that a recent or active designation is appropriate. Further investigation is needed, but it appears that this is an inactive or ancient slide that has been partially reactivated as a result of excavation of the toe of the slide and is either slowly active or inactive.

There is topographic evidence of other small to medium-size slides on this property and on adjoining property to the west, but limited field time required their omission from the accompanying map.

As a result of my field work and examination of topographic mapping of the site and surrounding area, I have estimated the maximum natural slope stability of the surficial silt on the site to be about 40% and for the sands a maximum of 30%. Under natural conditions there is no drainage of ground water.

Based on my experience with similar silt sediment, I believe that if drainage of shallow ground water is provided, it might be possible for the silt to stand at a maximum slope of about 50%. I have no comparable experience with the sand found on the site.

The above observations are for the maximum stable slopes in drained and undrained conditions at and near the site. They do not cover cut slopes, but cut slopes should usually be at or less than the maximum naturally stable slope because there is a tendency for soils unloaded by excavation of overlying material to expand, absorb infiltrated rainfall and fail on shallow failure-planes.

CONCLUSIONS

In this section of my testimony I would like to review the most common causes of landslides as a result of land use or land development and compare those causes with the proposed development.

The most common causes of landslides as a result of land use or development are:

1. Loading of a slope - Loading refers to increasing the weight on a slope by placement of a heavy structure or of a fill.

2. Increased ground water or blockage of ground-water flow - This increases the weight of the slope and also increases the pore-water pressure of ground water in the slope.

3. Increased erosion as a result of development - Changes in land use from forest to agriculture to suburban or urban land use results in an increase in the amount of runoff from rainfall and an increase in the level of the peak of flood waters. As a result of the increased flooding there is an increase in erosion that can cause slope instability.

4. Excavation of a slope beyond the naturally stable angle - Slopes that have been previously unstable continue being unstable and subject to natural failures until a stable angle is attained. Once a naturally stable condition is reached the slope must be considered as marginally stable at best for uses or alteration by man. A previously stable slope can also be oversteepened.

5. Removal of the toe of an existing landslide - This is probably the most common cause of reactivation of existing inactive and ancient landslides. Because of the extensive number of miles of roadways through hillside and mountainous areas, there are a large number of landslides with this primary cause in this area. There are two local examples that are somewhat famous,

at least among geologist. One is the landslide at the current site of the Oregon Museum of Science and Industry and the Portland Zoo. This slide was caused by the excavation of the toe of an ancient landslide when the exit from Highway 26 was built. The other was caused by excavation for Interstate 205 at the toe of an ancient landslide in the Willamette area of West Linn.

6. Removal of vegetation - When vegetation is removed on a large scale there is a loss of the binding strength provided by the roots of the vegetation. When this occurs on marginally stable slopes, there can be shallow failures of the slope.

Apparently the applicant does not propose to load the slope (factor 1), significantly increase ground water or block ground water (factor 2), or increase erosion (factor 3).

The applicant does intend to decrease ground water to a shallow depth at the face of the proposed excavation but not to greater depth. This shallow level of drainage of ground water is based on the faulty assumptions that there are no existing slope failures and that there is no ground water at greater depth that would influence slope stability.

The applicant does propose to increase the ground slope by excavation (factor 4). The applicant's representative, Mr. McDonald, recognized the marginally stable condition of the slopes and he appears to have competently accommodated that limitation to site development in regard to cut slope stability. However, the presence of existing inactive and ancient landslides was not recognized or accommodated.

The applicant also proposes to remove a substantial portion of the toe of existing landslides (factor 5). This will definitely remove some of the slope stabilizing resistance to failure provided.

Therefore, considering the applicant's proposal there are several features that cause serious concern:

1. The applicants representatives do not understand the complex geology of this site and, therefore, do not understand the complex nature of the slope stability and occurrence of ground water.

2. The investigation of this site by the applicant's engineer is very shallow in depth. A maximum depth of about 22 feet was investigated in one boring, but the average depth was about 13 feet for all of the borings. The proposed cut slope would be up to 55 feet or more in height.

3. The proposed depth of drainage of ground water is very shallow and designed to only protect the face of the cut. This approach might be appropriate if there were no existing landslides.

4. The slope stability considerations of the applicant's engineer appear to assume that sediments below the iron layer are not saturated with ground water. This assumption is not supported by the engineer's well logs or by field investigation.

5. The most serious concern is that the investigation, analyses and design for the applicant's proposal were made without recognition of existing landslides.

SUMMARY CONCLUSIONS

I find it necessary to conclude that the investigation, analyses and design for the proposed land use and land development appear to be inadequate to protect the proposed development and the public.

Slope failures are almost certain to occur as a result of the development as proposed, and such failure could be a hazard to life and private property.

It is possible that providing adequate slope stability will be either economically or physically infeasible.

RECOMMENDATIONS

I recommend that the application be denied at this time, and that the applicant conduct an appropriately detailed investigation to include mapping and analysis of existing landslides on the site and on adjacent property and to adequately characterize subsurface conditions on and above the site. Consideration should be given to drilling to sufficient depths in a subsurface investigation to identify landslide failure planes and ground water conditions.

I strongly recommend that the applicant retain the services of a qualified engineering geologist to map existing landslides and provide other slope stability considerations to the engineer.

Future research on this site should include a slope stability analysis that includes adequate consideration of existing slides.

