Staff Comments by PM dated 12/01/22

SEPA ENVIRONMENTAL CHECKLIST

Purpose of checklist:

Governmental agencies use this checklist to help determine whether the environmental impacts of your proposal are significant. This information is also helpful to determine if available avoidance, minimization or compensatory mitigation measures will address the probable significant impacts or if an environmental impact statement will be prepared to further analyze the proposal.

Instructions for applicants:

This environmental checklist asks you to describe some basic information about your proposal. Please answer each question accurately and carefully, to the best of your knowledge. You may need to consult with an agency specialist or private consultant for some questions. You may use "not applicable" or "does not apply" only when you can explain why it does not apply and not when the answer is unknown. You may also attach or incorporate by reference additional studies reports. Complete and accurate answers to these questions often avoid delays with the SEPA process as well as later in the decision-making process.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

Instructions for Lead Agencies:

Please adjust the format of this template as needed. Additional information may be necessary to evaluate the existing environment, all interrelated aspects of the proposal and an analysis of adverse impacts. The checklist is considered the first but not necessarily the only source of information needed to make an adequate threshold determination. Once a threshold determination is made, the lead agency is responsible for the completeness and accuracy of the checklist and other supporting documents.

Use of checklist for nonproject proposals:

For nonproject proposals (such as ordinances, regulations, plans and programs), complete the applicable parts of sections A and B plus the SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS (part D). Please completely answer all questions that apply and note that the words "project," "applicant," and "property or site" should be read as "proposal," "proponent," and "affected geographic area," respectively. The lead agency may exclude (for non-projects) questions in Part B - Environmental Elements –that do not contribute meaningfully to the analysis of the proposal.

A. Background [HELP]

1. Name of proposed project, if applicable:

Pinnacle Renewable Holdings (USA) Inc. (Note, Pinnacle Renewable Holdings (USA) Inc. is the legal name, and we are branded as part of "drax")

2. Name of applicant:

Pinnacle Renewable Holdings (USA) Inc.

3. Address and phone number of applicant and contact person:

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4. Date checklist prepared:

August 12, 2022

5. Agency requesting checklist:

Cowlitz County, Building and Planning Department

6. Proposed timing or schedule (including phasing, if applicable):

Construction operations require 12 - 18 months from final project approval to commissioning and commencement of regular operation. Construction is anticipated to begin in Fall 2022, approval depending.

In the future the project could potentially have inbound fibre products via rail access. The quantities and timeline of which are currently unknown and dependent on economic conditions.

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

There are no plans for additional construction after commencement of normal operation. In the future the project could potentially have inbound fibre products via rail access. The quantities and timeline of which are currently unknown and dependent on economic conditions.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

Air Dispersion Modeling (Trinity Consultants, prepared 2022)
Phase I Environmental Site Assessment (Trinity Consultants, 2021)
Spill Prevention, Control, and Countermeasure (SPCC) Plan (Trinity Consultants, will be prepared 2022)
Cultural Resources Report (Applied Archeological Research, 2015)
Traffic Study (Worley, prepared summer 2022)

Geotechnical Study (Lauren Services, 2021)

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

N/A – this is the only proposal directly affecting the property covered by this proposal

10. List any government approvals or permits that will be needed for your proposal, if known.

Air Quality Notice of Construction Permit (Southwest Clean Air Agency)
Air Quality Title V Air Operating Permit (Southwest Clean Air Agency)
National Pollutant Discharge Elimination System (NPDES) Construction Stormwater General Permit (Department of Ecology)
NPDES Industrial Stormwater General Permit (Department of Ecology)
Building Permit (Cowlitz County)
Planning Clearance (Cowlitz County)

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)

Drax Group, PLC. (Drax) is proposing to construct and operate a facility in Cowlitz County, Washington (the facility) that would produce premium pellet fuel from local hardwood & softwood residuals. The facility is located at 175 E Mill Rd, Longview, WA. A site plot plan is included in Attachment A.

The approximately 49 acre property is developed for industrial use. A separate entity previously operated onsite log storing and shipping operations. Drax will develop the property as a wood pellet production, storage, and shipping facility. Residual wood fibre from local lumber saw mills will arrive by truck, and the fibre will then be sized through primary breakdown equipment, then dried through a bark fired furnace and rotary drum dryer, then particle sized through a hammermill process. The fibre will then be pelletized to common pellets which densifies the product for long distance shipping to overseas markets. Production is estimated to be 450,000 oven dried metric tons (ODMT) or approximately 497,000 oven dried tons (ODT) of pellets annually.

The proposed operations will include:

- Fibre (wood chips, sawdust, bark, and shavings) hauling, receiving, processing, and storage areas;
- Fibre particle size breakdown (hammermills/biosizer);
- Fibre drying in a rotary dryer;
- Fibre pelletization production and subsequent cooling lines;
- Finished products storage;
- Maritime vessel (ship) loadout area,
- Emergency generator and fire pump.

The raw materials will be delivered to the facility via an estimated 200 trucks per day, for 260 days of the year are anticipated. Truck deliveries will be at greatest frequency Monday through Friday between 6 am and 8 pm . Finished products will be shipped via approximately 15 ships per year, or one ship approximately every 3 to 4 weeks is anticipated. The new facilities will take up approximately 15 acres of the 49 acre site with 30 acres being used for material an exterior lay-down yard. In the future the project

could potentially have inbound fibre products via rail access. The quantities and timeline of which are currently unknown and dependent on economic conditions.

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

The manufacturing facility is located at 175 E Mill Rd, Longview, WA. Section 9-7N-2West, parcel #'s 604210100 and 604210200. A site plot plan is included in Attachment A. A vicinity map is included below.

An overhead conveyor, pellet surge silo, and ship loading operations will be located at the Port of Longview, 10 International Way, Longview, WA. Section 9-7N-2W, at and adjacent to Berth 8, parcel # 's 60421, 604210202.

B. Environmental Elements [HELP]

1. *Earth* [help]

a. General description of the site:

(circle one): Flat, rolling, hilly, steep slopes, mountainous, other _____

b. What is the steepest slope on the site (approximate percent slope)?

The site is mostly flat and the steepest slope is not greater than 8%[1]

c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any agricultural land of long-term commercial significance and whether the proposal results in removing any of these soils.

According to the USDA Natural Resources Conservation Service Soil Survey[1], the site soil is classified as Pilchuck loamy fine sand. The majority of the site is developed, with the surface being either asphalt, gravel, structures, or railroad lines. A limited amount of the sandy soil onsite may be excavated and replaced with engineered fill dirt to support new structure foundations. Removed sandy soil will be transported offsite by the construction contractor and reused, reclaimed, or disposed of according to applicable regulations.

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

Landslide Hazard Areas: Landslide hazard areas are defined through several possible criteria including areas of historic failure and areas with slopes greater than 15 percent, based on the criteria set forth in section 19.15.150(H) of the Cowlitz County CAO. The site is not considered to be within mapped landslide hazard areas.

