SUBMITTED TO:
Ausenco Engineering
Canada, Inc.
855 Homer St.
Vancouver, B.C., Canada
V6B 2W2

BY:
Shannon & Wilson, Inc.
400 N. 34th Street, Ste. 100
Seattle, WA 98103

(206) 632-8020
www.shannonwilson.com

Ausenco Doc Number: 101051-05-RPT-0086_Rev 0
BHP Doc Number: 40600-GE-RPT-00102_ Rev 0
29-March-2019
Approved for Use

GEOTECHNICAL DATA REPORT

BHP Potash Export Terminal

HOQUIAM, WASHINGTON

SHANNON & WILSON

March 29 2019
Shannon & Wilson No: 101575-004

Submitted To: Ausenco Engineering Canada, Inc.
855 Homer St.
Vancouver, B.C., Canada V6B 2W2
Attn: Mr. Michael Sweeney, PEng

Subject: GEOTECHNICAL DATA REPORT, BHP POTASH EXPORT TERMINAL, HOQUIAM, WASHINGTON

Shannon & Wilson participated in this project as a subconsultant to Ausenco Engineering Canada, Inc. Our scope of services was specified in our agreement with Ausenco dated October 1, 2018.

We appreciate the opportunity to be of service to you on this project. If you have questions concerning this report, or we may be of further service, please contact us.

Sincerely,

SHANNON & WILSON, INC.

Oliver Hoopes
2019.03.29 16:14:24
-07'00'

Oliver T. Hoopes, PE
Senior Geotechnical Engineer

BMC:OTH:RAM/oth

CONTENTS

1 Introduction 1
2 Site and Project Description 1
3 Field Explorations 2
3.1 Utility Clearance 2
3.2 Borings 2
3.3 Soil Sampling 3
3.4 Boring Logs 4
3.5 Cone Penetrometer Testing (CPT) 5
3.6 Groundwater Observation 5
3.7 Existing Geotechnical Data 6
4 Laboratory Testing 6
5 Subsurface Conditions 6
5.1 Geologic Setting 7
5.2 Geologic Units 7
5.3 Subsurface Conditions 8
5.4 Groundwater Conditions 8
6 Closure 9
7 References 9

Tables

Table 1: Exploration Summary

Figures

Figure 1: Vicinity Map
Figure 2: Site and Exploration Plan
Figure 3: Generalized Subsurface Profile A-A'
Figure 4: Generalized Subsurface Profile B-B'
Figure 5: Generalized Subsurface Profile C-C'

Appendices

Appendix A: Boring and CPT Logs
Appendix B: Groundwater Level Observations

Appendix C: Existing Subsurface Data
Appendix D: Geotechnical Laboratory Testing
Important Information

CONTENTS

ACRONYMS

cm	centimeter
CPT	Cone Penetrometer Test
GUS	Gregory Undisturbed Sampler
I.D.	inner diameter
ISE	In Situ Engineering
kg	kilogram
km	kilometer
m	meter
NOAA	National Oceanic and Atmospheric Administration
O.D.	outer diameter
Project	BHP Potash Export Terminal Project
SBT	soil behavior type
SCPT	seismic Cone Penetrometer Test
SPT	Standard Penetrometer Test

1 INTRODUCTION

This Geotechnical Data Report presents field exploration data for the BHP Potash Export Terminal Project (Project), located in Hoquiam, Washington. The purpose of this report is to present factual findings from past and current field explorations, field testing, and laboratory testing collected at and near the Project.

This report was prepared for the exclusive use of Ausenco and BHP Billiton Canada Inc., the Project owner. The scope of the field explorations was based on the current conceptualization of the project and discussions with Ausenco and BHP about their scope, schedule, and budget goals. This report should be made available to prospective contractors to develop their bids to build or construct the Project; however, the information provided in the report is based on factual data only and not as a warranty of subsurface conditions. Unanticipated subsurface conditions are commonly encountered, and subsurface conditions cannot be fully determined by merely taking samples from borings and performing in situ tests. Additional geotechnical exploration may be required and/or desired by BHP or contractors to assess and mitigate design, construction, and operational risks identified as the Project is advanced through final design and construction.

2 SITE AND PROJECT DESCRIPTION

BHP proposes to develop the site as a potash export terminal supplied by an existing rail network. The proposed Project is located about 2.5 kilometers (km) west of downtown Hoquiam, near an existing wood pulp mill and Terminal 3 on the north shore of Grays Harbor (see Figure 1). The approximately 650-meter (m)-long by 500-m-wide site was previously part of a log storage and handling area for a pulp mill. It is bordered on the west by the City of Hoquiam's wastewater treatment facilities and wildlife viewing area. The east side of the site is bordered by an active pulp mill and export operation.

