GEOTECHNICAL INVESTIGATION

LOT 45 OWL CREEK SUBDIVISION
JACKSON, WYOMING

PREPARED
FOR
ROBERT AND DAWN SCHRAMM

PREPARED
BY
NELSON ENGINEERING
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Date 12/10/07
WYOMING

DECEMBER 2007
Project No. 07-298-01

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GENERAL AND PROJECT DESCRIPTION

This report pertains to a geotechnical investigation performed at Lot 45 of the Owl Creek Subdivision, Teton County, Wyoming. The purpose of the investigation was to ascertain subsurface conditions and provide geotechnical recommendations for residential structures. Conceptual site plans provided by TKP Architects of Golden Colorado call for a two level main residence, garage, detached guest residence and paved driveway.

Scope of Services

The scope of services for this investigation was to provide geotechnical recommendations for future construction based on a subsurface investigation and soils laboratory testing. The purpose of the subsurface investigation was to determine subsurface soils and groundwater characteristics. The results of the subsurface investigation and subsequent laboratory testing were utilized in an engineering analysis for foundation recommendations. Slope stability analyses were not conducted, as it is our engineering judgment that the existing slope geometry and material composition indicate stability. Specific recommendations for drainage and surface water conveyance were not within the scope of work for this report.

The foundation analysis and resulting recommendations contained herein are based on typical loads for a two-story residence. In the final design phase of the project, it will be critical that structural loads be properly communicated to the geotechnical engineer to verify that the imposed loading conditions on the proposed foundation configuration do not cause excessive settlement, exceed the bearing capacity of the site soils, or exceed the seismic loading capacity of the foundation elements. Lateral earth pressure recommendations contained within this report are general in nature; it is critical that earth retaining structural designs are reviewed and approved by the geotechnical engineer. For this report, it is assumed that foundation elements would not be subjected to unusual loading conditions such as eccentric loads or vibratory equipment. Unusual load conditions can induce settlement or reduce the bearing capacity of foundation elements.

SITE CONDITIONS

Description

The property is located in the Owl Creek Subdivision in the historic flood plain of the Snake River in central Jackson Hole. A levee system along the Snake River provides flood protection for the area. Currently, the parcel is occupied by a patchwork of meadows and mature cottonwood forest. The lot is bounded by Porter Loop Road on the south and west, undeveloped forest on the north, and a developed residential lot to the east. An unnamed seasonal stream flows north to south through the site and joins the Snake River approximately 2.5 miles to the south. Stream flow is thought to occur in response to flows in both the river and nearby irrigation canals and ditches. Live stream flows is likely extant from late May to late September in most years.

Geologic Mapping

The area's surface geology is mapped on the USGS "Geologic Map of the Teton Village Quadrangle, Teton County, Wyoming," Love, J.D. & Reed, J.C., 2000. Mapped deposits are described as "Q_{ag}-

Gravel Deposits – Gravel deposited along flood channel ways of major streams; composed chiefly of quartzite round stones."

Seismic Hazard

Jackson Hole and the project site are located within the Intermountain Seismic Belt, a zone extending from southern Utah through eastern Idaho and western Montana, and encompassing western Wyoming and the Teton Range (Smith and Arabasz, 1991). Faults active within the Quaternary period indicated on the "Map of Quaternary Faults and Folds in Wyoming" (Machette et al, 2001) near the project site include the Teton, East Gros Ventre, Philips Canyon, Hoback, and secondary faults in the Jackson Hole Valley. In particular, the Teton Fault is thought to be capable of producing major earthquakes of a magnitude of six or greater. The postulated trace of the Teton Fault, as mapped by Love et. al., passes about two miles to the west of the project. Multiple minor earthquakes with epicenters near the site have occurred in recent years (USGS Database).

Seismic Design Parameters

The International Building Code, 2003 Table 1615.1.1 designates site class by determining soil properties in the top 100 feet. Data obtained in this investigation is not sufficient to determine parameters to this depth; therefore, site Class D has been selected per paragraph 1615.1.1. Seismic coefficients and design spectra per the IBC should be determined using Site Class and a Latititude of 43.608° and Longitude of -110.763°.

SITE INVESTIGATIONS

Field Investigations

On November 20, 2007, four test pits were excavated within the lot. Test pit locations are shown on the Test Pit Location Drawing in the Appendix. All test pits were backfilled with excavated material after logging was completed.

Fish Creek Excavation of Wilson, Wyoming, excavated the test pits with a Deere 50D excavator. Darrell Robbins, a staff geologist at Nelson Engineering, logged the test pits and directed the sampling. Soils were classified in the field and logged by the soils engineer. The soil classifications, moisture conditions, and presence of organic or other notable features were recorded in the field logs. Groundwater observations were made at the time of the excavation based on field observations of soil moisture conditions. Field observations are presented on the test pit logs.

The stratification lines shown on the test pit logs represent the approximate boundary between soil types. The actual in-situ transition may be either gradual or abrupt. Due to the nature and depositional characteristics of natural soils and fills, care should be taken in interpolating subsurface conditions beyond the location of the test pits. Soil conditions can change rapidly in both the lateral and vertical directions. Groundwater conditions shown on the logs are only for the dates indicated.

The subsurface conditions were interpreted from the described test pits at the site. The soil properties inferred from the field and laboratory analyses supported by our experience formed the basis for developing our conclusions and recommendations.