Erosion Hazard Areas: Based on criteria set forth in section section 19.15.150(G) of the Cowlitz County CAO, the site is not considered to be within an erosion hazard area.

e. Describe the purpose, type, total area, and approximate quantities and total affected area of any filling, excavation, and grading proposed. Indicate source of fill.

Some shallow excavations may occur to facilitate the construction of structure foundations. Excavation and fill will be minimized to only necessary foundation support preparations. The exact quantities and area of excavation and filling have yet to be determined, pending a detailed geotechnical evaluation. Fill dirt will be engineered by the construction contractor specifically for structure foundation support. Fill dirt will be sourced locally; with more specific details yet to be determined.

Small amounts of trenching for utility service modifications may occur. All excavated dirt will be returned to trenches and no fill dirt will be required for modifications to utility services.

Minimal grading will occur onsite during construction or operation to ensure proper stormwater management.

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[1] USDA Natural Resources Conservation Service Web Soil Survey for Port of Longview location. Cowlitz County, WA soil map unit 160. https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

Stone column work will be required. Stone column work is similar to piling but done with stone to satisfy the sand, and that type of material does not liquify during an earthquake. Depth can range from 25-80 feet depending on engineering recommendations. A copy of the geotechnical report is provided in Attachment C.

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.

The only erosion that could occur would be temporary erosion of excavated material being stored onsite prior to removal. No other erosion could occur as a result of construction or operation. The site is, and will remain, flat.

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

The site is currently covered by asphalt (approx. 95%), gravel, structures, or railroad lines. The project will not alter the type of site coverings The majority (95%) will be covered with asphalt pavement, and buildings.

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

Appropriate erosion control measures would be implemented prior to excavation and construction activities. These control measures would be identified in the project plans and construction specifications and would be implemented as required by Cowlitz County and the SWPPP prepared in compliance with the Construction Stormwater General Permit. Best management practices would be selected from the Western Washington Stormwater Manual specific to the construction activities occurring within the project areas and may include, but not be limited to:

- Collecting and controlling stormwater flow in accordance with the SWPPP;
- Installation of filter fabric fences around disturbed areas;
- Stabilization of temporary soil stockpiles and exposed solids;
- Regular street cleaning for mud and dust control;
- Use of appropriate means to minimize tracking of sediment onto public roadways by construction vehicles; and
- Designation of personnel to inspect and maintain temporary erosion and sediment control measures.

Erosion or other impacts to the earth are not a concern during the operational phase of the project as the majority of the site is paved, therefore, no measures for reduction are proposed.

2. Air [help]

a. What types of emissions to the air would result from the proposal during construction, operation, and maintenance when the project is completed? If any, generally describe and give approximate quantities if known.

Construction will cause short term and localized air emissions. Fuel combustion emissions result from heavy equipment, portable electricity generator, and vehicle usage. Soil disturbance and vehicle travel will also cause releases of ground level fugitive dust.

Operation of the facility will produce emissions of criteria pollutants, hazardous/toxic air pollutants (HAPs/TAPs), and greenhouse gases. The air emissions are detailed in the Air Discharge Permit application. The application includes an air dispersion modeling analysis to quantify pollutant impacts on the ambient air in surrounding areas. Air emissions will be below the thresholds for which a Prevention of Significant Deterioration permit would be required. The anticipated facility annual Potential-To-Emit rates during operation are summarized below:

Table 2-1. Facility Wide Potential Emissions

Pollutant	Potential-To-Emit (ton/yr)
PM[1]	40.8
PM_{10}[2]	40.8
$PM_{2.5}$[3]	40.7
NO_x[4]	225
SO_2	0.1
CO	222.5
VOC[5]	225.5
CO_2e	185,280
Greatest Single HAP[6]	0.18
Total HAP	0.53

1. *Particulate matter*
2. *Particulate matter with an equivalent aerodynamic diameter less than or equal to 10 microns*
3. *Particulate matter with an equivalent aerodynamic diameter less than or equal to 2.5 microns*
4. *Oxides of nitrogen including, but not limited to: NO, NO_2, and N_2O*
5. *Volatile organic compounds*
6. *The single HAP with the largest annual emission rate is formaldehyde*

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

No off-site sources of emissions or odor would affect the proposed project. Cowlitz County and neighboring Columbia County in Oregon are attainment areas for all criteria pollutants.

Additional truck and marine transportation will increase emissions outside of the project area but are not anticipated to significantly affect air quality.

c. Proposed measures to reduce or control emissions or other impacts to air, if any:

Typical Best Management Construction Practices would be implemented to minimize construction related emissions, including but not limited to:

- Requiring proper maintenance of construction equipment;
- Avoiding prolonged idling of construction vehicles; and
- Using water to abate dust emissions resulting from construction vehicle travel at the construction site.

The facility will employ multiple control technologies which will reduce air emissions from the operation of the facility. The hog fuel furnace and dryer will be controlled by a wet electrostatic precipitator (WESP) and a regenerative thermal oxidizer (RTO). The RTO will reduce the VOC emissions from this process by 95%. Air exiting the rotary dryer has a high concentration of particulate matter, which is controlled using the wet electrostatic precipitator (WESP). The WESP first filters the coarse particulate matter, then creates a surface charge on the remaining fine particulates so that they are collected on charged plates. The process will also include four hammermills controlled by a baghouse and eleven pellet production and cooling lines controlled by two cyclones, a scrubber, and a regenerative catalytic oxidizer (RCO). The emission control equipment will comply with local, state and federal regulatory requirements. A comprehensive Best Available Control Technology analysis for criteria pollutants and HAPs/TAPs from each emission unit is included in the Air Discharge Permit application and is summarized in the table below.

Source	Pollutant	Control Technology
Rotary Dryer	PM	Wet Electrostatic Precipitator (WESP)
	NO_X	Good Combustion Practices
	VOC	Regenerative Thermal Oxidation (RTO), Good Combustion Practices
	CO	
	TAPs	Wet Electrostatic Precipitator (WESP), Regenerative Thermal Oxidation (RTO), Good Combustion Practices
Pellet Coolers	PM	Cyclone and Scrubber
	VOC	Regenerative Catalytic Oxidation (RCO)
Hammermills	PM	Baghouse
	VOC	Good Operating Practices
Dry Chip Storage Tent, Storage Domes, Biosizer, and Ship Loadout System	PM	Inherent Moisture and Size of Feed Material, Proper Maintenance, Good Operating Practices
Emergency Generator	PM, SO_2, NO_x, VOC, CO	NSPS IIII Compliance
Fire Pump Engine		
Dry Material Truck Tipper	PM	Baghouse
Paved Haul Roads	PM	Truck Traffic Fugitive Control Strategy and Monitoring Plan, including watering, sweeping, and/or speed limits
Stockpiles	PM	Site-Specific Fugitive Dust Control Plan

3. Water [help]

a. Surface Water: [help]

1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

The Columbia River is located approximately 400 feet south of the site. An active log pond owned by Pacific Fibre Products, (Log Pond) is located north of Fibre Way and is a log pond used for log

storage and stormwater detention. It no longer has connection to the Columbia River or other waterbodies. The Log Pond is a jurisdictional water of the United States.

