



DATE: February 26, 2007

TO: James Sims / Al Mostowfy MS 125

FROM: Chris Johnson / Nabil Dbaibo / Maher Shebl MS 29

SUBJECT: SR 20 XL-0832
Quiet Cove Road Vic. to SR 20 Spur, Stage 1
MP 44.79
Luminaire Standard Foundations

RECEIVED
MAR 01 2007
STATEWTS LAB

This memorandum provides soil recommendations for the design and construction of the proposed three (3) luminaires along the east side of SR 20 at the intersection with Lunz Road in Skagit County.

The conclusions and recommendations contained in this memorandum are based on the project description, site conditions as they existed at the time of our visit, and subsurface information as determined from our exploratory borings. It is further assumed that the subsurface conditions, as interpreted from the boring logs, are representative of the subsurface conditions at the luminaire locations. If, during construction, subsurface conditions are different from those encountered in the exploratory borings, we should be contacted so we can assist you and the Construction Office and reevaluate our recommendations.

Field Investigation

The field exploration program for the project consisted of drilling three (3) exploratory borings at the proposed luminaire locations. The drilling for the exploratory borings was performed using a CME 45 skid rig with an automatic hammer. The borings were advanced to a maximum depth of 32.0 feet below the ground surface using wet rotary drilling method. At each location, soil samples were obtained using a 2-inch OD, 1.4-inch ID split-spoon sampler. SPTs (Standard Penetration Tests) were performed in general accordance with ASTM Test Method D-1586. SPT values are obtained by driving the split-spoon sampler 18-inches into the soil with a 140-pound hammer using 30-inch drops. The number of blows required to achieve each 6 inches of penetration are recorded. The soil's SPT resistance, or N-value, is calculated as the number of blows required to achieve the final 12 inches of penetration. The drill rig is equipped with an automatic trip hammer to drive the split-spoon sampler. Disturbed soil samples were recovered and visually classified in the field using the Unified Soil Classification System (USCS) in general accordance with ASTM Test Method D-2488.

The Boring Location Plan and logs of the exploratory borings are attached and should be included in the contract documents.

Subsurface Conditions

The soil conditions were interpreted from the exploratory borings performed at the approximate locations of the proposed standard luminaire foundations provided by your office. The borings indicate that the site is underlain by loose sand, loose to medium silty sand with gravel, and loose to medium silt with sand. Detailed descriptions of the soil conditions are included in the attached boring logs, and should be included in the contract documents.

Groundwater was encountered in the borings at a depth varying between 2.0 and 6.0 ft below existing grade at the boring locations. Groundwater levels are also shown on the attached boring logs. It should be expected that the groundwater level will fluctuate with the season as a result of the variation of precipitation and infiltration.

Foundation Design

Luminaire # 1 and 3

Based on the soil conditions encountered in the exploratory borings at the locations of luminaires # 1 and 3, special foundation design is required to support these luminaires. The shafts diameters and depths to support the luminaires should be determined by the Bridge and Structures Office. Based on the results of our investigation, we recommend using the allowable lateral bearing pressure values shown in Table 1.

TABLE 1: Luminaire Foundation

Luminaire No.	Test Hole Number	Station (ft)	Offset (ft)	Depth (ft)	Allowable Lateral Bearing Pressure (psf)	Groundwater Depth (ft)
1	L-1-07	23+44	34' Rt.	0-3	1,900	6.0
				3-8	1,000	
				8-13	1,900	
				13-18	2,300	
				> 18	1,500	
3	L-3-07	26+88	31' Rt.	0-3	1,200	3.5
				3-7	1,100	
				7-25	1,000	
				> 25	1,500	

Luminaire # 2

Based on the soil conditions encountered in the exploratory boring at the location of luminaire # 2, the average allowable lateral bearing pressure meets the minimum required 1,500 psf required for a standard foundation. Therefore a WSDOT Standard foundation

(3-foot diameter shaft with 8-foot embedment) as shown on Light Standard Foundation Plan Sheet included in HQ Design Standards Team Memo dated February 1, 2006 can be used for these three luminaire foundations (copy attached).

Construction Considerations

Groundwater will be encountered during construction of the drilled shafts for the luminaire foundations. Stabilization measures will be required during shaft excavation. These measures could include the use of temporary casing, and could involve the use of slurries and/or the placement of concrete using tremie method. The base of the shaft borings should be cleaned from any loose soil before concrete placement. Excessive loose material left in the bottom of the shaft borings will increase the amount of settlement that occurs, affecting the performance of the signal structures. After placement of the reinforcing steel and concrete, the temporary casing, if used, must be removed so that the shaft can develop its friction resistance from the concrete/soil interface.