Laboratory Investigations

Samples obtained during the field investigation were taken to the laboratory where they were visually classified in accordance with ASTM Test Method D-2487-93. Representative samples were selected for testing to determine the physical properties of the in-place soils and to estimate engineering properties. Engineering properties of concern at this location included bearing capacity, consolidation and settlement characteristics including collapse potential, seismic response, drainage characteristics, and site-specific construction recommendations that are influenced by soil type and condition.

Laboratory testing was conducted to provide additional information to determine the suitability of the soils for use as foundation and subgrade materials and to verify field observations and classification estimates. The finalized laboratory observations were used to: 1) estimate soil strength and compressibility characteristics for bearing capacity determinations, 2) estimate consolidation characteristics, and 3) determine soils properties pertinent to determining the soil profile type for seismic determinations according to the International Building and Residential Code. Specific tests included Atterberg Limits Tests -ASTM D4318, Grain Size Analysis - ASTM C117 & C136, Soil Moisture Content Determinations -ASTM D2216, and Soil Classification - ASTM D2487.

The soil samples stored in our laboratory will be discarded after 30 days from the date this report is submitted unless we receive a specific request to retain them.

SUBSURFACE CONDITIONS

Soil Profiles

Soil profiles in all of the test pits were very similar. Surficial soils in the majority of the test pits consisted of less than one foot of semi-fertile topsoil composed of silt, sand and gravel mixtures. Roots, primarily from mature cottonwoods, were abundant throughout the area to depths of about four feet. Alluvial deposits composed of cobbles, small boulders, gravel and sand extended to the bottom of all of the test pits. In general, the alluvium was dense to very dense with high gravel and cobble fractions.

Groundwater

Although groundwater was not observed during excavation, a clean moist gravel and sand layer was observed at depths ranging from 3-5 feet below ground surface (bgs). This layer was observed in TP-4 to be approximately coincident in depth with bed of the on site seasonal stream. Seasonally, groundwater in the area responds to spring and summer flow increases in the Snake River as well as diversion into irrigation ditches in the general project area. Temporary monitoring wells were installed in TP-1, TP-2 and TP-4 for observation of seasonal groundwater depth fluctuation.

ENGINEERING ANALYSIS AND RECOMMENDATIONS

General

Basements are not recommended due to seasonal shallow groundwater depths. Footing depths of between 2 and 4 feet below existing grade are anticipated. Items presented in the following sections emphasize concerns at depths at and below the anticipated bottom of footer elevation in soils influenced by foundation loading.

Groundwater

A reasonably accurate assessment of peak groundwater elevation at the site can be obtained by measuring water levels in the monitoring wells in June and July. If project schedules do not permit this, we recommend designers assume peak groundwater elevation coincident to the ground surface during flood events. We recommend the installation of a properly designed dewatering system to protect mechanical equipment located in crawlspaces.

Spread Footings

Spread footings bearing on dense cobble and gravel deposits are appropriate foundation elements. A net allowable bearing capacity of **5000 PSF** is appropriate. Where silt and sand soils are encountered at bottom of footing elevation, these soils shall be removed and replaced with structural fill. Existing subgrade shall be compacted to a depth of 8 inches to 95% of maximum density per ASTM D698 (Standard Proctor) beneath all footings.

These calculations assume the following:

- The net allowable soil pressure includes dead load plus maximum live load.
- A maximum total settlement of **0.5 inches** be tolerated on any one footing and the maximum differential settlement between footings that can be tolerated is **0.2 inches.**
- A bottom of footing depth between 2 and 4 feet below existing ground.
- A maximum width of 3 feet was assumed for continuous footings and maximum dimension of 15 feet for isolated footings.

Bearing capacity values and settlement should be checked for each combination of load to determine whether settlement or bearing capacity will control the response of the footing. Foundation elements supporting large concentrated loads should be analyzed on an individual basis to determine settlement and bearing characteristics. Other foundation parameters are as noted below:

1. A one-third increase in allowable bearing capacity may be used for short duration loads such as wind or seismic.
2. Minimum bottom of footing depth of 3.5 feet below final grade for frost protection.
3. Lateral loads may be resisted by friction between the footing base and supporting soil and lateral bearing pressure against the sides of the footings. Design parameters recommended are: a coefficient of friction of 0.45 at the footing base, lateral passive bearing pressure of 225 psf per foot of depth and lateral earth pressure against stem walls of 45 psf per foot of depth.

   Any soil type encountered at the bottom of footing excavations other than the ones described herein, including isolated boulders, should be analyzed by a soils engineer, or removed and replaced with structural fill. Any excessively loose material or soft spots encountered in the footing subgrade will require over-excavation and backfilling with structural fill. All footings shall be suitably reinforced to make them as rigid as possible.

Interior Slabs-On-Grade

In areas where bottom of slab elevation coincides with fine grained softer soils, these soils should be removed and replaced with structural fill. Interior slabs shall be founded upon the following section from top to bottom: 1) 4 inches of crushed base composed of a ¾-inch minus free draining material (WYDOT Grade W or equivalent) compacted to a minimum of 95% of maximum density as determined by ASTM D1557, 2) structural fill placed to achieve grade as necessary, and 3) the upper 8 inches of native dense gravel and cobble subgrade compacted to a minimum of 95% of maximum density as determined by ASTM D698. Any excessively loose material or soft spots encountered in slab subgrade will require over-excavation and backfilling with structural fill. The recommended Modulus for Subgrade Reaction for use in Slab design per "The American Concrete Institute Design of Slabs on Grade, ACI 360R-92" is **300 lbs/in^3**.