In general, the potash export terminal will be constructed as a bulk receiving, storage, and export facility. Our understanding of the facility is based on the site plan provided by Ausenco (Drawing 40600-L0-DWG-00033-C, Rev C). Components of the facility and related infrastructure evaluated in this report include the following:

- Product unloading facility and unloading pit (onshore structure)
- Product storage building (onshore structure) with provision for an adjacent storage building
- Product stacking and reclaiming conveyor (onshore structure)

- Administration and maintenance buildings (onshore structure)
- Transfer towers (onshore and offshore structures)
- Offshore berthing and mooring facilities (offshore marine structure) including:
  - 300-m-long access road trestle
  - Service platform
  - Transfer tower
  - Pivot structure for quadrant shiploader
  - Four-leg and two-leg quadrant supports
  - Mooring and berthing dolphins
- Overpass
- Rail loop track
- Infiltration or storage ponds
- Maintenance and administration buildings

Figure 2 presents a site plan showing the location of the proposed design elements and structures.

3 FIELD EXPLORATIONS

We reviewed existing surficial and subsurface information and performed additional explorations to develop our understanding of the subsurface conditions at the site. Existing exploration information comes from two previous studies performed by Shannon & Wilson at the Project site. New explorations include geotechnical borings, observation wells, and cone penetrometer tests (CPTs). Figure 2 shows the locations of both existing and new field explorations performed at the site.

The boring designation, date completed, depth, approximate ground surface elevation, type of drill rig, and other details for each of the current explorations are summarized in Table 1.

3.1 Utility Clearance

Each boring location was checked for utility conflicts using existing utility maps, a private utility locating service, and One-Call utility locates.

3.2 Borings

We completed eight onshore geotechnical borings, three overwater geotechnical borings, and two observation well borings to characterize the subsurface conditions at the Project site. Boring depths ranged from 6 to 57 m. Holt Services, Inc. performed the borings under subcontract to Shannon & Wilson. All 11 geotechnical borings were advanced using mud rotary drilling techniques. Two geotechnical borings (H-01A-18 and H-06A-18) and the two observation well borings (OB-01-18 and OB-02-18) were advanced using hollow-stem auger drilling techniques. A Shannon & Wilson field representative observed the drilling and sampling of the borings.

The eight onshore mud rotary borings were completed using truck-mounted Mobile Drill B-58 and track-mounted Mobile Drill B-57 drill rigs. Mud rotary drilling involves circulating bentonite slurry drilling mud from a tank at the ground surface, down the drill rods, out through the 12.5-centimeter (cm)-diameter tricone bit, up the annulus of the hole between the drill rods and borehole sidewalls carrying drill cuttings with it, and back into the mud tank. The drilling mud also serves to cool the drill bit and provide hydrostatic pressure to stabilize the borehole wall.

The three overwater mud rotary borings (H-03-18, H-04-18, and H-05-18) were completed using a truck-mounted Mobile Drill B-58 drill rig secured to an approximately 15-m by 24-m barge operated by Quigg Brothers, Inc. Casing was lowered through a hole in the barge deck, the water column, and then seated approximately 1.5 meter into the sediment below to prevent loss of drilling fluid and maintain hole stability. The elevation of the sea floor where drilling commenced was established by measuring the length of casing required to reach the sea floor from the barge deck, measuring the distance from the barge deck to the top of the barge spuds, and collecting surveyed elevations of the top of the barge spuds from Goldsmith Engineering, Inc., who conducted the survey of the Project site. These three measurements allowed us to estimate the mudline borehole elevation.

The hollow-stem auger borings were completed using a track-mounted Mobile Drill B-57 drill rig. Hollow-stem auger drilling uses 20-cm outer-diameter (O.D.), 11-cm inner-diameter (I.D.) auger flights with a bit on the bottom flight to break up and pull drill cuttings up and out of the boring.

3.3 Soil Sampling

Samples were obtained at the depths shown on the boring logs by conducting a Standard Penetration Test (SPT) or by collecting undisturbed tube samples.

The SPTs were performed following the procedures outlined in ASTM Designation D1586, Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils (ASTM, 2011). To obtain samples in mud rotary borings, the tricone bit is removed from the end of the drilling rods and a 5-cm O.D., 3.5-cm I.D., 61-cm-long split-spoon sampler is attached and lowered to the bottom of the hole. To obtain samples in hollow-stem auger borings, the same sampler type is lowered through the hole in the stem of the auger flights to the bottom of the hole. The sampler is driven with a 63.5-kilogram (kg) hammer falling freely through a height of 76 cm. The number of blows required to achieve each of three 15-cm increments of sampler penetration is recorded. The number of blows required to cause the last 30 cm of penetration is termed the Standard Penetration Resistance (N-value). When penetration resistances exceeded 50 to 100 blows for 15 cm or less of penetration, the test was typically terminated, and the number of blows was recorded on the boring log along with the penetration distance. The SPT N-value is a useful parameter for determining the relative density or consistency of the soils. The relationship between relative density or consistency and N-value is shown in Appendix A, Figure A-1. SPTs were typically performed at 0.75 m intervals in the upper 6 m of each borehole, followed by 1.5-m intervals thereafter. The recorded N-values are included in the boring logs in Appendix A.