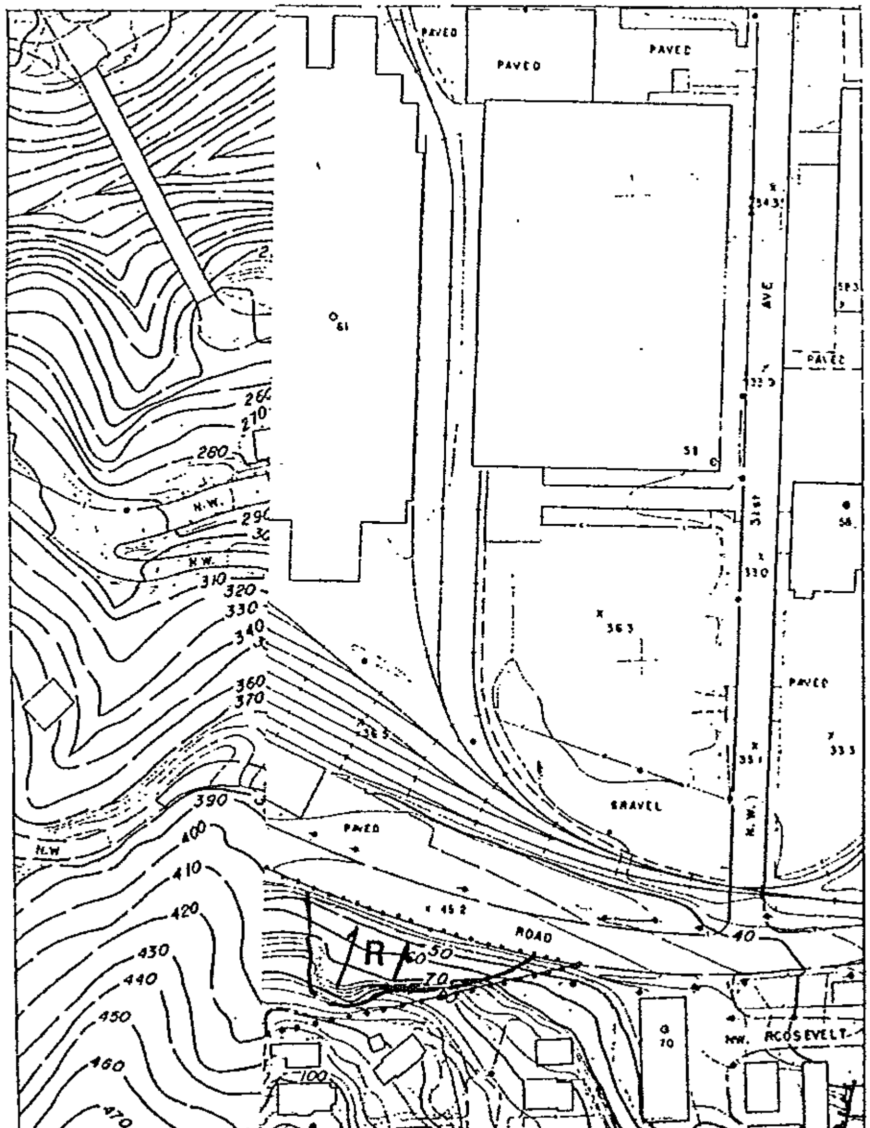
COMMENTS

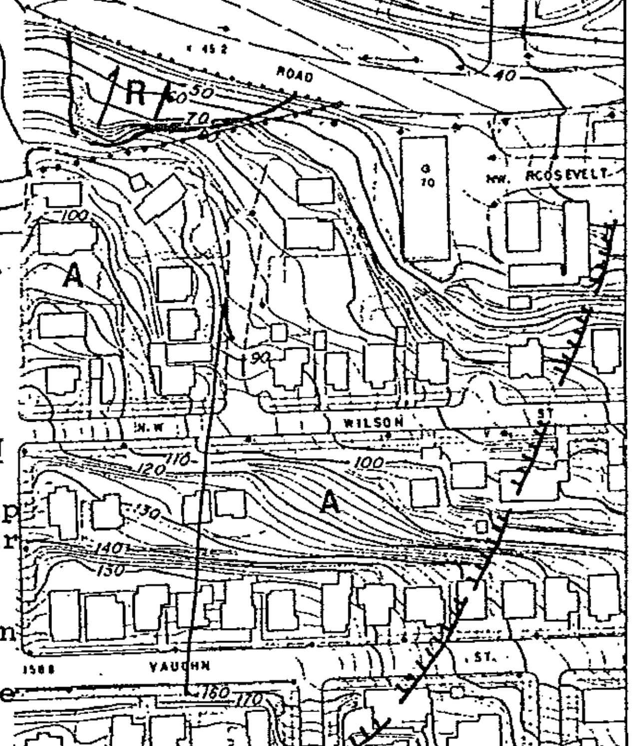
Prior to the beginning of the hearing on November 20, 1989, a new development plan was displayed. It is my understanding that this new plan is conceptual only and not the plan that the applicant is presenting for approval. The new plan is a slight improvement on previous plans, but not sufficient to change the findings, conclusions or recommendations presented here.

Respectfully,

Roger A. Redfern
November 28, 1989
RAR/wp

CERTIFIED
OREGON
ROGER A. REDFERN
E709
ENGINEERING GEOLOGIST





EXPLANATION

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Project. We understand that you are planning to construct single family dwellings on both lots. Building locations and design details are not known at this time, but we understand that a pole building may be utilized ; at least one dwelling may be constructed without a basement level.

Site Geology. Geologic conditions at the site appear to be somewhat typical of the east flank of the Portland West Hills. Three primary units are (from oldest to youngest): Columbia River Basalt, Troutdale Formation, and Portland Hills Silt Formation.

The basalt bedrock was deposited in numerous broad lava flow sheets about 35 million years ago throughout the Pacific Northwest. The Portland Hills represent a portion of the basalt that was deformed upwards about 10 million years ago into a mountain front rising above the valley lowlands. It is generally speculated that the eastern front of the Portland Hills is a fault with the hills being the portion that moved upwards relative to the Willamette Valley. Near the end of the deformation period, the Troutdale Formation (sand & gravel) was being deposited on the flanks of the hillside.

Up to about 40,000 years ago the bedrock hills were marked by extensive soil development and down-cutting by streams during the Pleistocene (Ice age) time period. Also, massive amounts of sediment were deposited in the valley lowlands, especially in the Columbia River drainage. Between about 1 million and 40,000 years ago, prehistoric easterly winds rushing through the Columbia River Gorge swept large areas of exposed fresh sediment, created heavy dust storms and silt deposits on the Troutdale Formation and decomposed basalt bedrock materials.

Reconnaissance. Field studies consisted of a geologic reconnaissance of the property on August 13, 1984. In addition to examining the ground surface and vegetation (conifer trees) for signs of slope movement, nearby cut slopes were logged and several shallow hand auger borings were made. The hand auger holes revealed probable highly weathered or decomposed basalt bedrock at 1 to 2 feet below the ground surface in the drainageway along the west property line near elevation 300 and SILT soils at all other locations. Apparent decomposed basalt was also observed near the base of a recent 7-foot high driveway cut-slope on adjacent property near the northeast corner of the site. South of the property near Belgrave Street decomposed basalt was penetrated in an exploratory test pit at 10 feet below the ground surface.

Typical of the Portland West Hills, topographic and vegetative indicators on the site suggest near-surface slope creep may be present. There are no signs of deep-seated landslide activity on the property.

Estimated Subsurface Conditions. Based on the above, we anticipate foundation soil conditions consisting of 7 to 12 feet of very stiff SILTS (likely thinner at lower elevations) overlying a thin zone of weathered Troutdale Formation and decomposed basalt which grades to fresh, relatively unweathered basalt at depths of 20 to 30 feet. The groundwater level is believed to be at depths of 5 to 15 feet below the surface depending on the

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NW Portland residents knock warehouse plan

Some homeowners fear landslide could develop if builder carves in hill

By PAUL KOBERSTEIN
of The Oregonian staff

Some residents of a Northwest Portland neighborhood fear their homes will slip away if an industrial site is carved into the hillside below.