Concrete slab-on-grade control joints should be saw-cut as early as possible. Nelson Engineering recommends the use of a soft cut system, which allows saw cutting as soon as the concrete can support foot traffic. Successful crack control is dependent upon proper joint spacing. Control joints should be placed in accordance with current Portland Cement Concrete Paving Association guidelines.

Sidewalks and Exterior Slabs

Sidewalks and exterior concrete slabs for foot traffic shall be placed upon a minimum of 3 inches of ¾-inch minus crushed gravel placed upon a minimum thickness of one foot structural fill or dense native gravels. Native silt, sandy silt, and clay topsoil should be removed and replaced with structural fill. The upper 8 inches of native subgrade must be compacted to a minimum of 95% of maximum dry density per ASTM D698 and inspected. Fill required to increase the elevation of exterior slabs should meet the requirements for granular structural fill. (Refer to the section on structural fill for requirements). All fill material within 2 feet of the slabs must be compacted to a minimum 95% of the maximum density as determined by ASTM D698.

Paved Roadway Recommendations

Structural fill should be used where it is necessary to raise existing grade beneath parking lots and roads. Native silt and sandy silt soils should be removed and replaced under paved areas where encountered. Proper drainage is essential for satisfactory road and parking area performance.

ROADWAY SECTION COMPONENTS	
Asphaltic Concrete	3"
¾" Minus Crushed Aggregate	6"
Structural Fill	18"
Upper 8 inches of native in-place material compacted to 95% of the maximum density determined by ASTM D698.	

CONSTRUCTION CONSIDERATIONS

Earthwork and Site Grading

Excavation work and heavy equipment access will prove difficult when wet conditions exist. Placement of gravel surfacing and/or free-draining native material supported by geotextile may be required to provide reasonable functional access to the construction site during wet weather.

General recommendations for earthwork suitability, placement, and compaction procedures are provided below.

- Within the building footprints and areas to be paved, all organic material, undocumented fill, and debris should be stripped and removed. Loose and disturbed native soils should be scarified, moisture-conditioned, and recompacted. Finish surfaces should be sloped away from foundations per the plans and specifications.

- Fill materials should not be placed, spread, or compacted while the ground is frozen or during unfavorable weather conditions. Fill materials should be at the proper moisture content prior to compaction and should contain no frozen soil.

- **Structural Fill** shall consist of imported or site gravels (USCS classification GW or GP) with the following characteristics: 6 inch maximum particle size with no more than 40% oversize (greater than ¾") and no more than 5% fines passing the #200 sieve.

  Structural fill shall be placed in layers of not more than 8 inches in thickness. Each layer of structural fill should be moisture conditioned to within 2% of optimum moisture content and compacted to a minimum density of 95% of the maximum dry density as determined by ASTM Designation D 698. Maximum density of material containing more than 30% oversize (greater than ¾" diameter) cannot be determined by use of the ASTM Designation D 698. In this case, a field maximum density may be determined by a test strip method. The material shall be compacted at or near optimum moisture content and a field density test shall be taken after each pass of the compaction equipment. This sequence shall continue until the maximum field density is achieved. This maximum field density shall be used for subsequent field compaction tests. Enough density tests should be taken to monitor proper compaction.

- Excavations for retaining walls and foundations should conform to the applicable OSHA and Wyoming safety standards. Over-excavations and utility trenches should be laid back to safe slopes or properly shored. Excavations and shoring operations should be conducted in accordance with the most recent versions of the OSHA Construction Standards for Excavations, Part 1926, Subpart P and Wyoming Public Works Standard Specifications. Safety of construction personnel is the responsibility of the contractor. Excavations for utilities shall be shored if the proper slope cannot be maintained.

- During earthwork phases of the project, a representative of Nelson Engineering should be present to observe exposed native soils and fill materials for suitability and consistency. A documented testing program should be conducted to determine that soil compaction is in accordance with requirements.

- Backfill placed against structures (i.e., pipes and walls) shall be of a character and in a manner that will not damage that structure. In no case shall material greater than 6 inches in diameter bear directly on or against these structures. Placing oversized material against rigid surfaces can damage the structure and interferes with proper compaction.

GENERAL COMMENTS

The structural engineer and other project designers should review this report. When project plans and specifications are complete, a consultation with this office should be arranged to ensure compliance with this report. Additional or supplementary recommendations with regards to foundations and earthwork may be required at this time. Monitoring and testing should also be performed to verify that suitable materials are used for structural fills and backfills, and that fills are properly placed and compacted. Concrete testing and special inspection should be performed prior to and during placement of all concrete to ensure concrete and reinforcing steel bar comply with project plans and specifications.