Closure

We trust the information contained in this report is sufficient so you can complete the design of your project. If you have any questions or require additional information, contact Nabil Dbaibo at 206-768-5905 or Maher Shebl at 206-768-5915.

CJJ/NTD/MAS:mas

Attachments: Boring Location Plan
Boring Logs

File: SR-20, XL-0832
Serial No: 07-007

cc: Jim Cuthbertson/HQ Mats Lab/MS-47365
Gary Bedi/HQ Bridge/MS-47340



EXPIRES 07/22/08

LUMINAIRE SCHEDULE

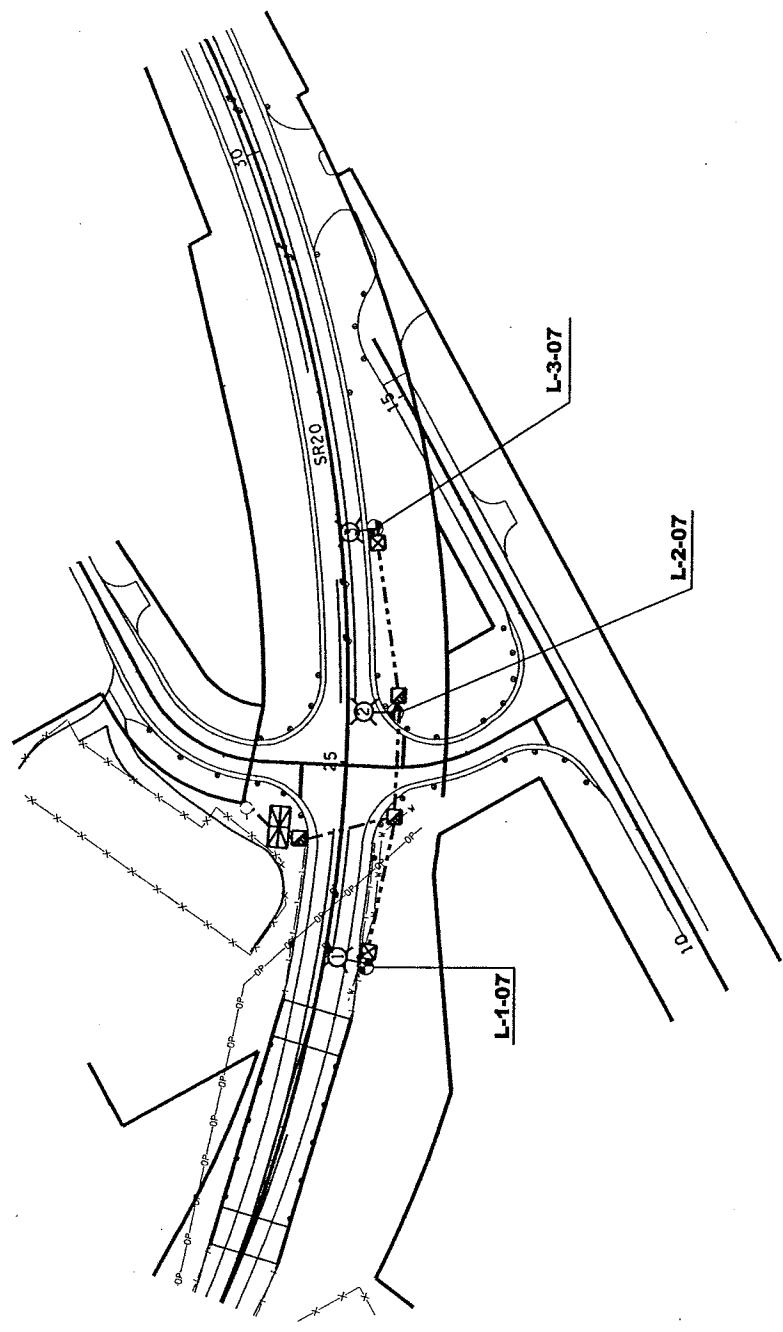
LUMINAIRE NUMBER	CIRCUIT	LOCATION	TYPE-DISTRIBUTION-MOUNTAGE	MAST ARM	H1	BASE TYPE	COMMENTS
1	A	SR 20 23+44	111-MED CUT OFF-400 HPS	16	50	FIXED	
2	A	SR 20 25+42	111-MED CUT OFF-400 HPS	16	50	SLIP	
3	A	SR 20 26+88	111-MED CUT OFF-400 HPS	16	50	SLIP	