Collection of undisturbed thin-walled tube samples was performed following the procedures outlined in ASTM Designation D1587, Standard Practice for Thin-Walled Tube Sampling of Soils for Geotechnical Purposes (ASTM, 2015). To obtain samples, the tricone bit is removed from the end of the drilling rods and a 76- to 91-cm-long, 6.5-cm I.D. steel tube is attached either directly to the drill rods (Shelby tube) or to a Gregory Undisturbed Sampler (GUS)-type piston sampler and lowered to the bottom of the hole. The tube is then pushed into the soil either by direct pressure from the drill rods in the case of the Shelby tube or by a piston extruded using water pressure from the drill rig. The GUS-type piston sampler was used in moderately cohesive soils when sample recovery with the basic Shelby tube was not possible. The tube was then pulled back out of the hole, caps were placed on both ends, and the tube was labeled and sealed with tape to maintain in situ moisture content. Undisturbed tube samples were collected for use in one-dimensional consolidation testing.

3.4 Boring Logs

The current Project boring logs are presented in Appendix A. The boring logs graphically shows the geologic units (layers) encountered in the boring as well as the Unified Soil Classification System symbol of each geologic layer, the natural water content, penetration resistance, percent fines, and the Atterberg Limits of soil samples at depths where tests were performed. Other information shown in the boring logs includes the most recent groundwater level measurement, ground surface elevation, coordinates, and types and depths of sampling. A soil description and log key for the current boring logs is presented in Appendix A, Figure A-1.

Our boring logs include interpreted geologic units for each soil layer. We based our geologic interpretations on review of the samples and the available geologic maps for the

Project area. These geologic soil units are interpretive and are based on the grouping of complex sediments and soil types into units.

3.5 Cone Penetrometer Testing (CPT)

We completed four seismic cone penetrometer tests (SCPTs) and four CPTs at the site in two separate campaigns to further characterize subsurface conditions. In Situ Engineering (ISE), under subcontract to Shannon & Wilson, completed the CPTs using a truck-mounted Mack CH600 rig. The CPT develops a continuous subsurface profile at a particular location but does not retrieve a soil sample for laboratory testing. The CPTs ranged in depth from 30 to 46 m below ground surface.

The CPTs were performed by advancing a steel rod with an instrumented cone tip into the subsurface at a relatively constant rate of approximately 2 cm per second. As the cone penetrates through the soil, measurements of tip resistance, sleeve friction, and pore pressure are recorded at 5-cm intervals. In four of the CPTs (CPT-5, -7, -8, and -9), penetration was suspended to perform pore pressure dissipation tests.

Seismic tests were performed in four of the CPTs (CPT-1, -2, -3, and -4) at approximately 2-m intervals during penetration of the probe into the ground. In this test, a steel H-beam is pinned between the ground and the hydraulic jacks on the CPT rig. After advancing the cone tip to a selected depth, advancement is stopped and the cone tip is maintained at that depth. The H-beam is then hit on each side with an instrumented hammer, thus creating shear waves. A geophone located within the cone tip measures the resulting shear wave at the cone tip. Using this data, shear wave velocities of the soil can be estimated using a pseudo-time interval method.

ISE interpreted the CPT data and developed logs for each test. These logs are included in Appendix A. The plots show corrected cone tip resistance, friction ratio, pore pressure, and soil behavior type (SBT). SBT classification is developed from the relationship between tip and side resistance and pore water pressure measurements.

3.6 Groundwater Observation

At each boring where observation wells were not installed, we noted when “wet” soils were encountered. We interpret the shallowest depth where wet soils were encountered to be the approximate depth of the unconfined groundwater table at the time of drilling.

We installed observation wells in borings OB-01-18 and OB-02-18 following completion of drilling and soil sampling. Both observation wells were constructed with a 5-cm I.D. polyvinyl chloride well casing and screen. The machine-slotted well screen allows for inflow of water and an end cap was attached to the bottom of the well screen. A filter pack consisting of No. 10-20 silica sand was placed around the well screen to act as a filter against the adjacent soil. The depth of the well screen was selected based on soil units encountered in the boring and anticipated groundwater levels. A 1.1-m steel stick-up monument surrounded by three steel bollards was placed at the ground surface to protect each observation well.

We installed Solinst pressure transducer dataloggers in the observation wells to record fluctuations in groundwater levels. The dataloggers were installed in the observation wells on November 2, 2018, and have been set to record groundwater level at six-minute intervals. Plots of groundwater level and tidal water level data from the National Oceanic and Atmospheric Administration (NOAA) station in Aberdeen (NOAA, 2018) are presented in Appendix B.

3.7 Existing Geotechnical Data

We collected borehole and test pit logs, CPT logs, geologic profiles, and geotechnical laboratory testing results from two previous studies conducted in the Project area by Shannon & Wilson (Shannon & Wilson, 2008; Shannon & Wilson, 2013) and Roger Lowe Associates, Inc. (1979-1980). We identified 22 previous field explorations. Explorations range in depth from 1 to 55 m below ground surface. The locations of the existing explorations are presented in Figure 2. Borehole, test pit, and CPT log; laboratory test data; and exploration plans with profile lines and the associated profiles for each previous project are presented in Appendix C.

4 LABORATORY TESTING

We performed geotechnical laboratory tests on selected soil samples retrieved from the borings. The geotechnical laboratory testing program included tests to classify the soil and provide data for engineering studies. We performed visual classification on all retrieved samples. Our laboratory testing program included water content determinations, grain size distribution analyses, and Atterberg Limits determinations. Descriptions of our laboratory test procedures and test results are included in Appendix D.