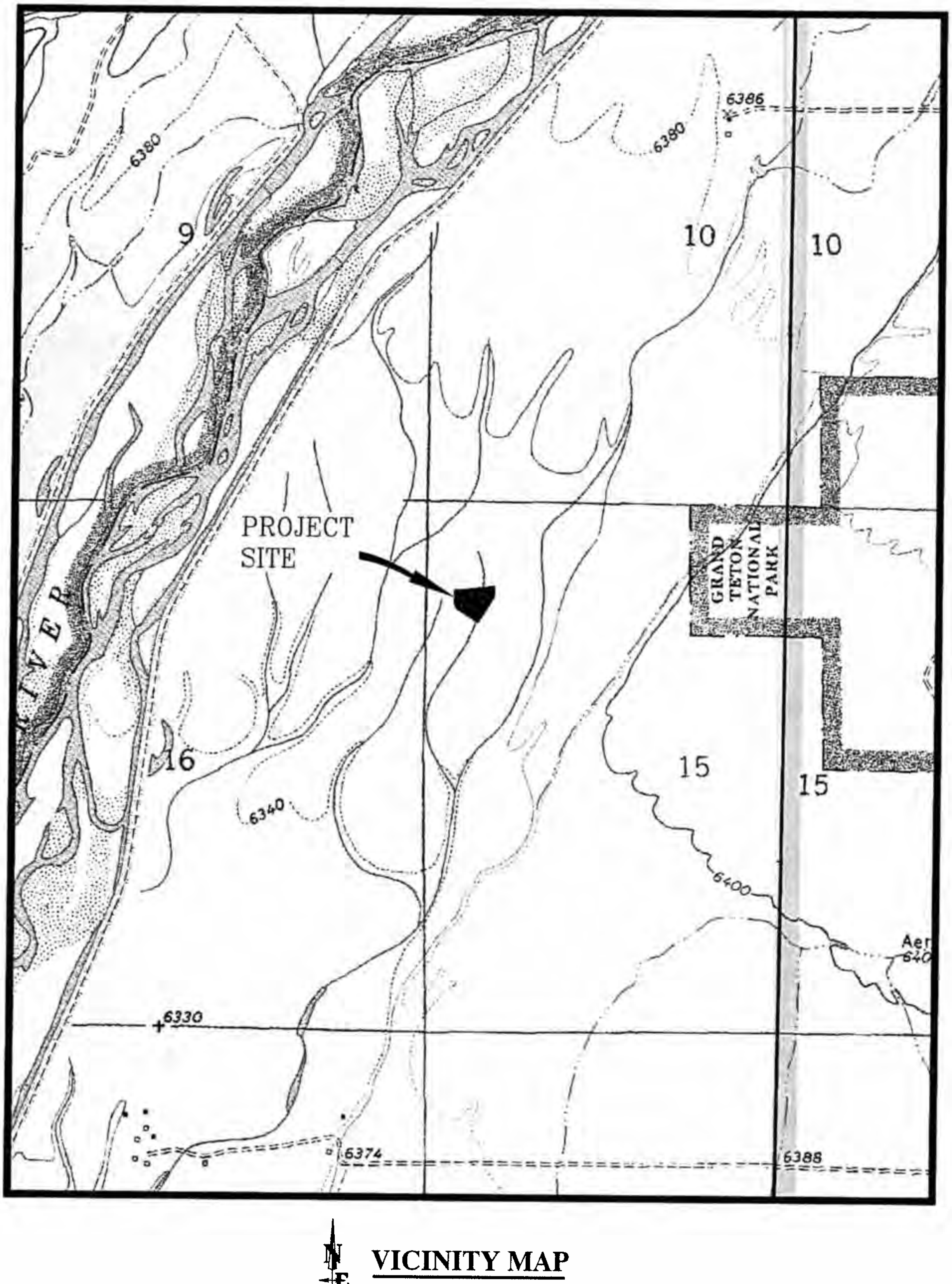
WARRANTY AND LIMITING CONDITIONS

The field observations and research reported herein are considered sufficient in detail and scope to form a reasonable basis for the purposes cited above. Nelson Engineering warrants that the findings and conclusions contained herein have been promulgated in accordance with generally accepted professional engineering practice in the fields of foundation engineering, soil mechanics, and engineering geology, only for the site described in this report. No other warranties are implied or expressed.

These engineering methods have been developed to provide the client with information regarding apparent or potential engineering conditions relating to the subject property within the scope cited above and are limited to the conditions observed at the time of the site visit and research. There is a distinct possibility that conditions may exist which could not be identified within the scope of the investigation or which were not apparent during the site investigation. The report is also limited to the information available at the time it was prepared. In the event additional information is provided to Nelson Engineering following this report, it will be forwarded to the client in the form received for evaluation by the client. This report was prepared for use by Robert and Dawn Schramm, in Conifer, Colorado ("Client") and the conclusions and recommendations presented in this report are based on the agreed-upon scope of work outlined in the report and the contract for professional services between Client and Nelson Engineering ("Consultant"). Use or misuse of this report, or reliance upon the findings hereof by any parties other than the Client, is at their own risk. Neither the Client nor Consultant may make any representation of warranty to such other parties as to the accuracy or completeness of this report or the suitability of its use by such other parties for any purpose whatsoever, known or unknown, to the Client or Consultant. Neither Robert and Dawn Schramm nor Nelson Engineering shall have any liability to, or indemnifies or holds harmless third parties for any losses incurred, by the actual or purported use or misuse of this report. No other warranties are implied or expressed.