BREAKER SCHEDULE

CIRCUIT	DESCRIPTION	BREAKER RATING	CONTACTOR RATING	VOLTAGE	LOAD (KVA)
...	MAIN	200 AMP
A	ILLUMINATION A	15 AMP	30 AMP	240	1.52
B	ILLUMINATION B	30 AMP	30 AMP	240	...
C	ILLUMINATION C	30 AMP	30 AMP	240	...
D	ILLUMINATION D	30 AMP	30 AMP	240	...
E	ILLUMINATION E	30 AMP	30 AMP	240	...
F	SPARE	20 AMP	N/A	120	...
G	SIGNAL	50 AMP	N/A	120	...
H	HEAT STRIP	20 AMP	N/A	120	1.8
I	PHOTOREL	15 AMP	N/A	120	0.1
J	PHOTOREL	15 AMP	N/A	120	0.001
K	PHOTOREL	15 AMP	N/A	120	3.4
BUSWORK SHALL BE RATED AT 250 AMP MINIMUM					1.6
PEAK CONTINUOUS					1.6

WIRING SCHEDULE

WIRING NO.	CONDUCTORS	CIRCUIT	COMMENTS
1	EXISTING 2 # 6	A	ILLUMINATION
2	2 # 6	A	ILLUMINATION
3	3 # 2	A	FUTURE USE
4	3 # 2	A	SOURCE LATERAL



PROJECT INFORMATION

PROJECT NO.	10 WASH
CONTRACT NO.	07A016
LOCATION NO.	

DESIGNER INFORMATION

DESIGNED BY	A. SCHAFF
CHECKED BY	A. MOSTOWY
PROJ. ENGR.	D. VANKAUSKAS
REGIONAL ADM.	L. ENG

DATE

DATE	2/12/2007
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REVISION

REVISION	
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FILE NAME

*****05050505*****

DATE

2/12/2007

DESIGNED BY

A. SCHAFF

CHECKED BY

A. MOSTOWY

PROJ. ENGR.

D. VANKAUSKAS

REGIONAL ADM.

L. ENG

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PROJECT TITLE

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07A016

LOCATION NO.

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PROJECT NO.

10 WASH

CONTRACT NO.

07A016



LOG OF TEST BORING

Start Card SE01555

Job No. XL-0832

SR 20

Elevation ft (m)

HOLE No. L-1-07

Sheet 1 of 2

Project Quiet Cove Rd. to SR-20 Spur.

Driller Verlo Lic# 2615

Site Address _____

Inspector Dan Reed

Start January 29, 2007 Completion January 29, 2007 Well ID# _____

Equipment CME 45 with Autohammer

Station 23+44 Offset 34ft Rt Casing 4

Method Wet Rotary

Northing _____ Easting _____ Latitude _____ Longitude _____

County Skagit Subsection SW1/4 of SE1/4 Section 18 Range 4E Township 34

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft				SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
			10	20	30	40							
0-1	0-0.3	o					3	D-1		Silty SAND with gravel , medium dense, gray, Moist, Homogenous, HCl not tested. Rec:1.5 Ret:1.5			
1-5	0.3-1.5	o					7	D-2		Silty SAND with gravel , loose, gray, Moist, Homogenous, HCl not tested. Rec:1.5 Ret:1.5			
5-10	1.5-3.0	x					5	D-3		SILT slightly elastic, loose, gray, Moist, Stratified, HCl not tested, Mixed soil colors and types. Rec:2 Ret:2 1/29/2007	▽		
10-15	3.0-4.5	x					3	D-4					
15-20	4.5-6.0	x					2	D-5		SILT slightly elastic, medium dense, gray, Moist, Homogenous, HCl not tested. Rec:2 Ret:2			
20-25	6.0-7.5	x					3	D-6		SILT slightly elastic, medium dense, gray, Moist, Homogenous, HCl not tested. Rec:2 Ret:2			
25-30	7.5-9.0	x					2	D-7		SILT slightly elastic, medium dense, gray, Moist, Homogenous, HCl not tested. Rec:2 Ret:2			
30-35	9.0-10.5	x					6	D-8		SILT slightly elastic, medium dense, gray, Moist, Homogenous, HCl not tested. Rec:2 Ret:2			
35-40	10.5-12.0	x					5						
40-45	12.0-13.5	x					6						
45-50	13.5-15.0	x					5						
50-55	15.0-16.5	x					6						
55-60	16.5-18.0	x					5						
60-65	18.0-19.5	x					6						
65-70	19.5-21.0	x					5						
70-75	21.0-22.5	x					6						
75-80	22.5-24.0	x					5						
80-85	24.0-25.5	x					6						
85-90	25.5-27.0	x					5						
90-95	27.0-28.5	x					6						
95-100	28.5-30.0	x					5						

SOIL XL-0832.GPJ SOIL.GDT 2/7/07 7:40:42 A2



Job No. XL-0832 SR 20 Elevation ft (m)

HOLE No. L-2-07

Sheet 1 of 2

Project Quiet Cove Rd. to SR-20 Spur.