The homes near Northwest 33rd Avenue and Vaughn Street overlook the Guilds Lake industrial area and, in particular, a proposed warehouse site at 2425 N.W. St. Helens Road.

During a Monday morning land-use hearing in the Portland Building, the homeowners urged hearings officer Elizabeth Normand to reject a developer's plan to excavate the bottom of the hillside. Normand said she would issue a decision within 10 days.

Laurie Wall, a city planner, said she was sympathetic to the homeowners' concerns. However, she recommended approval because the project as proposed was consistent with the city land-use code. What's more, she said, the developer promised to provide more protection for the residents than the code required.

Wayne Scott, the Portland developer, plans to build a warehouse and loading docks for the storage and delivery of newspapers. The land is zoned for heavy industrial use, despite its nearness to the neighborhood. The closest house is some 250 feet uphill.

John McDonald, a soil engineer working for Scott, said that the excavation wouldn't put the hillside in danger of a landslide. Other consultants for the developer said the project would be built with a landscaping of trees and shrubs to block the sight and sound of trucks coming and going.

But Ted McDermott, 3344 N.W. Vaughn St., (Attorney) (223-7019 (H), 226-1191 (O) Lindsay, et. al.) protested that the developer's soils analysis was made public only Monday morning and could contain errors. He asked Normand for time to review the report and make comments before she issued her decision.

However, Normand said the potential for landslides in the area wasn't relevant in a land-use hearing. The question could be brought to the attention of the city Bureau of Buildings when it later considers issuing a building permit, she said.

McDermott said he expected Normand to approve the excavation, and that he would then appeal the decision to the Portland City Council.

He said the area already exceeded noise levels permitted in a residential area.

"You don't make it better by adding more noise to it," McDermott said.

Sabina Wohlfeiler, who lives within 400 feet of the warehouse site, (226-3941) said the city took steps a decade ago to protect the neighborhood from a proposed freeway project. That project, known as Interstate 505, would have gone through her neighborhood but was blocked and rerouted through the Guilds Lake area.

The basic issue, she said, was "livability" and the city's commitment to protect it.

"When we purchased our home we thought the direction of the city was toward preserving the quality of the neighborhood, not toward it becoming heavy industrial," she said.

Also Monday, Normand approved a conditional-use permit for the renovation of two 90-year-old buildings on North Russell Street.

The developer, Manhattan Loft Co., plans to lease retail and residential space in the vacant Smithson and McKay Block buildings at 943 and 927 N. Russell St. Both buildings, located in an industrial zone, are on the National Registry of Historic Buildings and will be renovated to return to their original appearance, the developer said.

Council upholds decision against truck-fuel center

The Portland City Council in a 3-2 vote Wednesday upheld an earlier decision of a land-use hearings officer against an excavation permit that would allow a truck-fueling center to expand in Northwest Portland.

Mayor Bud Clark broke the City Council's earlier deadlock on the issue.

Two weeks ago, when Clark was absent during a hearing on the matter, the council split in a 2-2 vote on whether to grant the permit.

Ike Bay sought the permit to expand a five-acre parcel at 2425 N.W. St. Helens Road. The excavation of a portion of the hillside along the southwest side of St. Helens Road would have allowed a maneuvering and parking area for trucks and expansion of an existing truck-repair shop.

Bay appealed the decision of a hearings officer to the City Council.

Clark and commissioners Dick Bogle and Mike Lindberg voted Wednesday against a motion to grant the appeal sought by Bay. Commissioners Earl Blumenauer and Bob Koch voted in favor of granting the appeal.

Clark said his vote "was a very difficult decision."

The hearings officer, George H. Fleerlage, said in his opinion that the excavation would strip practically all the existing natural screening that forms the buffer between property zoned residential and heavy industrial.

Residents living near the site testified earlier that expansion of the truck center, which operates 24 hours a day, would create more noise and air pollution and would increase the danger of landslides.

Attorney Phil Grillo, representing Bay, said he had not decided whether to appeal the decision to the state Land Use Board of Appeals.

Lake Oswego

Q.S. 2825
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from Fred Deis
12.18.89

JOHN McDONALD ENGINEERING
SOILS - CIVIL - GEOTECHNICAL
Ground-Penetrating RADAR
10116 S.E. STANLEY AVENUE
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November 2, 1989

John R. Low Consulting Engineers, Inc.
1750 SW Skyline Boulevard
Portland, Oregon 97221

CONTINUING SOILS INVESTIGATIONS AT FTL, INC. SITE

This long-running project has gone through several concept stages while earth excavation was slowly proceeding. A number of soils investigations were made to provide a basis for the different ideas of dealing with the final earth cutbank. Likewise, the excavation progress allowed access for boreholes into the deeper soils. These boreholes are here reported on. In addition, the South Half of the property has been investigated for development and these findings are also included in this report.

In the beginning, it was anticipated that Troutdale Formation material, a cobbly gravel, would be present all over the site. My report of October 15, 1987 found surface silts and sands at depth. That of November 22, 1987 discussed the silt soil exposed in the South Half of the site and the concept of the anchored gunite slope protection. Continuing this concept, the December 31, 1987 report covered deeper boreholes that were made to find out how deep the sand was. These two boreholes both ended on what was described as weathered gravel of strong brown color. This was thought at the time to be the top of the Troutdale material.

My letter of May 26, 1988 made a recommendation for an unreinforced cutbank. Throughout the summer of 1988 the excavation was proceeding in such a way that it was difficult to tell where the final excavated surface would be. It was thought that the final exposed surface would be partly in sand, with silt underneath. My letter of October 24, 1988 made recommendations for the groundwater cutoff trench along the top of the cutbank as well as for additional cutoff trenches partway down the slope, where sand was anticipated to be found on top of sloping silt material. ?

In 1989 the excavation at the North Half of the site progressed in a more rational manner, and it turned out that all of the sand was removed from most of the final exposed slope. The very north end though, was still exposed sand. The main thing was that, after removing the sand, the final excavated slope was slightly steeper than the original slope of the underlying silt soil. This is shown in the attached rough sketch.

As the soil was gradually removed and the various sloping layers were exposed, it turned out that what was described in my December 31, 1987 report as weathered gravel of strong brown color was actually a surface of crusted iron accumulation that separated the shallower, mottled brown colored silt from the deeper, dark gray silts. The actual cobbles and boulders of the Troutdale Formation were found only at the very bottom of the excavation and only in the center of the site.

These excavation findings have lead to a different concept of the site history. The lateral extent of the cobbly Troutdale material is not certain. Silts cover the cobbly Troutdale material and cover the area to the north. Groundwater has leached iron from the shallower silt soil and deposited it in a crusted layer within the silt. This crusted layer cut off the oxygen from the deeper silt and also kept groundwater out.