APPENDIX

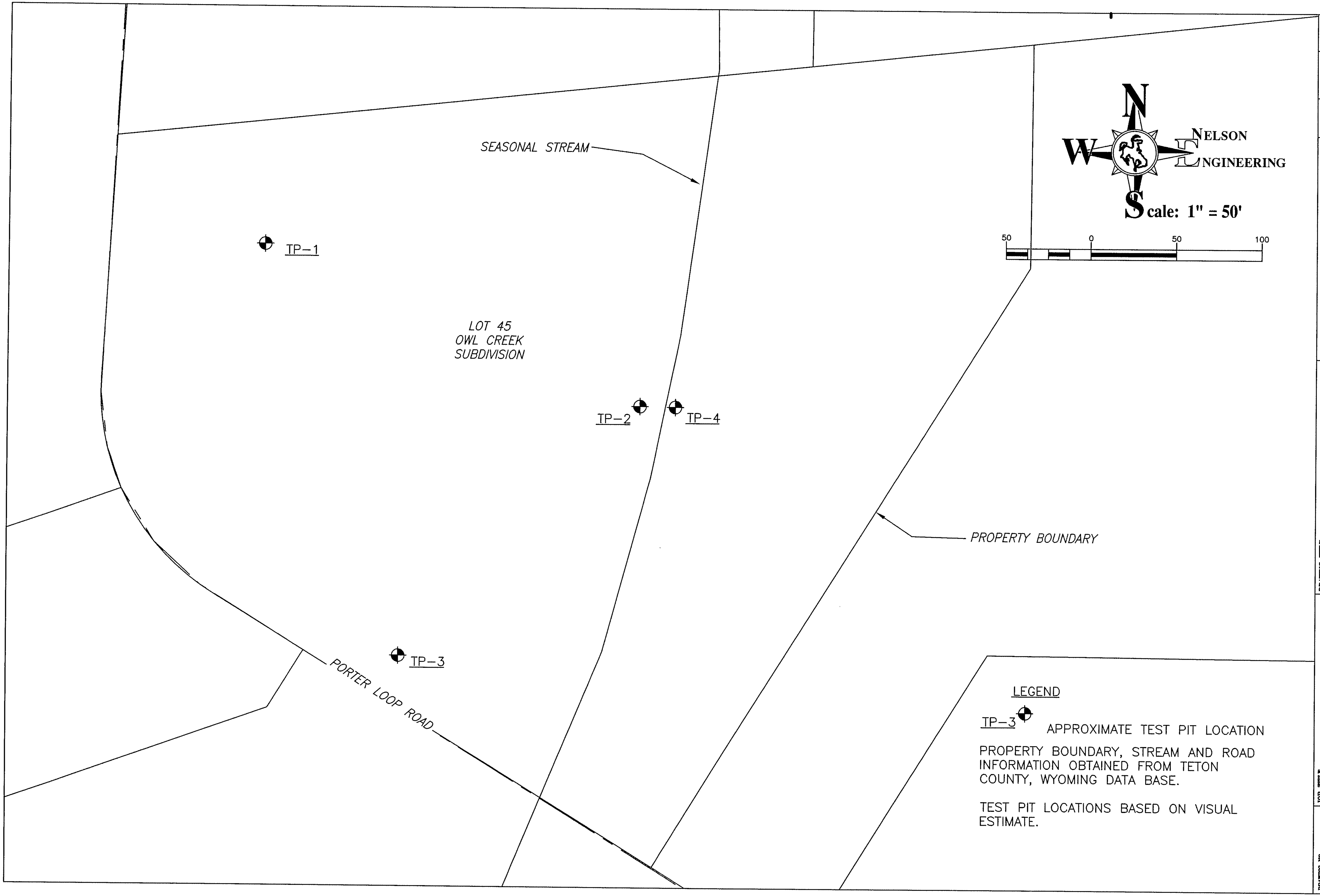
DRAWINGS



VICINITY MAP

SCALE: 1"=1500'

DRAWING NO 1	TITLE LOT 45 OWL CREEK GEOTECHNICAL INVESTIGATION SITE VICINITY MAP	NELSON ENGINEERING P.O. BOX 1599, JACKSON WYOMING (307) 733-2087	DATE	12/5/2007	REV.
JOB NO 07-298-01			SURVEYED		
			DRAWN	DR	
			CHECKED	PG	
			APPROVED		



LEGEND

TP-3 ⊕ APPROXIMATE TEST PIT LOCATION

PROPERTY BOUNDARY, STREAM AND ROAD INFORMATION OBTAINED FROM TETON COUNTY, WYOMING DATA BASE.

TEST PIT LOCATIONS BASED ON VISUAL ESTIMATE.

REV.	12/6/07
DATE	
SURVEYED	N/A
DRAWN	DR
CHECKED	
APPROVED	PG/DR

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DRAWING TITLE
TEST PIT SKETCH MAP

JOB TITLE
LOT 45 OWL CREEK
GEOTECHNICAL INVESTIGATION

DRAWING NO
2

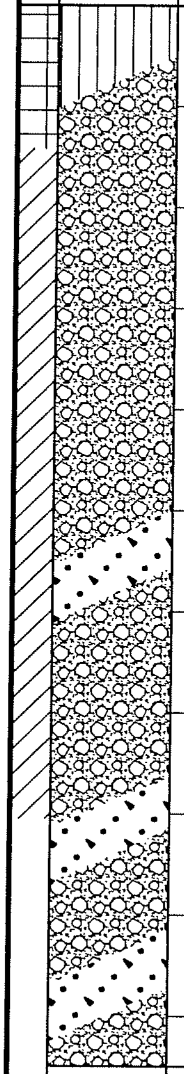
JOB NO
07-298-01

TEST PIT LOGS

PROJECT NAME: **LOT 45 OWL CREEK SUBDIVISION**
DATE STARTED / FINISHED: **11/20/2007**
LOGGED BY: **DLR**
BOREHOLE LOCATION/ELEVATION: **SEE TEST PIT LOCATION MAP**

TEST PIT No. 2 PAGE: **1**
OPERATOR: **FISH CREEK EXCAVATION**
EXCAVATOR TYPE: **DEERE 50D MINI EXCAVATOR**

This log is part of a report prepared by Nelson Engineering for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with passage of time. The data presented is a simplification of actual conditions encountered.