The Port of Longview's stormwater pond facility (Finger Slough) runs along the west edge of the property and is not considered a jurisdictional water of the United States. The Finger Slough discharges rarely and only in extreme conditions. If it discharges, the water goes to the Consolidated Diking Improvement District #1 ditch system which is pumped through their Reynolds pump station to the Columbia River.

2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.

The project will take place next to the Finger Slough along the west edge of the property and adjacent to the southeast, but will not disturb the slough or ponds themselves. See attached site plan in Attachment A.

3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.

None

4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.

The project will not require surface water withdrawals or diversions.

5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.

The site is within Federal Emergency Management Agency (FEMA) Zone X, which means that the site is protected from 100-year floods by a levee along the river, maintained by the Consolidated Diking Improvement District No. 1. No, the site lies in an area with reduced flood risk due to levee[2]

6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.

No discharges of waste materials to surface waters will occur as part of the proposed project.

b. Ground Water: [help]

1) Will groundwater be withdrawn from a well for drinking water or other purposes? If so, give a general description of the well, proposed uses and approximate quantities withdrawn from the well. Will water be discharged to groundwater? Give general description, purpose, and approximate quantities if known.

Groundwater will not be withdrawn from a well.

2 FEMA Flood Map Service Center for Fibre Way, Longview, WA

2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals. . . ; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.

No waste material will be discharged into the ground. The pelletizing process does not produce any process wastewater as it is a closed loop system. All blowdown water from the WESP is recycled to the step grate furnace and is subsequently evaporated.

c. Water runoff (including stormwater):

1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.

Applicant is in process of renewing state Stormwater permit

Only stormwater runoff will need to be managed on the site, and a small amount of runoff from equipment cleaning via water spraying. Equipment cleaning is conducted by spraying with water hoses. Cleaning uses only water, no solvents or inorganic constituents.

All runoff will be directed into the stormwater collection and infiltration pond on the southeast portion of the property. Stormwater at the site flows to the ditches on the west and east sides of the site, which provide filtration. From the ditches, stormwater is transferred to underground storage where it is pumped to the pumphouse on the south side of the site and through sand filters. Overflow bags are used to store stormwater if stormwater flow exceeds the capacity of the pump and filter. After passing through the sand filter, stormwater is transferred to a pond where it infiltrates into the ground. In an extreme rain event, the pond would discharge to the Port of Longview's Finger Slough.

Further details of stormwater management will be detailed in the SWPPP for construction and facility operation, which are in development.

2) Could waste materials enter ground or surface waters? If so, generally describe.

No waste materials will enter ground or surface waters, other than runoff that collects in the designated stormwater pond.

Wet fibre storage (sawdust, bark, bush grind) will be outside the main plant area on a paved surface. Approximately 30,000 ODMT of wet material will be stored in the outdoor fibre yard at any given time. There are no hazardous materials associated with the fibre piles, and the majority of rainwater that comes into contact with the piles will be absorbed as the fibre is not fully saturated. Negligible amounts of natural wood fibre leachate will runoff the piles and be contained in the designated stormwater pond.

All hazardous materials and wastes will be properly contained and/or disposed of to prevent any contamination of ground or surface waters. These procedures are detailed further in Section 7.a.3 of this report.

3) Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site? If so, describe.

No

d. Proposed measures to reduce or control surface, ground, and runoff water, and drainage pattern impacts, if any:

Drainage to the designated stormwater collection and infiltration pond, which was constructed in 2014, is considered to be an industry best practice. Further plans for surface, ground, and runoff water will be detailed in the SWPPP.

4. Plants [help]

a. Check the types of vegetation found on the site:

__x_deciduous tree: alder, maple, aspen, other
__x_evergreen tree: fir, cedar, pine, other
__x_shrubs
__x_grass
____pasture
____crop or grain
____ Orchards, vineyards or other permanent crops.
____ wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other
____water plants: water lily, eelgrass, milfoil, other
____other types of vegetation

b. What kind and amount of vegetation will be removed or altered?

None

c. List threatened and endangered species known to be on or near the site.

No threatened or endangered plant species have been found living on the site.

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

None proposed

e. List all noxious weeds and invasive species known to be on or near the site.

There are no known noxious weeds or invasive species on or near the site.

5. Animals [help]

a. List any birds and other animals which have been observed on or near the site or are known to be on or near the site.

Birds: hawk, heron, eagle, songbird, osprey, duck
Mammals: deer, nutria

Heron Rookery nearby

The project is not anticipated to have an impact on fish given it's non-water construction envelope and existing stormwater system.

b. List any threatened and endangered species known to be on or near the site.

Although the project does not connect to the Columbia River at any construction points, it is adjacent to and these species are present.

Project is also outside of 200' shoreline environment designation

Upper Columbia River Spring Chinook (Endangered)
Snake River Fall Chinook (Threatened)
Snake River Spring-Summer Chinook (Threatened)
Snake River Sockeye (Endangered)
Snake River Steelhead (Threatened)
Middle Columbia River Steelhead (Threatened)
Upper Columbia River Steelhead (Endangered)
Lower Columbia River Steelhead (Threatened)
Lower Columbia River Chinook (Threatened)
Lower Columbia River Coho (Candidate for listing)
Columbia River Bull Trout (Threatened)
Columbia River Chum (Threatened)
Sea run Cutthroat Trout (Proposed as Threatened)
Steller Sea Lions (Threatened)
Pacific Eulachon (Threatened)
Columbia River Whitetail Deer (Threatened)

c. Is the site part of a migration route? If so, explain.

The project site is under the Pacific Waterfowl migration route. The Columbia River is a migration route for anadromous fish.

d. Proposed measures to preserve or enhance wildlife, if any:

None proposed because the project is not expected to impact any wildlife habitat.

e. List any invasive animal species known to be on or near the site.

No invasive animal species are known to be on or near the site.

6. Energy and Natural Resources [help]

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

Construction will require electricity and liquid fuels to power heavy equipment, tools, and various machinery.

Operation of the facility will require electricity for general plant processes and manufacturing. Natural gas will be used during operation for the RCO and the RTO. Hog fuel and bark will also be used during operation for process heating.

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

There will be no effect on the potential use of solar energy by an adjacent property.

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:

Heat generation for the rotary dryer is directly fired from a step grate furnace using bark fuel. The use of this biomass fuel, rather than fossil fuel or electricity, reduces energy impacts.

7. Environmental Health [help]

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.

1) Describe any known or possible contamination at the site from present or past uses.