Driller Verlo Lic# 2615

Site Address _____

Inspector Dan Reed

Start January 31, 2007 Completion January 31, 2007 Well ID# _____ Equipment CME 45 with Autohammer

Station 25+42 Offset 36ft Rt Casing 4 Method Wet Rotary

Northing _____ Easting _____ Latitude _____ Longitude _____

County Skagit Subsection SW1/4 of SE1/4 Section 18 Range 4E Township 34

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft				SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
			10	20	30	40							
0	0												
1	0.3												
5	1.5												
2	0.6												
10	3.0												
4	1.2												
15	4.5												
5	1.5												
6	1.8												
20	6.0												

SOIL_XL-0832.GPJ SOIL.GDT 2/7/07,7:40:43 A2



LOG OF TEST BORING

Start Card SE01555

Job No. XL-0832 SR 20 Elevation ft (m)

HOLE No. L-3-07

Sheet 1 of 2

Project Quiet Cove Rd. to SR-20 Spur.

Driller Verlo Lic# 2615

Site Address _____

Inspector Dan Reed

Start January 31, 2007 Completion January 31, 2007 Well ID# _____ Equipment CME 45 with Autohammer

Station 26+88 Offset 31ft Rt Casing 4 Method Wet Rotary

Northing _____ Easting _____ Latitude _____ Longitude _____

County Skagit Subsection SW1/4 of SE1/4 Section 18 Range 4E Township 34

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft				SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
			10	20	30	40							
0-1	0-0.3	[Profile]	10				5 4 3 4 (7)	D-1		Well graded SAND , loose, brown, Moist, Homogenous, HCl not tested. Rec:1.5 Ret:1.5			
1-2	0.3-0.6	[Profile]					4 5 7 5 (12)	D-2		Silty SAND with gravel , medium dense, dark brown, Moist, Stratified, HCl not tested, Mixed soil colors and types. Rec:2 Ret:2 1/31/2007	▽		
2-3	0.6-0.9	[Profile]					3 6 4 5 (10)	D-3		Silty SAND with gravel , medium dense, dark brown, Moist, Stratified, HCl not tested. Rec:2 Ret:2			
3-4	0.9-1.2	[Profile]					3 3 4 5 (7)	D-4		Silty SAND with gravel , loose, dark brown, Wet, Homogenous, HCl not tested. Rec:2 Ret:2			
4-5	1.2-1.5	[Profile]					1 2 3 2 (5)	D-5		Silty SAND with gravel , loose, gray, Wet, Homogenous, HCl not tested. Rec:2 Ret:2			
5-6	1.5-1.8	[Profile]					1 2 2 3 (4)	D-6		Silty SAND with gravel , very loose, gray, Wet, Homogenous, HCl not tested. Rec:2 Ret:2			
6-7	1.8-2.1	[Profile]					2 2 3 2 (5)	D-7		Silty SAND with gravel , loose, gray, Wet, Homogenous, HCl not tested. Rec:2 Ret:2			
7-8	2.1-2.4	[Profile]					2 3 2 4 (5)	D-8		SILT slightly elastic, loose, gray, Wet, Stratified, HCl not tested. Rec:2 Ret:2			

SOIL_XL-0832.GPJ SOIL.GDT 27/07:7:40:43 A2



Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft				SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
			10	20	30	40							
7							3 3 3 (6)	D-9		Silty SAND with gravel sand lenses, loose, gray, Wet, Stratified, HCl not tested. Rec:2 Ret:2			
25							3 5 4 5 (9)	D-10		Silty SAND with gravel, loose, gray, Wet, Homogenous, HCl not tested. Rec:2 Ret:2			
30							5 5 6 7 (11)	D-11		Silty SAND with gravel, medium dense, gray, Wet, Homogenous, HCl not tested. Rec:2 Ret:2			
32							4 5 6 5 (11)	D-12		Silty SAND with gravel, medium dense, gray, Wet, Homogenous, HCl not tested. Rec:2 Ret:2			
10										End of test hole boring at 32.0 ft below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data.			
35													
11													
12													
40													
13													
45													