DEPTH (FT)	SAMPLES UNDISTURBED	SAMPLES BULK	SAMPLE ID	MATERIAL DESCRIPTION	LIQUID LIMIT	PLASTIC LIMIT	DRY DENSITY (PCF)	MOISTURE (%)	REMARKS
				0'-0.5' MOIST, DARK BROWN, SANDY SILT WITH OCCASIONAL GRAVEL, (TOPSOIL), HIGH ROOT DESNITY (UP TO 2 INCH DIAMETER)					FLOOD PLAIN COTTON WOOD AND PINE FOREST, HIGH ROOT DENSITY TO ~ 4 FT
				SLIGHTLY MOIST, BROWN, SANDY GRAVEL, GW, VERY DENSE					MODERATE ROCKY DIGGING FROM GROUND SURFACE TO BOP
4		☒	TP2-1 4-4.5'	MOIST, BROWN, GRAVEL (GW), ALLUVIUM, VERY DENSE, (CLEAN WITH FEW FINES INDICATION OF SEASONAL HIGH GROUNDWATER LEVEL)		NP		0.8	MODERATE WALL CAVING 3 FT TO BOP
				5'-BOP INTERBEDDED MOIST, BROWN, GRAVEL AND GRAVELLY SAND, VERY DENSE, ~10-20% COBBLES (GRAVELS DOMINATE, ~70% GRAVEL - 20% GRAVELLY SAND) GRAPHIC LOG DISPLAYS APPROXIMATE LOCATION OF INTERBEDS					
10				BOP=10.5' GROUNDWATER NOT ENCOUNTERED MONITORING WELL INSTALLED, 1.25" DIAMETER PVC 8' BELOW GROUND SURFACE 2' STICK UP SCREENED FROM 8' TO 1' BGS					

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CLIENT: **DAWN & ROBERT SCHRAMM**
CONIFER, COLORADO

JOB NO. 07-298-01

PROJECT NAME: **LOT 45 OWL CREEK SUBDIVISION**
DATE STARTED / FINISHED: **11/20/2007**
LOGGED BY: **DLR**
BOREHOLE LOCATION/ELEVATION: **SEE TEST PIT LOCATION MAP**

TEST PIT No. 3 PAGE: **1**
OPERATOR: **FISH CREEK EXCAVATION**
EXCAVATOR TYPE: **DEERE 50D MINI EXCAVATOR**

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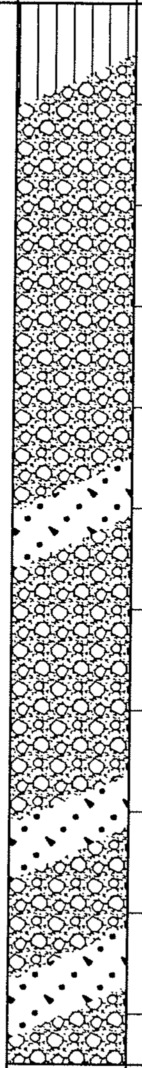
WELL LOG	GRAPHICS LOG	DEPTH (FT)	SAMPLES UNDISTURBED	SAMPLES BULK	SAMPLE ID	MATERIAL DESCRIPTION	LIQUID LIMIT	PLASTIC LIMIT	DRY DENSITY (PCF)	MOISTURE (%)	REMARKS
						0'–0.5' MOIST, DARK BROWN, SANDY SILT WITH OCCASIONAL GRAVEL, (TOPSOIL), HIGH ROOT DENSITY (UP TO 2 INCH DIAMETER)					FLOOD PLAIN COTTON WOOD AND PINE FOREST, HIGH ROOT DENSITY TO ~ 4 FT
		1									
		2				SLIGHTLY MOIST BROWN, SANDY GRAVEL, GW, VERY DENSE					MODERATE ROCKY DIGGING FROM GROUND SURFACE TO BOP
		3		☒	TP3–1 4–4.5'	MOIST, BROWN, GRAVEL (GW), ALLUVIUM, VERY DENSE, (CLEAN WITH FEW FINES INDICATION OF SEASONAL HIGH GROUNDWATER LEVEL)					
		4				4.5'–BOP INTERBEDDED MOIST, BROWN, GRAVEL AND GRAVELLY SAND, VERY DENSE, ~10–20% COBBLES (GRAVELS DOMINATE, ~70% GRAVEL – 20% GRAVELLY SAND)					MODERATE WALL CAVING 2.75 FT TO BOP
		5				GRAPHIC LOG DISPLAYS APPROXIMATE LOCATION OF INTERBEDS					
		6									
		7									
		8									
		9									
		10									
						BOP=10.5' GROUNDWATER NOT ENCOUNTERED MONITORING WELL INSTALLED, 1.25" DIAMETER PVC 8' BELOW GROUND SURFACE 2' STICK UP SCREENED FROM 8' TO 1' BGS					
		11									
		12									
		13									
		14									
		15									

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CLIENT: **DAWN & ROBERT SCHRAMM**
CONIFER, COLORADO

JOB NO. 07-298-01

PROJECT NAME: **LOT 45 OWL CREEK SUBDIVISION**
DATE STARTED / FINISHED: **11/20/2007**
LOGGED BY: **DLR**
BOREHOLE LOCATION/ELEVATION: **SEE TEST PIT LOCATION MAP**