There is no known contamination at the site. A Phase I Environmental Site Assessment was conducted and determined that there are no Recognized Environmental Conditions for the site.

2) Describe existing hazardous chemicals/conditions that might affect project development and design. This includes underground hazardous liquid and gas transmission pipelines located within the project area and in the vicinity.

A gas transmission pipeline runs along the north side of Fibre Way. This is greater than 660 feet from the project area.

A Phase I Environmental Site Assessment was conducted and determined that there are no Recognized Environmental Conditions for the site.

3) Describe any toxic or hazardous chemicals that might be stored, used, or produced during the project's development or construction, or at any time during the operating life of the project.

The pellet production processes do not require any hazardous chemicals or controlled substances for pellet production beyond caustic soda for the dryer discharge WESP. The WESP caustic soda usage is described below. Minimal amounts of other chemicals will be onsite that are required for ongoing operations, including grease for machinery and fuel for loaders. Waste generated at the plant will be stored in an approved waste storage unit and will managed by an approved waste disposal contractor.

Approximately 5,250 gallons of caustic soda solution will be stored in the WESP building in a high density polyethylene (HDPE) tank under the WESP and will be surrounded by a concrete berm for secondary containment. This berm will be below ground level to ensure that any spills are contained within the building. The caustic soda will be diluted with water prior to use for WESP blowdown and to neutralize the pH of the water system. This neutral pH blowdown water will be evaporated in the step grate furnace.

The facility will have a 2,600 gallon diesel fuel storage tank that will be located in the yard on a paved concrete pad. The emergency generator and fire pump will also have diesel fuel tanks of approximately 700 gallons each. The tanks will adhere to best fuel storage practices and will be constructed out of double walled steel. A spill containment kit will be next to the tanks in order to clean up any spills from refueling the loaders and engines. Processes will be put in place to ensure spills are managed according to industry best practices and applicable regulations.

Liquid and solid wastes onsite are outlined in Tables 7-1 and 7-2 below:

Table 7-1. Waste Liquids Generated Onsite

Type	Source	Annual Volume	Storage Location	Disposal Method
Oils (engine, lubricant, etc.)	Bearings, loader, skid steer, man lifts, forklifts, etc.…	Estimated 1,000 gallons	Inventory supply room	Oil disposal through approved contractor (TBD)
Sanitary Sewage	Toilets, Sinks	N/A	N/A	Sewer line

Table 7-2. Waste Solids Generated Onsite

Type	Source	Annual Volume	Storage Location	Disposal Method
Domestic Garbage	Miscellaneous Plant	5 tons	Trash Bin Onsite	Approved contractor TBD
Step grate rocks	Step grate furnace	330 tons	N/A	Sold to asphalt manufacturer
Rocks from Dryer	Rotary Dryer	220 tons	N/A	Sold to asphalt manufacturer

4) Describe special emergency services that might be required.

No special emergency services will be required. All facility employees will have basic fire protection and first aid training. Additional employees will have advanced emergency response training as required by applicable regulations.

Drax will contract with the Longview Fire Department (LFD) to be included in the fire service area. Although the facility is located in unincorporated Cowlitz County, the nearest fire station to the facility is operated by LFD.

5) Proposed measures to reduce or control environmental health hazards, if any:

Rocks (residual solids) from the step grate furnace and dryer will be reclaimed through sale to asphalt manufacturers, rather than being disposed of as waste.

Adverse environmental health hazards from caustic soda or diesel fuel spills are mitigated by use of secondary containment, spill kits, and spill response training for facility employees. An SPCC plan will be developed and implemented.

All caustic soda is chemically neutralized and consumed by the manufacturing process, therefore, there is no waste caustic soda.

b. Noise

1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?

Existing noise is consistent with a heavy industrial area and would not affect the proposed project.

2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.

Short-term construction related noise may include engine and mechanical equipment noises associated with the use of heavy equipment such as excavators, cranes, and concrete mixers. These noise levels would likely exceed existing background noise. Hauling activities to and from the project area would also contribute to traffic noise.

The proposed project would generate noise involved in the manufacturing process from operation of process equipment. The noise from facility operation is expected to be consistent with the surrounding heavy industrial area and not contribute to significant impacts above existing background noise.

3) Proposed measures to reduce or control noise impacts, if any:

All construction activities would comply with Cowlitz County noise ordinances. All impacts from noise generated by construction would be short term and temporary in nature. Construction best management practices would be used to minimize construction noise and could include:

- The site is not located adjacent to any residential zones.
- Construction work will typically occur between 6 am and 8 pm. There may be occurrences when a night shift could be required.
- Work will occur in an existing industrial zone that is likely to have similar noise levels on a daily basis.

- Locating activities away from sensitive receptors when possible;
- Notifying adjacent or nearby property owners near active construction areas of upcoming noisy construction activities; and
- Using effective vehicle mufflers, engine intake silencers, and engine enclosures, and shutting off equipment when not in use.

The land use in the surrounding area is zoned as Heavy Industrial and intended for industrial uses. Noise generated from the operation of the proposed project would not exceed noise levels for a typical manufacturer. The proposed project would comply with the Cowlitz County noise standards.

There is a Heron Rookery adjacent to the west side of the Finger Slough. Construction activities will be planned to mitigate noise impacts to heron breeding, using mitigation strategies such as those included in Management Recommendations for Washington's Priority Habitats and Species[3].

8. Land and Shoreline Use [help]

No proposed work within 200' of the Columbia River

a. What is the current use of the site and adjacent properties? Will the proposal affect current land uses on nearby or adjacent properties? If so, describe.

The previous land use was a log storage, sorting, and shipping yard. Adjacent properties include a grain terminal, marine port, pulp and paper mill, and other industrial operations. The proposal will not affect current land uses on nearby or adjacent properties.

b. Has the project site been used as working farmlands or working forest lands? If so, describe. How much agricultural or forest land of long-term commercial significance will be converted to other uses as a result of the proposal, if any? If resource lands have not been designated, how many acres in farmland or forest land tax status will be converted to nonfarm or nonforest use?

The site has historically been and is currently industrial. No agricultural or forest land will be disturbed.

1) Will the proposal affect or be affected by surrounding working farm or forest land normal business operations, such as oversize equipment access, the application of pesticides, tilling, and harvesting? If so, how:

No. There are no working farm or forest lands in the vicinity of the site.

c. Describe any structures on the site.

A small office, pumphouse, and maintenance building exist in the southeast corner of the site. A debarker and wash rack are located on the east side of the site. A small number (less than 10) of other light structures exist, such as tag shacks or portable office buildings. A copy of Drax's stormwater map, which includes locations of existing structures, is included as Attachment B.

d. Will any structures be demolished? If so, what?

[3] Azerrad, J. M. 2012. Management recommendations for Washington's priority species: Great Blue Heron. Washington Department of Fish and Wildlife, Olympia, Washington.