5 SUBSURFACE CONDITIONS

Our interpretation of the existing subsurface conditions is based on our understanding of prior construction activities at the site, new and existing borings, test pits, observation wells, and CPTs; and from the Earthquake-Induced Landslide and Liquefaction Susceptibility and

Initiation Potential Maps for Tsunami Inundation Zones in Aberdeen, Hoquiam, and Cosmopolis, Grays Harbor County, Washington (Slaughter et al., 2013). Our interpretation of the subsurface soil and groundwater conditions in the Project area is shown on the Generalized Subsurface Profiles in Figures 3, 4, and 5. The following sections describe the subsurface conditions encountered at the Project site.

5.1 Geologic Setting

The Project site is located in the Grays Harbor basin, south of the Olympic Range and east of the convergence zone where the North American Plate is subducting beneath the Juan de Fuca Plate. The Grays Harbor basin is partially bounded on the west by two peninsulas, including the 12-km-long Ocean Shores peninsula to the north and the 8-km-long Westport peninsula to the south. The main river flowing through the area is the Chehalis River, which flows from the east of the Project site. The Chehalis River watershed is the second largest in Washington State, draining an approximately 6,700-square-km basin (Ely et al., 2008) located entirely in southwest Washington (Slaughter et al., 2013). The geology of the Project site consists primarily of unconsolidated sediments in the low-lying area between the Chehalis River and the bedrock-cored hills to the north. These sediments include elements of alluvium from the current Chehalis River, including tide flat, estuarine deposits, and floodplain sediments, and older Pleistocene aged alluvium. Soil at depths of 45 m or more consist of outwash from alpine glaciation in the Olympic Mountains (Logan, 1987).

5.2 Geologic Units

The general geology in the Project area is characterized by deep glacial outwash deposits overlain by alluvium and estuarine deposits. Onshore portions of the Project site are typically overlain by a thin cover of recent fill. The soil units encountered in our geotechnical investigations are as follows:

- Fill (Hf) – Materials placed by humans, both engineered and nonengineered. Typically, very loose to dense, comprised of various materials, including soil, quarry spalls, construction debris, cobbles, wood chips, and other organic debris. Fill materials encountered in the Project site are likely related to the site's previous use as a log storage and handling facility for a wood pulp mill. Based on historic aerial photography, it appears that the fill was placed to build out the land area into an existing estuary.
- Estuarine Deposits (He) – Estuary deposits of the current and ancestral Chehalis River. The estuarine deposits are very soft to medium stiff, laminated silts, elastic silts, and silty clays with interbeds of sandy silts and sandy elastic silts. Local concentrations of organic-rich silt and woody debris were encountered.

- Alluvium (Ha) – River or creek deposits of the current and ancestral Chehalis River, including overbank deposits. Typically, loose to medium dense, silty sand and sandy gravel.
- Advance Outwash (Qva) – Glaciofluvial sediments deposited as glacial ice advanced. Clean to silty gravel; dense to very dense.

5.3 Subsurface Conditions

The generalized subsurface conditions interpolated and extrapolated from existing and new geotechnical data are presented in Figures 3, 4, and 5. In general, the subsurface soils consist of onshore fill overlying estuarine and alluvial soil overlying advance outwash gravels. The surficial fill soil is approximately 1 to 6 m deep. Below the fill is a very soft to soft, highly compressible estuarine deposits with interbeds of silty sand. Below this (upper) estuarine layer, we encountered a relatively thick layer of loose to dense, silty, alluvial sand. The typical SPT blow counts in this alluvial layer would be between 20 and 30 blows per 0.3 m onshore and 10 to 12 blows per 0.3 m offshore. A lower estuarine soil layer below the sand layer consists of very soft to stiff, clayey silt and silty clay. Typical SPT blow counts in this lower estuarine layer range between 1 and 6 blows per 0.3 m offshore and on the southern onshore portion of the site. For the northern onshore portion the site, typical SPT blow counts in this lower estuarine layer range between 10 and 20 blows per 0.3 m. The lower estuarine soil overlies alluvium consisting of stiff to hard silts, gravelly sand, and sandy gravels. Below this alluvium, we encountered advance glacial outwash that consists of dense to very dense, sandy gravel. The typical SPT blow count in this advance glacial outwash layer would be between 50 blows per 0.3 m and 50 blows per 0.1 m. The approximate elevation of the top of the advance glacial outwash layer is between -40 and -45 m (North American Vertical Datum of 1988).

Note that this description of subsurface conditions is generalized across a large project site. Variability of the subsurface conditions was observed throughout the site. Subsurface conditions should be further evaluated and recharacterized as necessary for engineering analyses and construction activities anticipated at specific locations across the site. Subsurface conditions assumed for specific analyses will be presented in the engineering design report.

5.4 Groundwater Conditions

Maximum observed groundwater levels in borings OB-01-18 and OB-02-18, as well as in observation wells MW-1-18 through MW-7-18 installed by others (BergerABAM, 2018), are summarized in Table B-1. Wells MH-1-18 through MH-7-18 were monitored by BergerABAM on a quarterly basis from March 28, 2018, to December 18, 2018. Figure B-1 in

Appendix B presents groundwater data from dataloggers during November and December of 2018.