The fact that the original surface of the silt deposit was quite steep means that at one time this was the bank of the Willamette River. From USGS topographic maps it can be concluded that at one time the Willamette River meandered over the site and then turned sharply to meander over Mocks Bottom, east of Swan Island. The sand on the site had to be deposited after that time, and finally, surface silts eroded down from the hills to cover the sand surface.

The soil strength tests reported on in my December 31, 1987 report were made in the sand at the north end of the site and in the upper silt soil in about the center of the North Half of the site. The test in the sand represents the exposed material in the final cutbank. Even though the test in the upper silt was made quite deeply, the excavation was ultimately carried to well below this test level.

New tests of soil strength have been made in the dark gray silt at lower levels. The attached worksheet for the Iowa Borehole Shear Test at 1.5' depth below the final excavated surface shows a soil friction angle of 38.2 degrees. The test at 3.5' depth shows 23.0 degrees for the soil friction angle and 550 pounds per square foot for cohesive strength. This dark gray silt is not saturated with water, since it is protected and roofed over by the crusted iron layer. Strength calculations show that this material is stable and has a safety factor at the final slope and height of the cutbank.

Now that the excavation in the North Half of the site is nearly complete it turns out that the shallow groundwater cutoff trench at the top of the excavated cutbank did not extend quite far enough to protect the entire slope. This will have to be extended on both ends, and provisions will have to be made to drain the one and possibly two pockets or dips in the trench. Finally, even though the shallow surface groundwater will have been cut off there still are a few layers within the deeper silt that carry groundwater. These will have to be trenched and fitted with filtered collection facilities.

SOUTH HALF SOIL INVESTIGATIONS

Four boreholes with continuous sampling have been made in the locations shown on the attached Exploration Sketch. Soil samples were given hand classification tests to decide whether they were of sandy, silty, or clayey nature. Their colors were referred to the standard Munsell soil color plates for clues to the soil moisture regime and to the pattern of soil development.

Borehole A was made near the anticipated top of the sloping cutbank.

0 to 1'	Brown silt
1 to 6'	Dark yellowish brown fine sandy silt
4.5'	Thin layer of brown silt
6 to 9'	Pale brown fine sand
7'	6" layer of faint mottles of yellowish brown
9 to 12.5'	Brown fine sand, wet
12.5 to 13'	Dark yellowish brown silt, wet
13 to 14'	Clayey silt, mottled grayish brown and dark yellowish brown

End borehole at 14' depth.

Borehole B was made near the end of NW 33rd Avenue.

0 to 1'	Silts of mixed brown and dark brown colors
1 to 3'	Silt, mottled brown, yellowish brown, and dark yellowish brown
3 to 4'	Fine sandy silt, mottled brown and dark brown
4 to 8'	Brown fine sand
8 to 14'	Brown medium sand, wet
14'	Brown silty medium sand, wet

End borehole at 14' depth.

Borehole C was made on a little ridge near where the top of the cutbank will be.

0 to 0.5'	Dark brown organic silt
0.5 to 2'	Brown silt
2 to 3.5'	Silt, mottled yellowish brown and brown
3.5 to 4'	Silt with streaks of black color, then pale brown
4 to 4.5'	Wet silt, then strong brown crusty iron layer
4.5 to 6.5'	Silt, pale brown with yellowish brown motles
6.5 to 7'	Yellowish brown crusty iron layer
7 to 9'	Silt, grayish brown with strong brown streaks, wet
9 to 11'	Clayey silt, then silt with dark gray streaks
11'	Dark gray silt, stiff and hard to auger

End borehole at 11' depth.

Borehole D was on the steep side slope of the ravine near the south end of the existing shop building.

0 to 1' Dark brown organic silt
1 to 4' Clayey silt, mottled grayish brown and yellowish brown
4 to 5' Silt, mottled yellowish brown and dark yellowish brown
5 to 6' Dark yellowish brown silt
6 to 8' Silt, mottled strong brown and grayish brown, moist
8 to 9' Dark gray clayey silt, moist
9 to 11' Dark gray silt with soft black bits of gravel

An Iowa Borehole Shear Test at 10.5' depth showed a soil friction angle of 39.0 degrees. Borehole ended at 11' depth.

My overall opinion of the soil strength over the entire site is that it is adequate to support the recommended 60 percent cutslope inclination and still have a safety factor. Where the soil friction angle was lower, there was sufficient soil cohesion present to make up the difference. The soil strength measurements from the December 31, 1987 report are consistent with the more recent tests. Cutoff trenches to gather shallow groundwater are recommended in the South Half of the site as they were in the North Half to increase the safety factor of the stability of the cutslope.

In the South Half of the site there will not be a smooth planar surface as was made in the North Half. The top of the slope will move in and out to preserve vegetation near the property line and to mantain a buffer near existing houses. Therefore, in making the needed groundwater cutoff trench or trenches, individual investigation will be have to be done to delineate the best route for the trenches to follow.