The debarker and some of the pole buildings and portable buildings may be removed, pending finalization of building plans.

e. What is the current zoning classification of the site?

Heavy Manufacturing (MH)

f. What is the current comprehensive plan designation of the site?

Economic Resource Land Industrial

g. If applicable, what is the current shoreline master program designation of the site?

No fixed infrastructure for this project – such as the facility, conveyors, and surge silo – will be located within the shoreline jurisdiction. The mobile ship loader use and loading operations will occur within a High Intensity designated area at the Port of Longview approximately 15 times per year. One ship approximately every 3 to 4 weeks is anticipated.

h. Has any part of the site been classified as a critical area by the city or county? If so, specify.

Cowlitz County (CCC 19.15.050) has defined critical areas as areas of greater environmental sensitivity in accordance with WAC 197-11-908. “Critical area” includes the following areas and ecosystems: (1) wetlands; (2) areas with a critical recharging effect on aquifers used for potable water; (3) fish and wildlife habitat conservation areas; (4) frequently flooded areas; and (5) geologically hazardous areas as defined in RCW 36.70A.030.

There are no wetlands onsite.

There are no publicly identified critical aquifer recharge areas that have been mapped within the project area boundary[4].

There are no fish and wildlife conservation critical areas within the project site.

The site does not lie in a frequently flooded area as defined in CCC 19.15.050. The site lies in an area with reduced flood risk due to the levee[5].

The site lies in an area of high susceptibility to liquefaction[6]. Appropriate measures will be taken in the design and construction of facility structures to protect against damages caused by seismic events, in accordance with local, state, and federal regulations.

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4 Cowlitz County Environmental Planning Internet Clearance (EPIC) GIS mapping for Group A and B Wellhead Protection Areas

5 FEMA Flood Map Service Center for Fibre Way, Longview, WA

6 WDNR: Liquefaction Susceptibility Map of Cowlitz County (2004) http://www.co.cowlitz.wa.us/DocumentCenter/View/3148

i. Approximately how many people would reside or work in the completed project?

The project would employ about 50 full time employees.

j. Approximately how many people would the completed project displace?

None; the property is an industrial site.

k. Proposed measures to avoid or reduce displacement impacts, if any:

Not applicable

L. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:

The proposal is consistent with the existing and projected land use plans

m. Proposed measures to reduce or control impacts to agricultural and forest lands of long-term commercial significance, if any:

None proposed

9. Housing [help]

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.

None

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.

None

c. Proposed measures to reduce or control housing impacts, if any:

Not applicable

10. Aesthetics [help]

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?

The tallest structures are the pellet storage silo stacks at 145 ft, constructed of metal. The mobile ship loader, conveyors, and surge silo are constructed of metal and anticipated to be 25, 82, and 75 ft, respectively, pending finalization of design.

b. What views in the immediate vicinity would be altered or obstructed?

No views in the immediate vicinity would be altered or obstructed beyond which is expected from typical industrial facilities in the nearby area. Views of the manufacturing equipment, buildings, and storage piles are typical for an industrial area.

c. Proposed measures to reduce or control aesthetic impacts, if any:

None

11. Light and Glare [help]

a. What type of light or glare will the proposal produce? What time of day would it mainly occur?

Onsite lighting will be required for safety and security from dusk until dawn. Buildings and equipment will not have surface coatings or materials that produce glare.

Aircraft warning lights may be installed as per prevailing rules and regulations.

Lighting is already or will be installed on and around dock loading equipment in order to meet United States Coast Guard requirements.

b. Could light or glare from the finished project be a safety hazard or interfere with views?

Lights will be directed inward toward the facility to avoid excess light pollution to surrounding areas. Views will not be affected nor will light impact visibility for drivers on nearby roads. Buildings and equipment will not have surface coatings or materials that produce glare. No views in the immediate vicinity would be altered or obstructed beyond which is expected from typical industrial facilities in the nearby area.

c. What existing off-site sources of light or glare may affect your proposal?

No known off-site sources of light or glare would affect the proposed project.

d. Proposed measures to reduce or control light and glare impacts, if any:

Light fixtures would be focused downwards and away from adjacent roads to reduce off-site glare and light pollution. Security lights would operate from dusk to dawn only and would be off during daylight hours to conserve energy. Lighting would only be bright enough to provide for safe working and security.

12. Recreation [help]

a. What designated and informal recreational opportunities are in the immediate vicinity?

The proposed project is located in a heavy industrial area. No bike or walking trails or parks are located near the proposed project. The only recreational activities that occur near the proposed project would occur on the Columbia River. The following recreational activities may occur on the Columbia River; fishing, water skiing, boating, and canoeing.

b. Would the proposed project displace any existing recreational uses? If so, describe.

The proposed project would not displace any existing recreational uses.

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:

No measures are proposed because no impacts on recreation opportunities are anticipated as a result of the proposed project.

13. Historic and cultural preservation [help]

a. Are there any buildings, structures, or sites, located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers ? If so, specifically describe.

None

b. Are there any landmarks, features, or other evidence of Indian or historic use or occupation? This may include human burials or old cemeteries. Are there any material evidence, artifacts, or areas of cultural importance on or near the site? Please list any professional studies conducted at the site to identify such resources.

A backhoe-assisted cultural resources survey was conducted in 2014 during the construction of the existing stormwater conveyance and infiltration system at the facility. The purpose of the survey was to document the presence or absence of archeological deposits associated with 45CW6, a Chinook village known to have been located near the mouth of the Cowlitz River, or other unrecorded archeological resources. No archeological resources were encountered during the survey, and the survey report concluded that no additional archeological investigations were necessary and that construction of the stormwater system could proceed on the condition that an Inadvertent Discovery Plan be developed and maintained onsite during construction.[7]

c. Describe the methods used to assess the potential impacts to cultural and historic resources on or near the project site. Examples include consultation with tribes and the department of archeology and historic preservation, archaeological surveys, historic maps, GIS data, etc.

The project is on an existing developed industrial site and surrounded by other developed industrial sites. There will be no additional impacts to cultural and historic resources on or near the project site.

[7] Roulette, Bill R. 2014 Cultural Resource Monitoring and Inadvertent Discovery Plan For the Pacific Lumber and Shipping, LLC, Stormwater Conveyance, and Treatment Improvement Project, Longview, Washington. Prepared for Pacific Lumber & Shipping, LLC, Longview, Washington

As discussed above, a backhoe-assisted cultural resources survey was conducted in 2014 and concluded that additional archeological investigations were not necessary.

d. Proposed measures to avoid, minimize, or compensate for loss, changes to, and disturbance to resources. Please include plans for the above and any permits that may be required.

An Inadvertent Discovery Plan, which includes photographs of common artifact types that may be found at archeological sites located in the lower Columbia River valley, will be on hand during construction, and construction personnel will be trained with the plan.