In general, the shallowest depth to groundwater observed from these wells at the site ranges from about 1 to 2 m.

6 CLOSURE

This report was prepared for the exclusive use of Ausenco and the Project owner for preliminary design of the Project. The contents of this report should not be considered as a warranty of site and subsurface conditions. Please review the Important Information included at the end of this report.

Should the purpose of this report or Project change, this report immediately ceases to be valid and use of it by any party without Shannon & Wilson's written authorization will be at the user's sole risk.

7 REFERENCES

ASTM International, 2011, Standard test method for standard penetration test (SPT) and split-barrel sampling of soils, D1586-11: West Conshohocken, Pa., ASTM International, Annual book of standards, v. 04.08, soil and rock (I): D420 - D5876, 9 p., available: www.astm.org.

ASTM International, 2012, Standard practice for thin-walled tube sampling of soils for geotechnical purposes, D1587-08(2012)e1: West Conshohocken, Pa., ASTM International, Annual book of standards, v. 04.08, soil and rock (I): D420 - D5876, 4 p., available: www.astm.org.

BergerABAM, 2018, Proposed Grays Harbor potash export facility – terminal 3 groundwater monitoring wells: well coordinates and groundwater elevations: Memorandum from V. England, BergerABAM, Vancouver, Wash., to M. Sweeney, Ausenco Limited, October 30.

Ely, D. Matthew; Frasl, Kenneth E.; Marshall, Cameron A.; Reed, Fred, 2008, Seepage investigation for selected river reaches in the Chehalis River basin, Washington; US Geological Survey Scientific Investigations Report 2008-5180, 12 p., available: http://pubs.usgs.gov/sir/2008/5180/.

Logan, R. L., 1987, Geologic map of the Chehalis River and Westport quadrangles, Washington; Olympia, Wash., Washington State Division of Geology and Earth Resources, Open File Report 87-8, 17p., 1 plate, scale 1:100,000.

Roger Lowe Associates, Inc., 1979-1980, Figures, boring logs, and laboratory test results from geotechnical reports for ITT Rayonier: Excerpts dated September 6, 1979 and January 25, 1980, 50 p., received by Shannon & Wilson, Inc. from Ausenco August 16, 2017.

U.S. National Oceanic and Atmospheric Administration (NOAA), 2018, Tides & currents, Aberdeen, WA: Washington, D.C., NOAA, station ID 9441187, available: https://tidesandcurrents.noaa.gov/stationhome.html?id=9441187, accessed December, 2018.

Shannon & Wilson, Inc., 2008, Geotechnical report, wastewater treatment facility biosolids lagoon project, Hoquiam, Washington: Report prepared by Shannon & Wilson, Inc., Seattle, Wash., 21-1-21000-001, for HDR Engineering, Inc., December.

Shannon & Wilson, Inc., 2013, Draft geotechnical report, USD crude-by-rail terminal, Port of Grays Harbor, Hoquiam, Washington: Report prepared by Shannon & Wilson, Inc., Seattle, Wash., 21-1-21839-001, for HDR Engineering, Inc., September.

Slaughter, S. L.; Walsh, T. J.; Ypma, Anton; and others, 2013, Earthquake-induced landslide and liquefaction susceptibility and initiation potential maps for tsunami inundation zones in Aberdeen, Hoquiam, and Cosmopolis, Grays Harbor County, Washington, for a M9+ Cascadia subduction zone event; Washington State Department of Geology and Earth Resources, Report of Investigations 36, 39 p., 2 plates, scape 1:18,000.

NOTE

Bing Map Image adapted from aerial imagery provided by Autodesk Live Maps and Microsoft Bing Maps reprinted with permission from Microsoft Corporation.