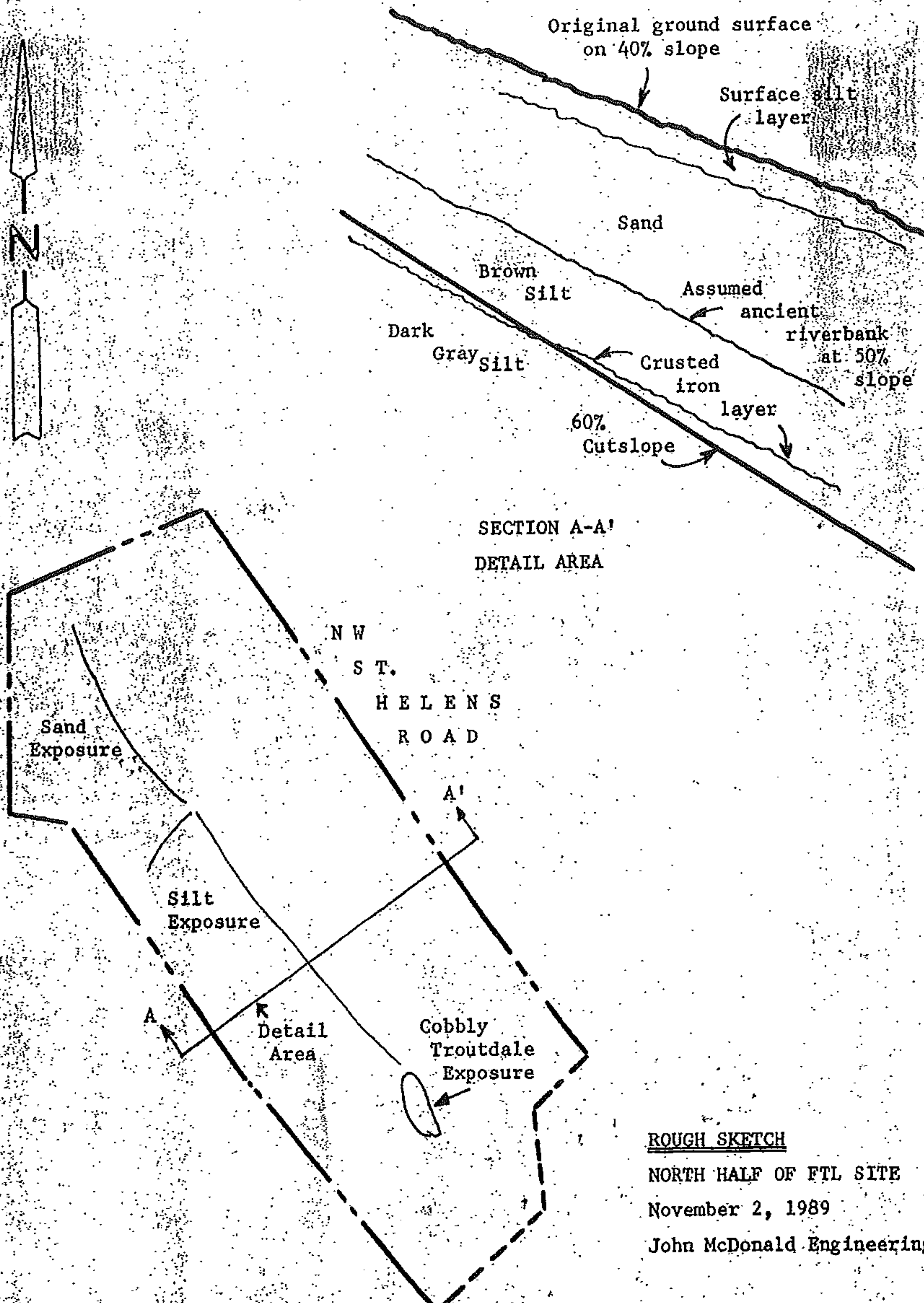
For building construction the recommended maximum soil bearing pressure is 2,500 pounds per square foot. Retaining walls should be designed to resist an equivalent fluid density of 50 pounds per cubic foot.

The concept of using screw anchors to support walls and building components has advanced rapidly as experiments are reported in the technical literature and new applications are tried. Studies of anchor corrosion in soils have established that longevities in keeping with those of other building components can be assured. A special soil test probe has been obtained so that dependable predictions of holding power can be made, and a local company is building special equipment to install the screw anchors. So there may be a use for the original anchoring concept in connection with the present retaining wall concept.

Very truly yours,

John K. McDonald

REGISTERED PROFESSIONAL ENGINEER 5682 OREGON JULY 8 1966 JOHN K. McDONALD



ROUGH SKETCH

NORTH HALF OF FTL SITE

November 2, 1989

John McDonald Engineering

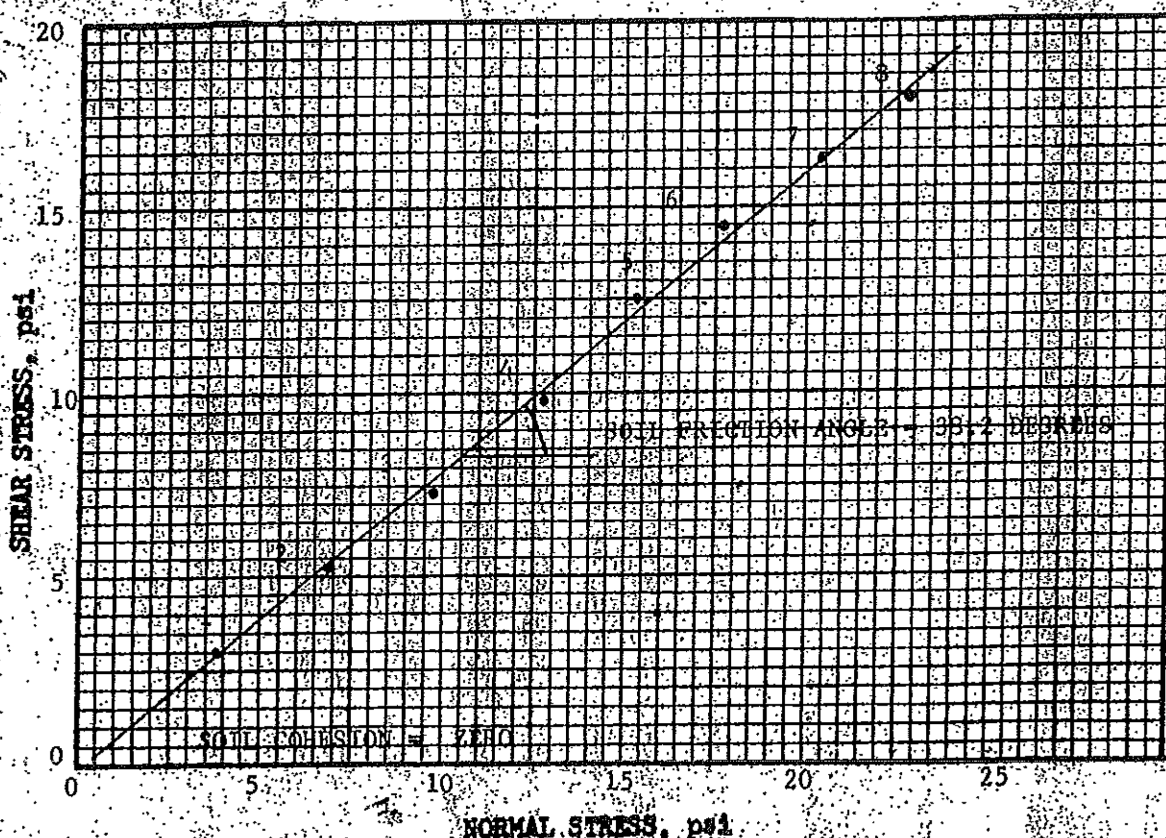
IOWA BORE HOLE SHEAR

Location FTL St. Helens Road Site, North Part **Date** August 14, 1989

Depth 1.5 feet **Horizon** ______ **Tested by** J.K. McDonald

Description Dark Gray Silt

Point No.	Normal Stress		Shear Stress		Cons. Time	Remarks
	Gauge	σ_n	Gauge	τ_{max}		
1	14.5	3.8	13.5	3.0	10 min.	
2	26.5	6.9	22.0	5.2	5	
3	37.0	9.6	30.0	7.3	5	
4	48.5	12.7	39.5	9.8	5	
5	58.5	15.4	49.0	12.5	5	
6	68.0	17.6	56.5	14.5	5	
7	78.0	20.4	63.5	16.2	5	
8	86.5	22.6	70.0	17.9	5 min.	