Standard Inadvertant Discovery language will be conditioned on all approved permits

14. Transportation [help]

a. Identify public streets and highways serving the site or affected geographic area and describe proposed access to the existing street system. Show on site plans, if any.

Public streets and highways serving the site and area include I-5, Fibre Way, and Industrial Way (SR-432). The site is along E Mill Rd (Port of Longview private road), and driveways provide access at multiple locations. A traffic study is provided in Attachment D.

b. Is the site or affected geographic area currently served by public transit? If so, generally describe. If not, what is the approximate distance to the nearest transit stop?

No, the site is not served by public transit. The nearest public transit stop is on Seventh Avenue at Wal-Mart approximately 1.5 miles away.

c. How many additional parking spaces would the completed project or non-project proposal have? How many would the project or proposal eliminate?

The project will not change the total site parking capacity. The facility will have approximately twenty designated parking spaces. A large open asphalt and gravel area onsite will provide additional parking if necessary.

d. Will the proposal require any new or improvements to existing roads, streets, pedestrian, bicycle or state transportation facilities, not including driveways? If so, generally describe (indicate whether public or private).

No changes to the existing transportation infrastructure are anticipated. A traffic study is provided in Attachment D.

e. Will the project or proposal use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.

Finished pellets will be loaded to ships on the Columbia River.

The project will not use or occur in the immediate vicinity of air transportation. The project will occur in the immediate vicinity of the West Rock rail spur. In the future the project could potentially have inbound fibre products via rail access, the quantities and timeline of which are currently unknown and dependent on economic conditions.

f. How many vehicular trips per day would be generated by the completed project or proposal? If known, indicate when peak volumes would occur and what percentage of the volume would be trucks (such as commercial and nonpassenger vehicles). What data or transportation models were used to make these estimates?

Fibre deliveries will come by truck. Approximately 200 trucks per day, 260 days of the year are anticipated. Truck deliveries will be at greatest frequency Monday through Friday between 6 am and 8 pm. Trucks will reach the site via East Mill Road, which is accessed from Fibre Way. Truck traffic total volume is estimated based on expected raw material demand and individual truck capacity. Truck traffic schedules are estimated based on the supply schedules of local sawmills, which produce the raw materials for pellets. A traffic study is provided in Attachment D.

There is an employee shift change at 7 am and 7 pm each day. Approximately twenty employees will arrive and depart during each shift change. An additional four employees work during the day Monday through Friday and will arrive in the mornings and depart in the evenings.

Finished pellets will be loaded into ships at Berth 8 at the Port of Longview on the Columbia River. Approximately 15 ships per year, or one ship approximately every 3 to 4 weeks are anticipated. Ship traffic volume is estimated based on maximum production of pellets and anticipated ship capacity.

g. Will the proposal interfere with, affect or be affected by the movement of agricultural and forest products on roads or streets in the area? If so, generally describe.

The proposed project would not interfere with or affect or be affected by the movement of agricultural and forest products on roads or streets in the area due to the industrial (rather than agricultural or forested) nature of the site and surrounding area. Trucks will enter the site from East Mill Road (Port of Longview private road), which will minimize additional congestion on public roads. A traffic study is provided in Attachment D.

h. Proposed measures to reduce or control transportation impacts, if any:

The project will utilize exclusively marine transportation for shipping finished products to minimize impacts of truck transportation on local roadways.

15. Public Services [help]

a. Would the project result in an increased need for public services (for example: fire protection, police protection, public transit, health care, schools, other)? If so, generally describe.

An increased need for public services is not anticipated, as there would generally be less than twenty employees and contractors onsite at a time. No industrial workplace hazards will be introduced beyond what is typical of local facilities. Occupational health and safety will be ensured with industry best practices and compliance with applicable regulations.

Drax will contract with the Longview Fire Department (LFD) to be included in the fire service area. Although the facility is located in unincorporated Cowlitz County, the nearest fire station to the facility is operated by LFD.

b. Proposed measures to reduce or control direct impacts on public services, if any.

All facility employees will have basic fire protection and first aid training. Additional employees will have advanced emergency response training as required by applicable regulations.

16. Utilities [help]

a. Circle utilities currently available at the site:
electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other _____

b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.

A natural gas line exists on the north edge of the property along Fibre Way. This line will be accessed and natural gas service established for onsite buildings and equipment. An underground connection will be constructed to facilitate natural gas access. It is anticipated that Cascade Natural Gas will be the utility provider.

A private industrial waste disposal contractor will handle general refuse and any potential hazardous waste. The contractor is yet to be chosen.

Electricity service exists at the site but may need to be upgraded. Cowlitz County Public Utility District is the utility provider.

Water for the WESP and general plant process water will be supplied by connection to the potable water line that is existing onsite.

Sanitary sewer service infrastructure exists at the site.

C. Signature [HELP]

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: _____

Name of signee George Anglada

Position and Agency/Organization President, Pinnacle USA

Date Submitted: 10/3/2022

D. Supplemental sheet for nonproject actions [HELP]

(**IT IS NOT NECESSARY** to use this sheet for project actions)

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment.

When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

1. How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?

Proposed measures to avoid or reduce such increases are:

2. How would the proposal be likely to affect plants, animals, fish, or marine life?

Proposed measures to protect or conserve plants, animals, fish, or marine life are:

3. How would the proposal be likely to deplete energy or natural resources?

Proposed measures to protect or conserve energy and natural resources are:

4. How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection; such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?

Proposed measures to protect such resources or to avoid or reduce impacts are:

5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?