Potash Export Terminal
Grays Harbor
Hoquiam, Washington

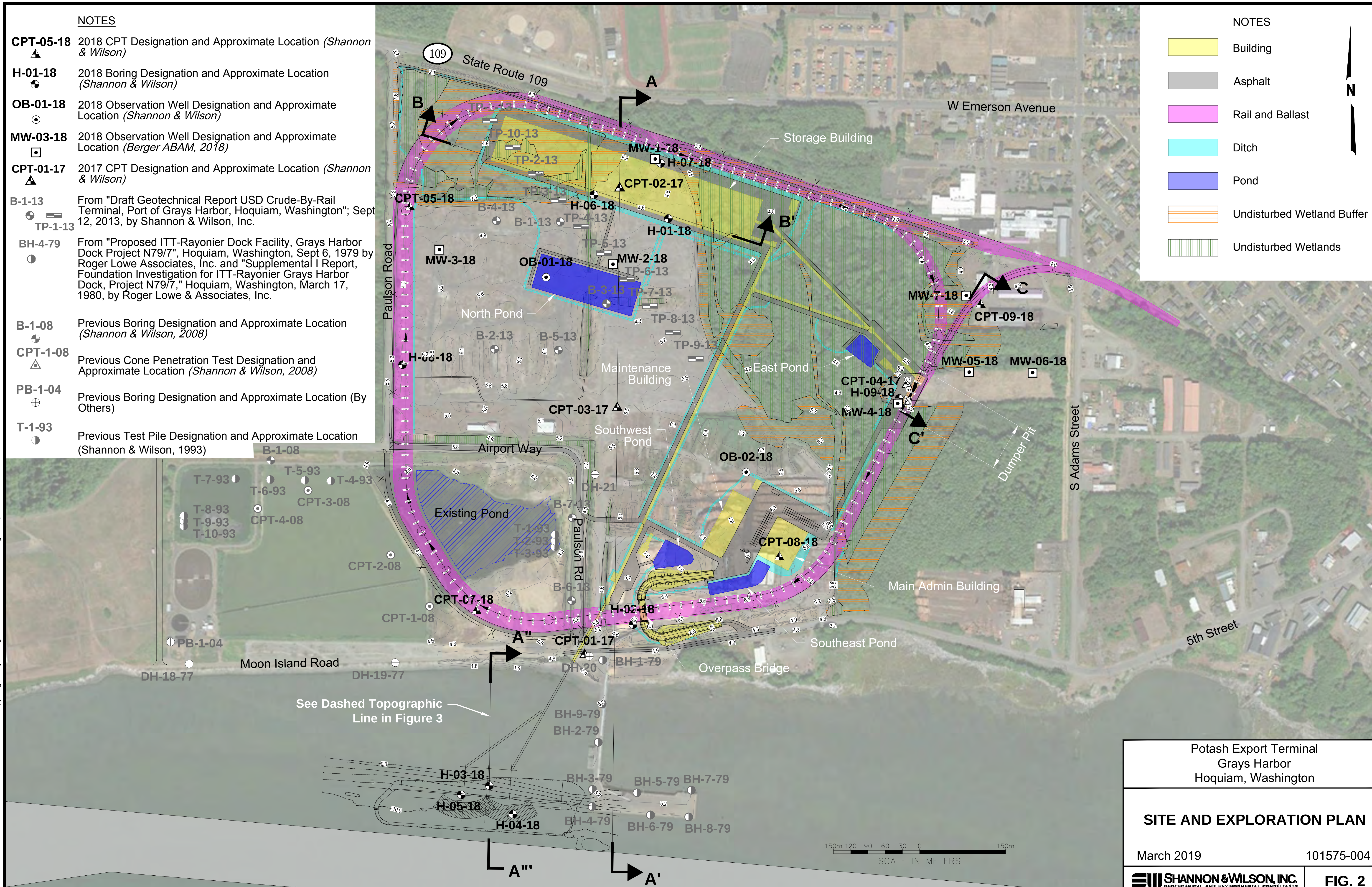
VICINITY MAP

March 2019 21-1-22400-004

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 1

Filename: J:_SEA\101575\004\101575-004 Vicinity Map.dwg Date: 02-27-2019 Login: awp



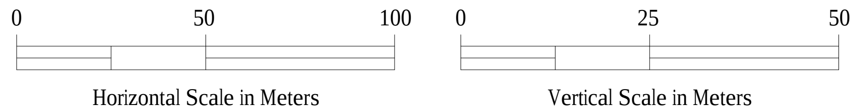
Potash Export Terminal
Grays Harbor
Hoquiam, Washington

SITE AND EXPLORATION PLAN

March 2019 101575-004

SHANNON & WILSON, INC. GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 2



NOTES

CPT-01 This Study

B-1 From "Draft Geotechnical Report USD Crude-By-Rail Terminal, Port of Grays Harbor, Hoquiam, Washington"; Sept 12, 2013, by Shannon & Wilson, Inc.

BH-4 From "Proposed ITT-Rayonier Dock Facility, Grays Harbor Dock Project N79/7", Hoquiam, Washington, Sept 6, 1979 by Roger Lowe Associates, Inc. and "Supplemental I Report, Foundation Investigation for ITT-Rayonier Grays Harbor Dock, Project N79/7," Hoquiam, Washington, March 17, 1980, by Roger Lowe & Associates, Inc.

SOIL UNITS

0	FILL
1	UPPER FINE-GRAINED WITH INTERBEDDED LOOSE SAND
2	SAND-LIKE WITH INTERBEDDED SILT
3	LOWER FINE-GRAINED WITH INTERBEDDED SILTY SAND
4	DENSE SAND/GRAVEL AND STIFF SILT
5	DENSE OUTWASH GRAVEL

SAMPLER NOTES

* 1.5 Inch Inside Diameter Split-Spoon Sampler Driven by 140lb Hammer with 30-Inch Drop.