TEST PIT No. 4 PAGE: 1
OPERATOR: **FISH CREEK EXCAVATION**
EXCAVATOR TYPE: **DEERE 50D MINI EXCAVATOR**

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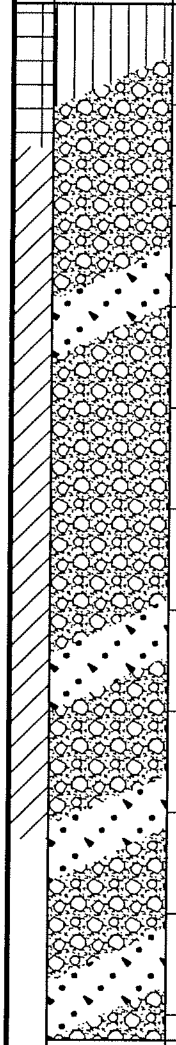
WELL LOG / GRAPHICS LOG



DEPTH (FT)	SAMPLES: UNDISTURBED	SAMPLES: BULK	SAMPLE ID	MATERIAL DESCRIPTION	LIQUID LIMIT	PLASTIC LIMIT	DRY DENSITY (PCF)	MOISTURE (%)	REMARKS
0				0'–0.5' MOIST, DARK BROWN, SANDY SILT WITH OCCASIONAL GRAVEL, (TOPSOIL), HIGH ROOT DENSITY (UP TO 2 INCH DIAMETER)					FLOOD PLAIN COTTON WOOD AND PINE FOREST, HIGH ROOT DENSITY TO ~ 4 FT
1				SLIGHTLY MOIST, BROWN, SANDY GRAVEL, GW, VERY DENSE					
2									MODERATE ROCKY DIGGING FROM GROUND SURFACE TO BOP
3				2.5'–BOP INTERBEDDED MOIST, BROWN, GRAVEL AND GRAVELLY SAND, VERY DENSE, ~ 10–20% COBBLES, (GRAVELS DOMINATE, ~70% GRAVEL – 20% GRAVELLY SAND) (INCREASED MOISTURE @ 2.5FT ~ COINCIDENT WITH BOTTOM OF ADJACENT SEASONAL STREAM)					
4									MODERATE WALL CAVING 3 FT TO 8 FT
5		☒	TP2-1 5–5.5'	MOIST, BROWN, GRAVEL (GW), ALLUVIUM, VERY DENSE, (CLEAN WITH FEW FINES INDICATION OF SEASONAL HIGH GROUNDWATER LEVEL)					
6				GRAPHIC LOG DISPLAYS APPROXIMATE LOCATION OF INTERBEDS					
7									CATASTROPHIC WALL CAVING 8 FT TO BOP
8									
9									
10				BOP=10.25' GROUNDWATER NOT ENCOUNTERED MONITORING WELL INSTALLED, 1.25" DIAMETER PVC 8.25' BELOW GROUND SURFACE 1.0' STICK UP SCREENED FROM 8.25' TO 0.5' BGS					
11									
12									
13									
14									
15									

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CLIENT: **DAWN & ROBERT SCHRAMM**
CONIFER, COLORADO

JOB NO. 07-298-01

GENERAL GEOTECHNICAL NOTES

SPT values given in the logs are corrected for overburden utilizing the Liao and Whitman (1986) method for overburden pressure greater than 500PSF, Skempton (1986) method for overburden pressures less than 500 PSF

DRILLING, SAMPLING, SOIL PROPERTIES ABBREVIATIONS AND SYMBOLS

N: Standard Penetration Test number
U_c: Unconfined compressive strength, Pounds/ft^2 (PSF)
Pp: Pocket Penetrometer values, Ton/ft^2 (TSF)
FILGC: Fragments indicate gravels and cobbles larger than split spoon diameter.
w: Water content, %
LL: Liquid limit, %
PI: Plasticity index, %
γd: In-situ dry density, lbs/ft^3 (PCF)
▼: Ground water level
SS: Split-Spoon Sample
ST: Shelby Tube Sampler
CS: Cylindrical Brass Lined Sample
▨ Monitoring Well, diagonal hatching indicates screened interval