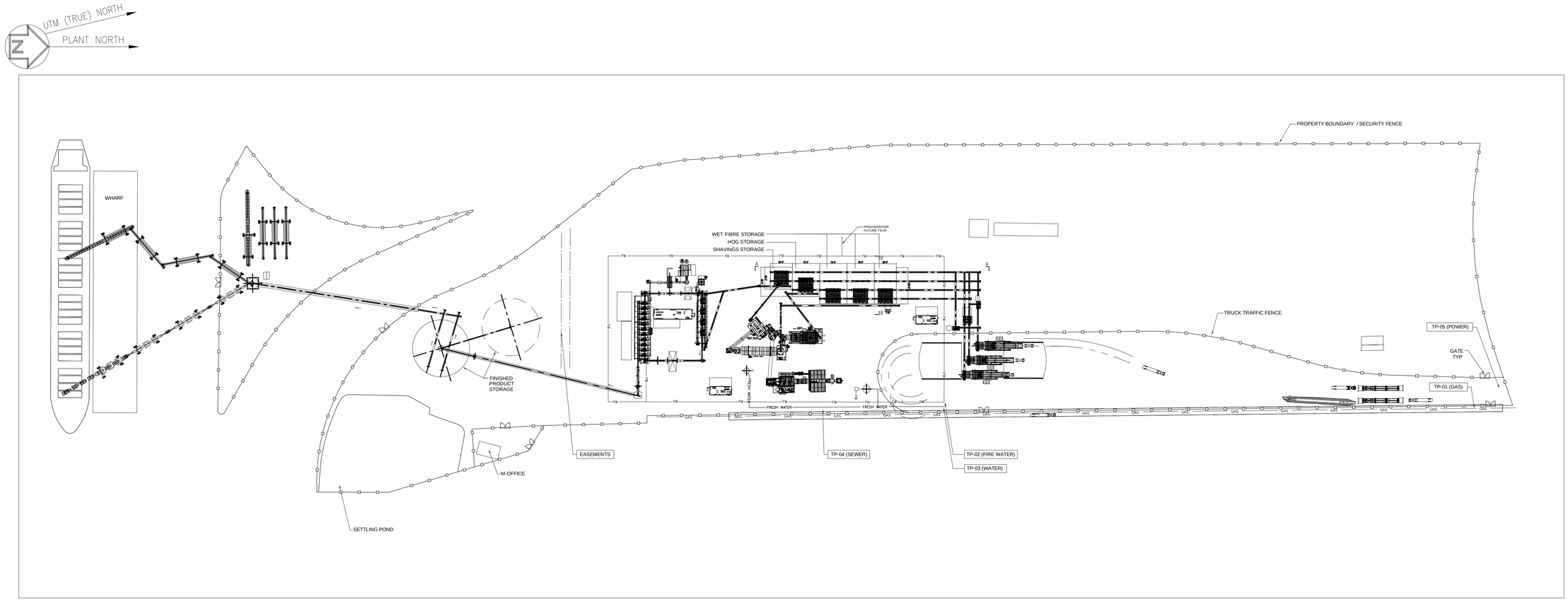
Proposed measures to avoid or reduce shoreline and land use impacts are:

6. How would the proposal be likely to increase demands on transportation or public services and utilities?

Proposed measures to reduce or respond to such demand(s) are:

7. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.

Attachment A: Site Plot Plan



SITE LAYOUT

SCALE: 1"=125'

LEGENDS:

1. FIRE WATER — FW
2. FRESH WATER — FRESH WATER
3. GAS — GAS

0 125' 250' 375' 500'

SCALE BAR

PROPERTY ADDRESS:
175 EAST MILL ROAD, LONGVIEW, WA, 98632

REV	DATE	REVISION DESCRIPTION	DRAWN	DRAFT CHK	DESIGNED	ENG CHK	APPROVED	CUSTOMER
0	07-27-22	ISSUED FOR INFORMATION	JA	MA	MA	SB	DF	

REF DRAWING No	REFERENCE DRAWING TITLE

ARCH D | SCALE NTS

Worley
energy | chemicals | resources

WORLEY PROJECT No.
417058-43742

ENGINEERING AND PERMIT STAMPS (As Required)

CUSTOMER

drax

DRAX PROJECT No.
DRXG1003-LONGVIEW

"This drawing is prepared solely for the use of the contractual customer of Worley and Worley assumes no liability to any other party for any representations contained in this drawing."

DRG TITLE

DRAX LONGVIEW
PELLET PLANT
AIR PERMIT PLAN
–

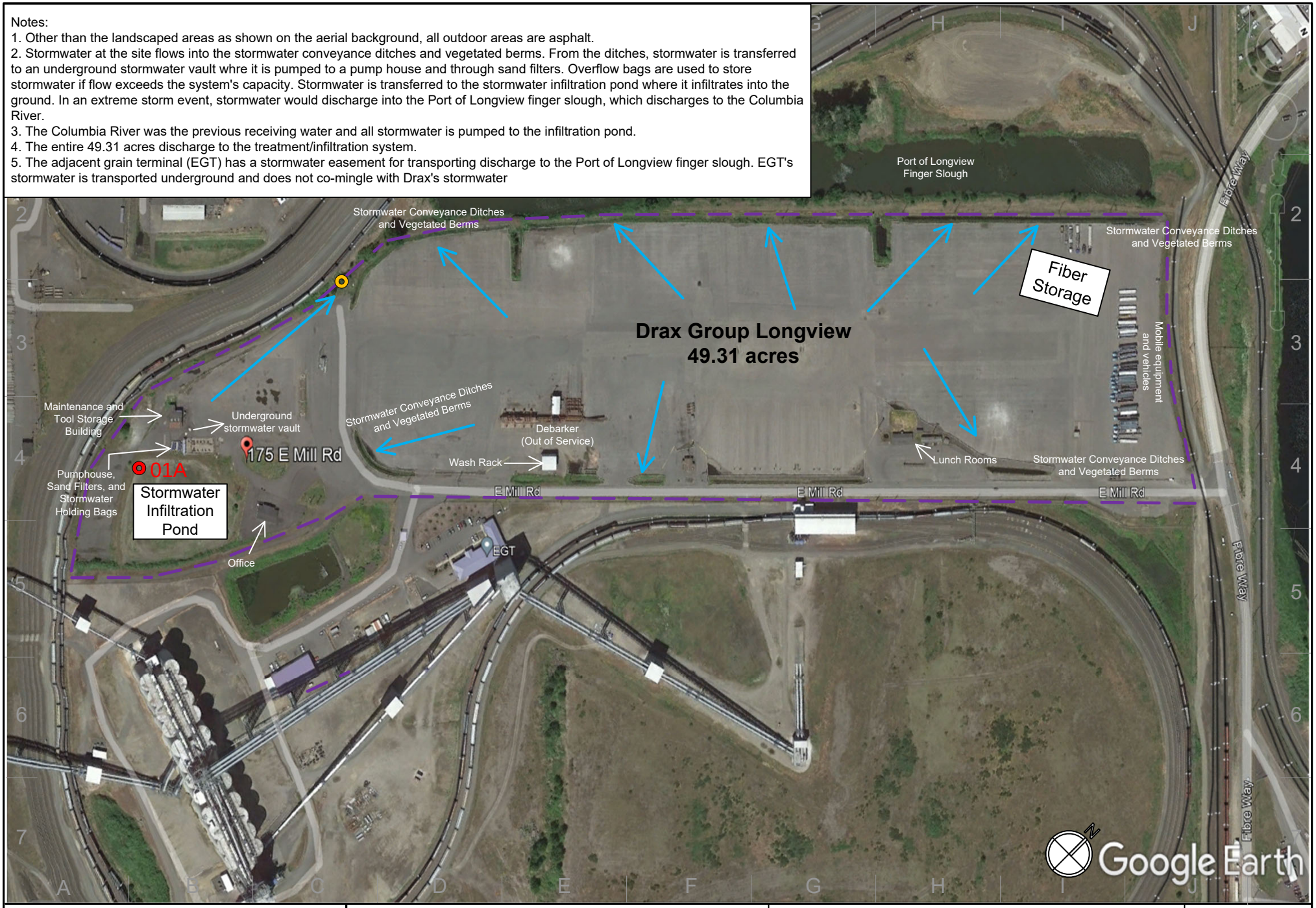
DRG No 417058-43742-GE-PLN-0002

REV 0

Worley_ARCH D

Attachment B: Existing Structure Map

Notes:
1. Other than the landscaped areas as shown on the aerial background, all outdoor areas are asphalt.
2. Stormwater at the site flows into the stormwater conveyance ditches and vegetated berms. From the ditches, stormwater is transferred to an underground stormwater vault whre it is pumped to a pump house and through sand filters. Overflow bags are used to store stormwater if flow exceeds the system's capacity. Stormwater is transferred to the stormwater infiltration pond where it infiltrates into the ground. In an extreme storm event, stormwater would discharge into the Port of Longview finger slough, which discharges to the Columbia River.
3. The Columbia River was the previous receiving water and all stormwater is pumped to the infiltration pond.
4. The entire 49.31 acres discharge to the treatment/infiltration system.
5. The adjacent grain terminal (EGT) has a stormwater easement for transporting discharge to the Port of Longview finger slough. EGT's stormwater is transported underground and does not co-mingle with Drax's stormwater