** 2.5 Inch Inside Diameter Split-Spoon Sampler with Liners Driven by 140lb Hammer with 30-Inch Drop

*** 2.5 Inch Inside Diameter Split-Spoon Sampler with Liners Driven by 300lb Hammer with 30-Inch Drop

Potash Export Terminal
Grays Harbor
Hoquiam, Washington

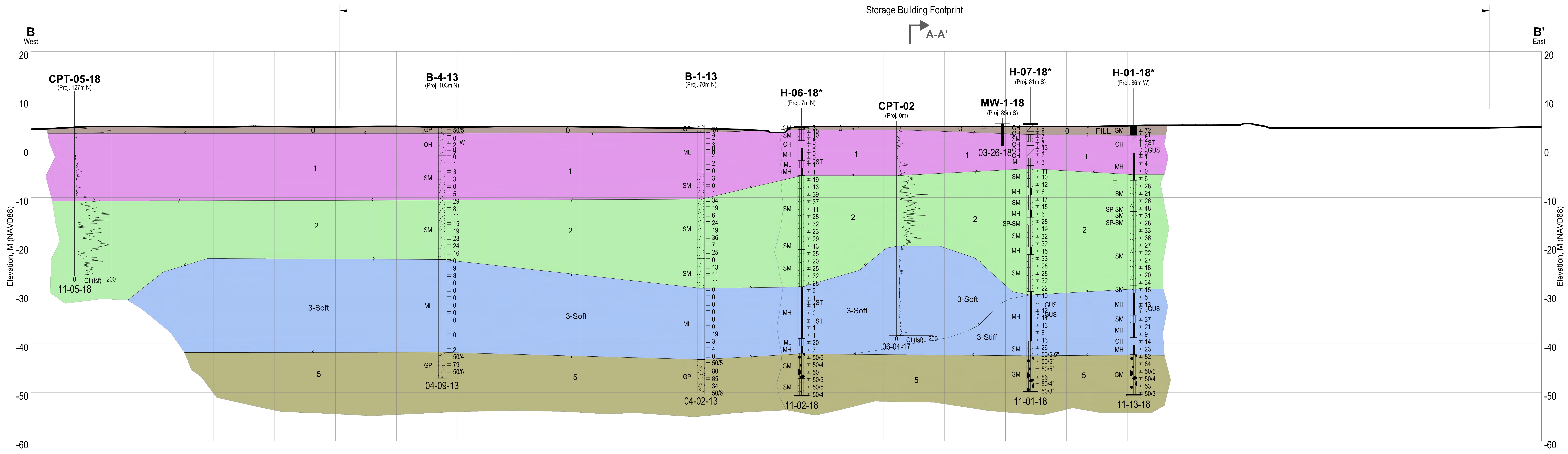
GENERALIZED SUBSURFACE PROFILE A-A'

March 2019 101575-004

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 3

Filename: J:_SEA\101575\005\101575-005 Profiles.dwg Layout: FIG 3 Date: 02-27-2019 Login: awp



NOTES

CPT-01 This Study

B-1 From "Draft Geotechnical Report USD Crude-By-Rail Terminal, Port of Grays Harbor, Hoquiam, Washington"; Sept 12, 2013, by Shannon & Wilson, Inc.

BH-4 From "Proposed ITT-Rayonier Dock Facility, Grays Harbor Dock Project N79/7", Hoquiam, Washington, Sept 6, 1979 by Roger Lowe Associates, Inc. and "Supplemental I Report, Foundation Investigation for ITT-Rayonier Grays Harbor Dock, Project N79/7," Hoquiam, Washington, March 17, 1980, by Roger Lowe & Associates, Inc.

SOIL UNITS

0	FILL
1	UPPER FINE-GRAINED WITH INTERBEDDED LOOSE SAND
2	SAND-LIKE WITH INTERBEDDED SILT
3	LOWER FINE-GRAINED WITH INTERBEDDED SILTY SAND
4	DENSE SAND/GRAVEL AND STIFF SILT
5	DENSE OUTWASH GRAVEL

SAMPLER NOTES

* 1.5 Inch Inside Diameter Split-Spoon Sampler Driven by 140lb Hammer with 30-Inch Drop.