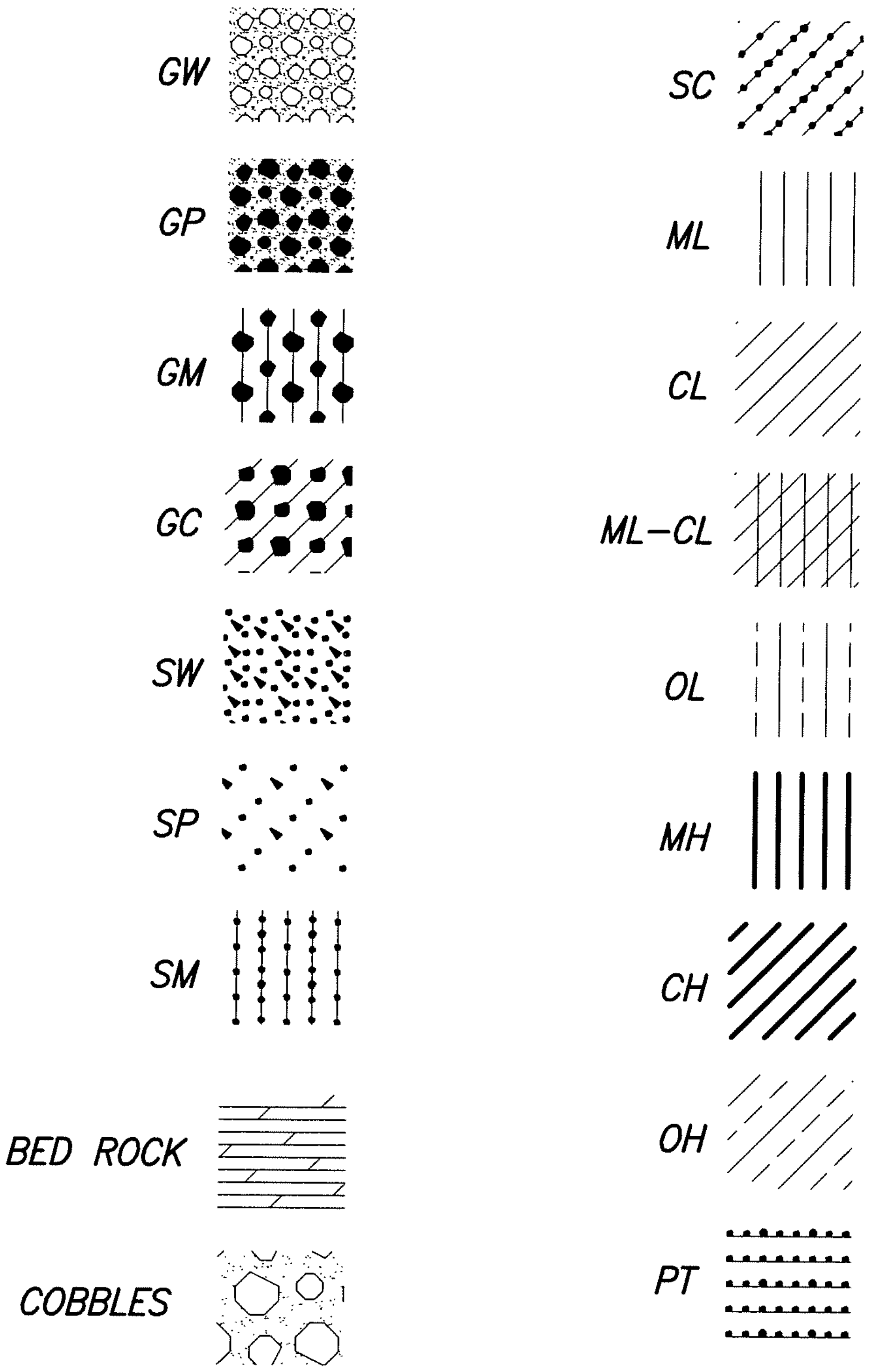
RELATIVE DENSITY AND CONSISTENCY CLASSIFICATION

Non-Cohesive Soils	Standard Penetration	Cohesive Soils	Pp-(tons/ft^2)
Very Loose	0 - 4	Very Soft	0 - 0.25
Loose	4 - 10	Soft	0.25 - 0.50
Slightly Compact	8 - 15	Firm (Medium)	0.50 - 1.00
Medium Dense	10 - 30	Stiff	1.00 - 2.00
Dense	30 - 50	Very Stiff	2.00 - 4.00
Very Dense	50+	Hard	4.00+

PARTICLE SIZE

Boulders:	8 in.+	**Coarse Sand:**	5 mm(#4)-0.6 mm(#30)	**Silts:**	0.074mm(#200) -0.005mm
Cobbles:	8 in.-3in.	**Medium Sand:**	0.6 mm(#30)-0.2mm(#80)		
Gravel:	3in.-5mm(#4)	**Fine Sand:**	0.2mm(#80)-0.074mm(#200)	**Clays:**	0.005mm & Smaller

SOIL GRAPHICS



NOTE: ANGLED DEMARCATIONS ON THE LOGS INDICATE APPROXIMATE OR POORLY DEFINED BOUNDARIES BETWEEN SOIL TYPES.

NELSON ENGINEERING

P.O. BOX 1599, JACKSON WYOMING (307) 733-2087

Soil Classification Report

Nelson Engineering
P.O Box 1599
430 South Cache
Jackson, WY 83001
(307) 733-2087

Project:	Lot 45 Owl Creek		Sampled By:	DR
Job Number	07-298-01		Date:	
Sample ID:	TP 2-1		Tested By:	SM
Visual ID:	Gravelly sand		Date:	11/28/2007

Standard Sieve No.	Particle Size (mm)	Tare Weight (g)	Sample + Tare (g)	Sample Weight (g)	Cumulative % Retained	Percent Passing
6"	150	113.4	113.43	0.00	0.0%	100.0%
3"	75	113.4	113.43	0.00	0.0%	100.0%
1 1/2"	38	113.4	1462.20	1348.77	51.7%	48.3%
3/4"	18.75	113.4	900.52	787.09	81.8%	18.2%
#4	4.75	113.4	389.88	276.45	92.4%	7.6%
#10	2.00	113.4	158.34	44.91	94.2%	5.8%
#40	0.425	113.4	191.03	77.60	97.1%	2.9%
#200	0.075	113.4	180.31	66.88	99.7%	0.3%
Pan	0	113.4		7.83	100.0%	0.0%
		Total Weight of Sample (g)		**2609.5**		

Moisture Content	
Wet Wt + Tare (g)	2745.4
Dry Wt. + Tare (g)	2723.3
Wt of Water (g)	22.1
Tare Wt. (g)	113.8
Dry Wt. (g)	2609.5
Moisture Content	0.8%
Wash	
Wet Wt. + Tare (g)	2745.4
Pre Wash Dry (g)	2609.5
Post Wash Dry (g)	2601.0
Tare Wt. (g)	113.8
Wt.Of Minus #200 =	7.8

Soil Classification: Well-graded Gravel (GW)

Gravel	**92%**
Sand	**7%**
Fines	**0%**

In-Situ Moisture Content	**0.8%**

Particle Size	
D60=	**35**
D30=	**28**
D10=	**8**
Cu=	**4**
Cc=	**3**