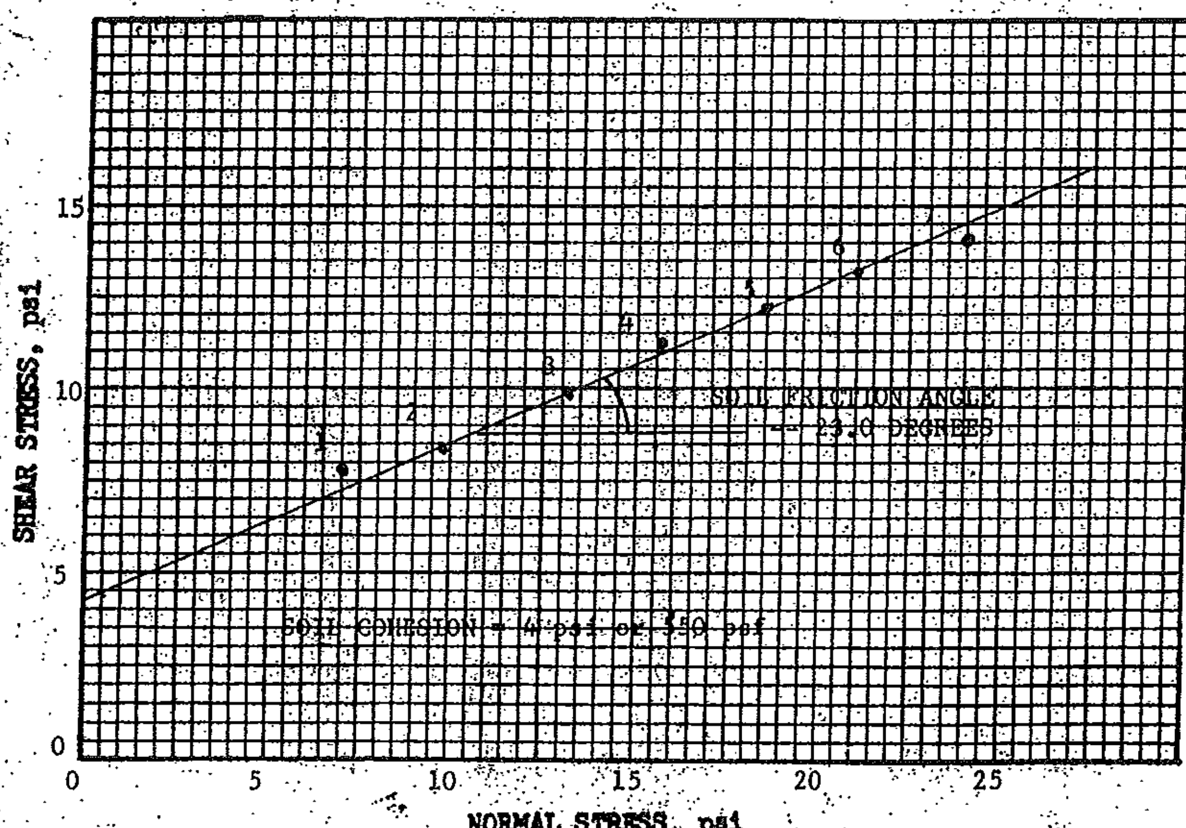
IOWA BORE HOLE SHEAR

Location FTL St. Helens Road Site, North Part **Date** August 14, 1989

Depth 3.5 feet **Horizon** ______ **Tested by** J.K. McDonald

Description Dark Gray Clay

Point	Normal Stress		Shear Stress		Cons.	Remarks
NO.	Gauge	σ_n	Gauge	τ_{max}	Time	
1	27.0	7.0	31.5	7.7	10 min.	
2	38.0	9.9	34.0	8.4	5	
3	50.0	13.1	40.0	9.9	5	
4	60.0	15.6	44.5	11.2	5	
5	71.0	18.5	47.5	12.2	5	
6	80.5	21.0	51.5	13.1	5	
7	91.5	24.0	55.0	14.0	5 min.	