** 2.5 Inch Inside Diameter Split-Spoon Sampler with Liners Driven by 140lb Hammer with 30-Inch Drop

*** 2.5 Inch Inside Diameter Split-Spoon Sampler with Liners Driven by 300lb Hammer with 30-Inch Drop

0 25 50
Horizontal Scale in Meters

0 12.5 25
Vertical Scale in Meters

Potash Export Terminal
Grays Harbor
Hoquiam, Washington

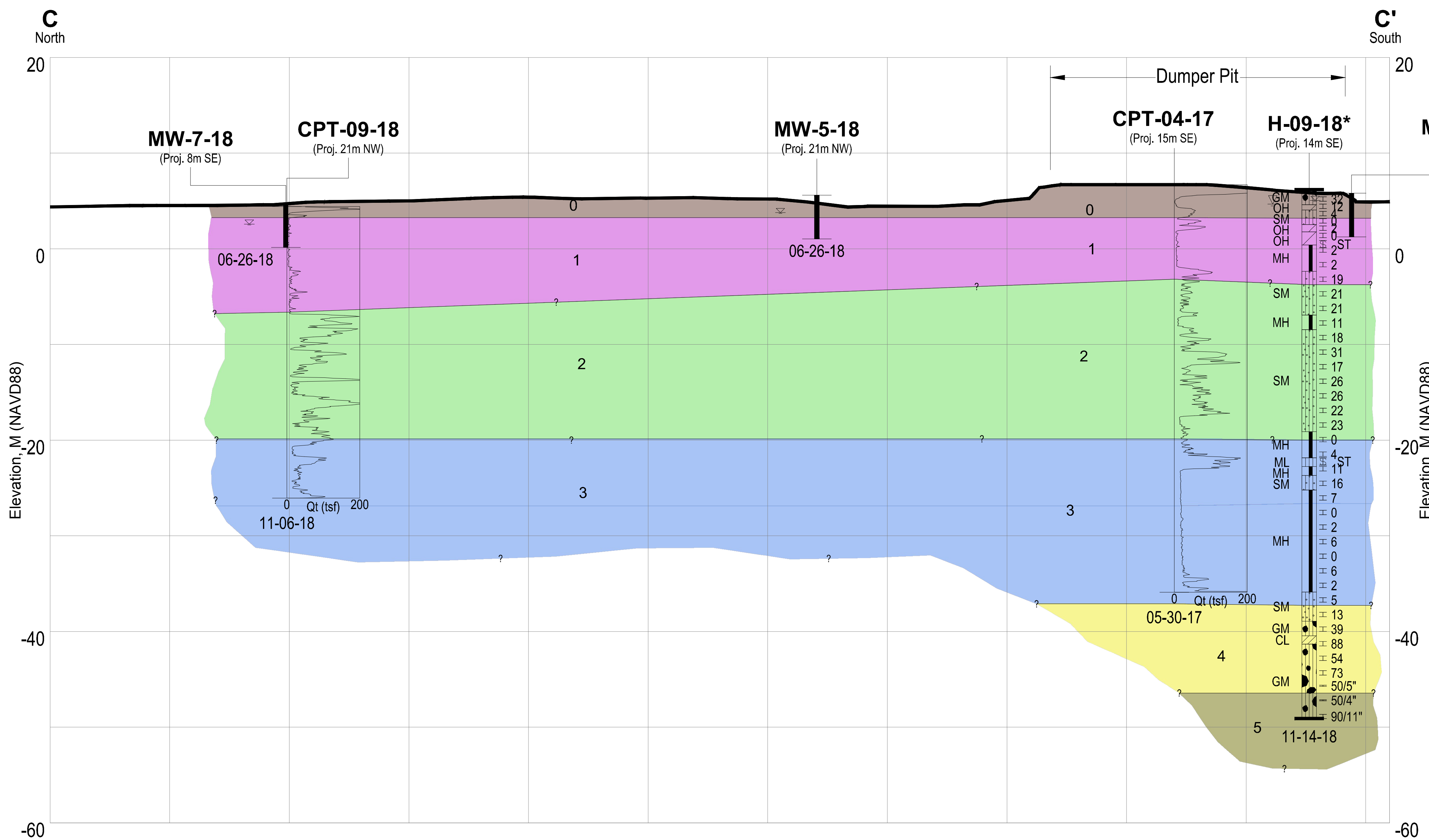
GENERALIZED SUBSURFACE PROFILE B-B'

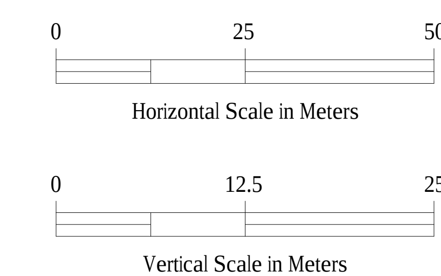
March 2019 101575-004

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 4

Filename: J:_SEA\101575\005\101575-005 Profiles.dwg Layout: FIG 4 Date: 02-27-2019 Login: awp





SAMPLER NOTES

* 1.5 Inch Inside Diameter Split-Spoon Sampler Driven by 140lb Hammer with 30-Inch Drop.

** 2.5 Inch Inside Diameter Split-Spoon Sampler with Liners Driven by 140lb Hammer with 30-Inch Drop

*** 2.5 Inch Inside Diameter Split-Spoon Sampler with Liners Driven by 300lb Hammer with 30-Inch Drop

NOTES

CPT-01 This Study

B-1 From "Draft Geotechnical Report USD Crude-By-Rail Terminal, Port of Grays Harbor, Hoquiam, Washington"; Sept 12, 2013, by Shannon & Wilson, Inc.

BH-4 From "Proposed ITT-Rayonier Dock Facility, Grays Harbor Dock Project N79/7", Hoquiam, Washington, Sept 6, 1979 by Roger Lowe Associates, Inc. and "Supplemental I Report, Foundation Investigation for ITT-Rayonier Grays Harbor Dock, Project N79/7," Hoquiam, Washington, March 17, 1980, by Roger Lowe & Associates, Inc.

SOIL UNITS

0	FILL
1	UPPER FINE-GRAINED WITH INTERBEDDED LOOSE SAND
2	SAND-LIKE WITH INTERBEDDED SILT
3	LOWER FINE-GRAINED WITH INTERBEDDED SILTY SAND
4	DENSE SAND/GRAVEL AND STIFF SILT
5	DENSE OUTWASH GRAVEL

Potash Export Terminal
Grays Harbor
Hoquiam, Washington

GENERALIZED SUBSURFACE PROFILE C-C'

March 2019 101575-004

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 5

Filename: J:_SEA\101575\005\101575-005 Profiles.dwg Layout: FIG 5 Date: 02-27-2019 Login: awp