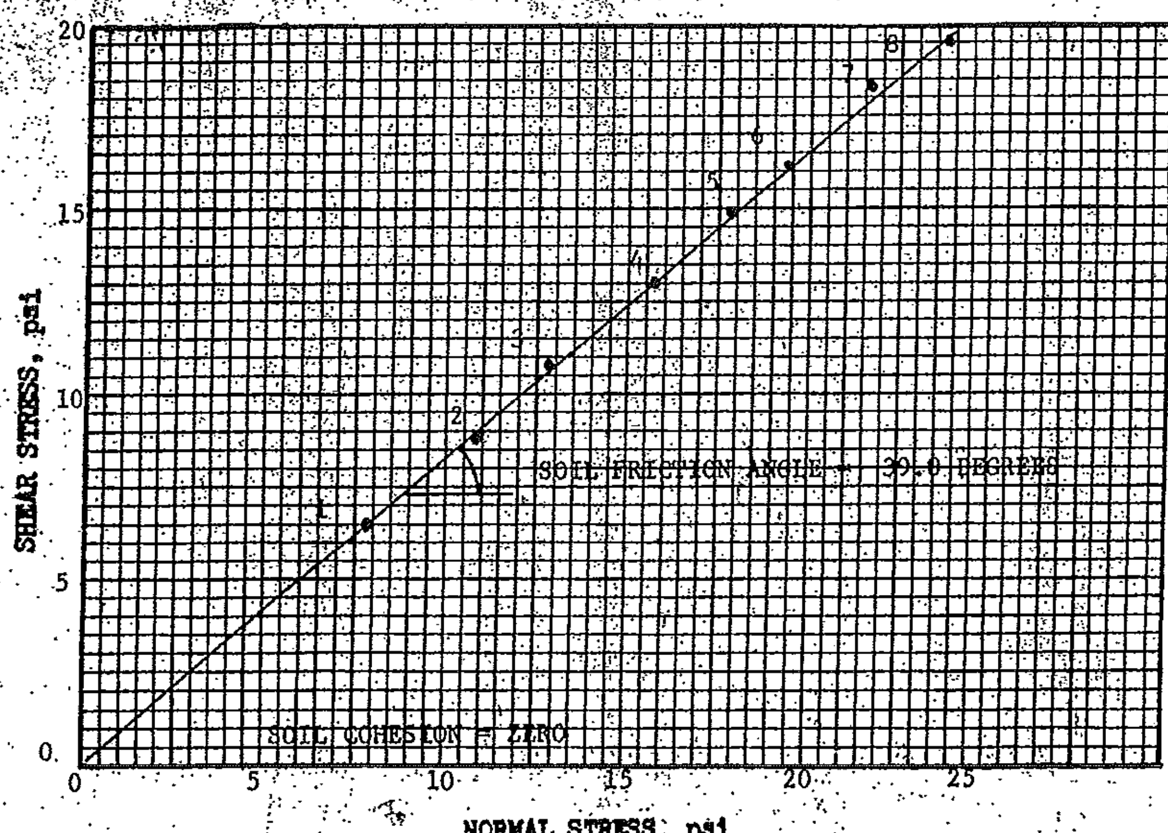
IOWA BORE HOLE SHEAR

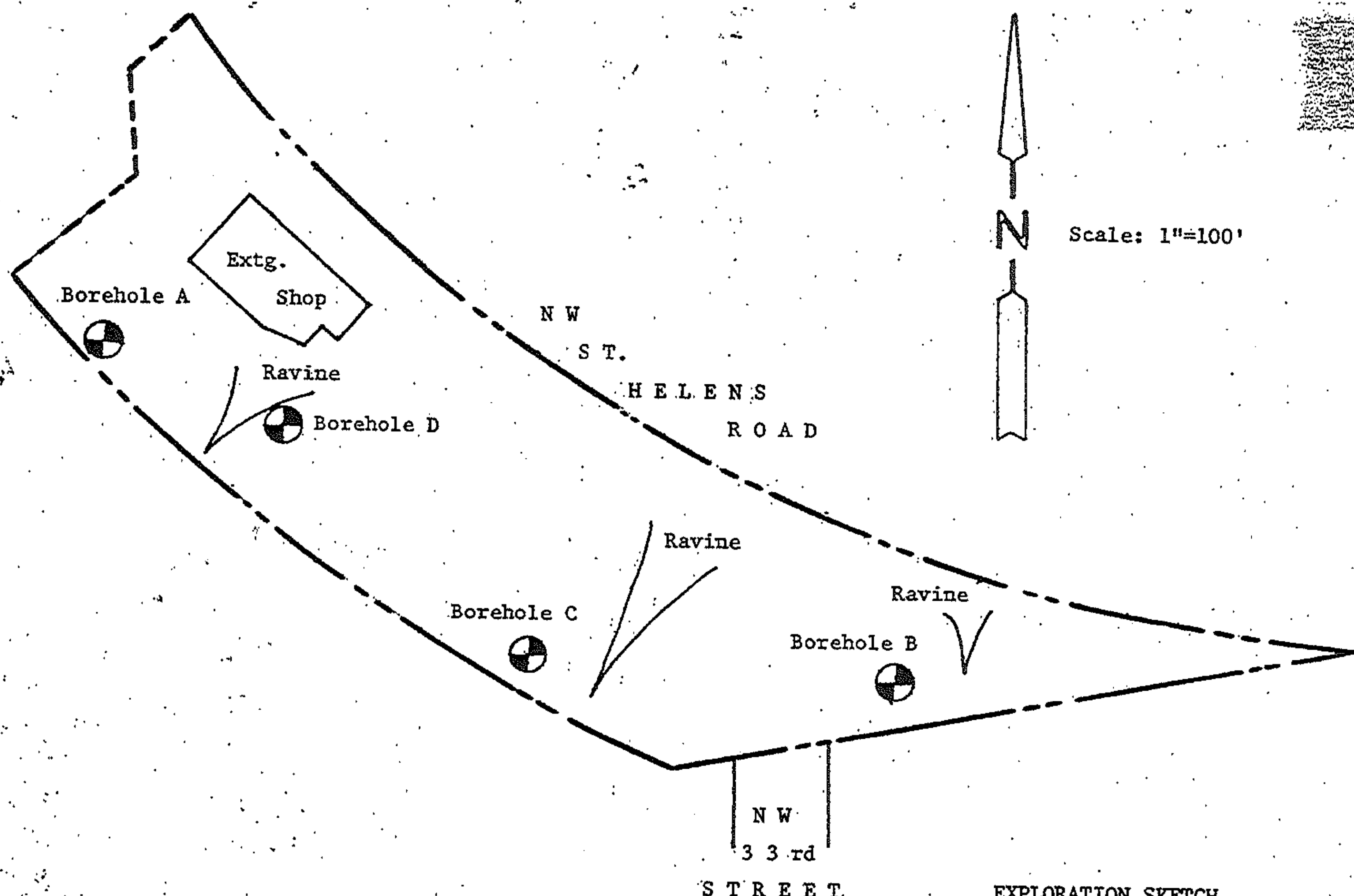
Location FTL St. Helen Site, South Part **Date** August 16, 1989

Depth 10.5 feet **Horizon** ______ **Tested by** J.K. McDonald

Description Dark Gray Silt

Point No.	Normal Stress Gauge	Normal Stress σ_n	Shear Stress Gauge	Shear Stress τ_{max}	Cons. Time	Remarks
1	30.0	7.8	27.5	6.5	10 min.	
2	41.0	10.9	35.5	8.8	5	
3	49.0	12.8	42.0	10.8	5	
4	60.0	15.7	50.5	13.0	5	
5	68.0	17.8	59.0	14.9	5	
6	74.5	19.4	63.0	16.1	5	
7	83.0	21.6	71.5	18.4	5	
8	91.0	23.8	76.0	19.5	5 min.	





EXPLORATION SKETCH

SOUTH HALF OF FTL SITE

October 31, 1989

John McDonald Engineering

Received 11.29.89
WBK

CHRIS WRENCH
Post Office Box 10654
Portland, Oregon 97210
503/227 4671

November 29, 1989

PHOTO EVIDENCE OF MATERIAL PRESENTED AT HEARING ON CU-64-89 Nov. 20, 1989

This photo shows the ground water seeping out of the face of the current excavation on St. Helens Road, which was mentioned by Mr. John McDonald at the hearing. The photo was taken in September, 1989, at the end of the dry season before the fall rains began. Most of the cut face of the excavation is dry, but at the left can be seen where ground water is soaking the soil. Mr. McDonald testified to the need for further drains in the excavated area.

Please enter this into the record of material presented on CU-64-89. It illustrates a point made verbally during the hearing.

Thank you.
Chris Wrench
Chris Wrench

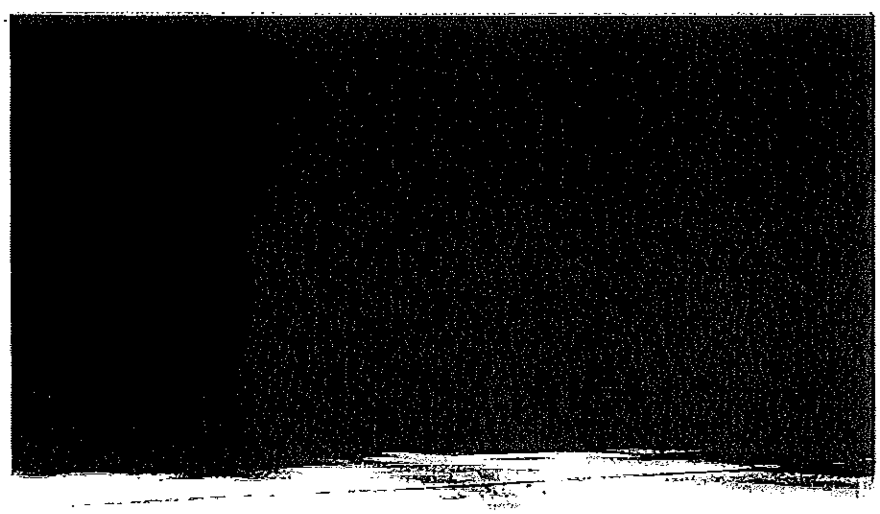


photo by Chris Wrench

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                    BUILDING PERMIT APPLICATION       14:38:52  09/06/90
                                   6914                          N33N899

STR NO  2425  DIR NW NAME ST. HELENS           TYPE RD   BLDG      FLR    -
BETWEEN                            AND
LOT       BLK       ADDITION
TAX LOT 18    SECTION 29   TOWN/RANGE 941     OCCUP GRP M3
TAX ACCT R9412918 0                           CONST TYPE VN
MAP   2825   ZONE HI     COMP PLAN            FIRE EXT N       DETECTION N
JOB NAME                                      UNINCORPORATED MULTNOMAH COUNTY N
DESCRIPTION SLOPE STABILIZATION, GRADING AND GRAVEL BASE FOR FUTURE PAVING


PRELIM MEETING WITH
PLANS 3    SPECS     CALCS     SOILS RPTS
ADDITIONAL PERMITS REQUIRED FOR    PLUM      ELEC      MECH
OWNER SCOTT, A.WAYNE                                         DATE 10/29/87
OWNR ADDR P.O.BOX 10799            CITY,ST PORTLAND, OR.       ZIP 97210
BUILDER SCOTT, A.WAYNE                                        LIC #
APPLICANT LOW, JOHN R.                PHONE 297-3786
APPL ADDR 1750NW SKYLINE BLVD.     CITY,ST PORTLAND, OR.       ZIP 97221
PF2 CENSUS DATA PF4 APPLICATION MENU  PF6 FEE CODE MENU   PF8 CAVEATS PF16 TAX
PF3 SUPPLEMENT  PF5 ASSIGN PLAN CHECK PF7 APPROVALS       PF9 NOTES   PRMTA001
                              APPLICATION STATUS              PAGE 1    OF    2

  STREET ADDRESS:  2425  NW ST. HELENS          RD    BLDG:      FLR:
  CONTRACTOR: SCOTT, A.WAYNE
  APPLICANT: LOW, JOHN R.                    PHONE: 297-3786
  TYPE: BLDG DATE REC: 10/29/87 APP NO:    6914   PRMT NO: 88-102141
                                                      DATE DUE:
  DEPT ASSIGNED TO #PLN  DATE OUT DATE IN  CHCK DATE  DATE APPR    I05/23   3
  COMM JE                         05/06/88 11/03/87   05/06/88      PLAN LOC
  PLAN LW                         04/27/88            04/27/88
  GEOT WSF                        05/06/88 03/16/88   05/06/88
  ADMN AM                         05/17/88            05/17/88     JOB NAME
  PLMG AA                         03/30/88            03/30/88
  FIRE DDD                        11/19/87            11/23/87         20000
  DRIV GRA                        05/17/88 12/03/87   05/17/88     VALUATION
  WATR                            11/02/87            11/02/87
  SAN  SSH                        03/25/88 11/30/87   03/25/88     A
  MFEC SLT                        12/01/87            12/01/87     EXAM CLASS
                         SELECT PF KEY FOR DESIRED FUNCTION
PF1  EXAM STATUS          PF5  NEXT PAGE            PF9  ISSUANCE ADD/UPDATE MENU
                          PF6  APPL SEARCH          PF10 APPROVAL UPDATE
PF3  APPL STATUS          PF7  SUBMITTALS           PF11 NOTES MENU
PF4  MAIN MENU            PF8  PROP/STRUCT INFO     PF12 TOTAL FEE CODES
 PR75-175- RECORD SUCCESSFULLY UPDATED                                    PR75
```

4

JOHN McDONALD ENGINEERING
SOILS - CIVIL - GEOTECHNICAL
Ground-Penetrating RADAR
10116 S.E. STANLEY AVENUE
PORTLAND, OREGON 97222
(503) 774-0077

December 6, 1989

City of Portland
Bureau of Buildings
1120 SW Fifth Avenue
Portland, Oregon 97204-1992

Final

Attn: Frederick C. Deis
Special Inspections Coordinator

2425 NW St. Helens Rd

CONTINUING INSPECTIONS AT FTL, INC., SITE, PERMIT #88-102141

A soils investigation report dated November 2, 1989 accompanies this letter. The report covered field observations and tests. It mentioned that more needed to be done with the shallow groundwater cutoff trenches. All during the fall, frequent visits have been made to the site to check for signs of groundwater emergence. The weather has been quite dry and no groundwater had gathered. One location where secondary cutoff trenches had been anticipated to be needed is now planned to be excavated as part of a second phase of the project.

With the latest rainy weather the north end of the groundwater cutoff trench has started to discharge a tiny seep of water. Last year this discharge was quite vigorous and the water just spilled down the cutslope, as the trench had not been completed to the north end of the property. Yesterday I added fifty feet of pipe so that this discharge water could go straight into an existing drainage inlet at the top of the cutslope at the north end of the property.

In addition, a temporary pipe had previously been installed to catch water at a sag in the cutoff trench and lead it back into the cutoff trench at a lower point. This pipe was rehabilitated yesterday and made to work again. The permanent installation calls for a pipe to come straight down the cutslope to meet the drainage system that will be built at the bottom of the slope.

The grass is growing well and is doing its job of holding the surface soil in place. Nevertheless, there are two tiny erosion spots on the cutslope near the north end. One of these is where an excess cut was made and soil was just pushed up to fill it in. The other is where the outlet water from the north end of the groundwater cutoff trench used to discharge. These will be watched and, if needed, water pickups will be installed and soil will be replaced with filter fabric reinforcement.

Overall, the work has been done in substantial conformance with the recommendations. Frequent visits and observations will be continued to make certain that the cutslope performs as it was intended to.

Very truly yours,

REGISTERED PROFESSIONAL ENGINEER 8657 OREGON JULY 8 1966 JOHN K. McDONALD

John K. McDonald

#6914 88-102141
1/4 2825
2425 NW St. Helens
CU 64-89

LUR 91-00106 The Council directs: a. That the Report and Recommendation of the Planning Commission is adopted and incorporated by reference. b. Based on the Report and Recommendation of the Planning Commission and the findings of this Ordinance, the Official Zoning Maps are amended as shown on the maps in Appendix A.