Prepared By:
Trinity Consultants

Prepared For:
drax
Drax Group Longview
175 East Mill Road
Longview, WA 98632

Legend
- Overflow Discharge Location – Monitoring Point
- Overflow Discharge to Port of Longview Finger Slough
- Stormwater Flow Direction to Drains
- Lease/Operational Boundary

Project Number:
194801.0045

Date:
May 2022

Attachment C: Geotechnical Report

March 4, 2022

Mr. Darren Swaan
Drax Biomass Inc.
1500 N. 19th Street, Suite 501
Monroe, Louisiana 71201

Via email: Darren.Swaan@pinnaclepellet.com

Regarding: Preliminary Geotechnical Considerations
Longview Industrial Site
Longview, Washington
PBS Project 73543.000

Dear Mr. Swaan:

PBS Engineering and Environmental Inc. (PBS) has prepared this letter summarizing preliminary geotechnical considerations for the proposed biomass plant located in Longview, Washington.

PROJECT UNDERSTANDING

PBS understands that the client intends to develop the Longview industrial site into a new biomass plant. A preliminary site layout has been provided to PBS. The site layout is currently being finalized, and foundation loads and type will be provided to PBS for consideration in preparing the geotechnical engineering report for the project.

The general site location is shown on the Vicinity Map, Figure 1. The locations of PBS' explorations in relation to existing site features, based on the proposed facility layout available at the time of exploration, are shown on the Site Plan, Figure 2.

SITE CONDITIONS

Surface Description

The site is roughly rectangular and is bordered to the north by Fibre Way, to the east by E Mill Road, to the south by train tracks, and to the west by a manmade pond and continued train tracks. The site is currently not in use and was formerly used as a lumber center. Various small buildings and structures typical of sawmills and lumber facilities remain on the site, most notably in the south-center of the site. Otherwise, the site is generally open, with the majority covered with asphalt concrete (AC) pavement. The site is located less than 1,000 feet to the northeast of the Columbia River.

Review of available site topographic data provided by the ALTA/NSPS Land Title Survey performed between April 6, 2021, and April 14, 2021, indicates the site is relatively flat with ground surface elevations ranging from 16 feet above mean level (amsl) in the south to 24 feet amsl to the north (NAVD 88). The site slopes gently to the east and west with higher elevations in the center of the site.

Subsurface Conditions

The site was explored by drilling 12 borings, designated B-1 through B-12, and advancing three cone penetration test (CPT) probes, designated CPT-1 through CPT-3. Borings were advanced to depths of 21.5 to 121.5 feet below the existing ground surface (bgs) by Holt Services, Inc., of Vancouver, Washington, using a track-mounted Mobile B-57 drill rig and mud rotary drilling techniques. CPTs were completed to depths of approximately 78 to 84 feet bgs by Oregon Geotechnical Explorations using a 20-ton, truck-mounted electric Dutch cone CPT rig. CPT-1 and CPT-2 were terminated due to refusal, and CPT-3 was advanced to its target depth of 80 feet bgs.

PBS has summarized the subsurface units as follows:

Asphalt Concrete and Aggregate Base:	Six inches of asphalt concrete (AC) underlain by 6 to 8 inches of aggregate base course was encountered at the ground surface in all 12 borings.
FILL:	Gravel fill was encountered beneath the AC and base course in borings B-1, B-2, B-3, B-5, B-6, B-8. B-10, B-11, and B-12, and was present to depths of approximately 2.5 to 5 feet bgs. The fill consisted of well-graded gravel (GW) with sand, silty gravel (GM) with sand, and well-graded gravel (GW-GW) with silt and sand. The fill consists of fine to coarse subangular gravel, fine to coarse sand, and was medium dense to very dense with SPT N-values ranging from 25 to more than 50 blows for less than 6 inches of penetration. Occasional woody debris was encountered in B-2 within the fill to a depth of approximately 5 feet. CPT-2 required predrilling using the mud-rotary drill rig in order to advance through approximately 6 feet of fill. The fill encountered in B-8 consisted of dense, brown-gray silty sand (SM) with fine to coarse sand, and fine to coarse subrounded to subangular gravel.
SAND:	Sand encountered in our explorations included poorly graded sand (SP-SM) with silt, silty sand (SM), well-graded sand (SW) with gravel, poorly graded sand (SP), well-graded sand (SW), and well-graded sand (SW-SM) with silt. The sand was generally gray and ranged from fine to coarse grained in the well-graded sands, and fine to medium in the poorly graded sands. SPT N-values ranged from 3 to 45 with relative densities of very loose to dense. The sand was generally encountered beneath the fill and present to the depth explored in all borings. This is consistent with subsurface conditions observed in the CPTs, which indicate the sand included occasional interbedding of fine-grained clay and silt.
SILT and CLAY:	Fine-grained soils were not prevalent throughout our explorations. Gray silt (ML) with sand was encountered infrequently in our borings and generally occurred as interbeds of less than 1.5 to 2 feet thick and between the sand deposits. Sandy silt (ML) was encountered directly beneath the AC and base course in B-4, and was present from a depth of approximately 1 foot bgs to 5 feet bgs. A 5-foot-thick silt layer was encountered at 20 feet bgs in B-7, and a 7-foot-thick layer was encountered at 25 feet bgs in B-9. Gray, high plasticity clay (CH) was encountered in the final SPT sample of B-1 at a depth of approximately 121 feet bgs.

Groundwater

Static groundwater was not directly measured in our borings due to the use of mud rotary drilling techniques. However, samples collected from our borings generally became wet between depths of 7 and 12 feet bgs. Pore pressure dissipation testing in the CPTs indicate groundwater could be present at depths of 7 to 10 feet bgs. We anticipate the static groundwater level is closely tied to the water level in the river and based on our experience, we anticipate the static groundwater level fluctuates several feet in response to rising and falling river levels. Note that groundwater levels can fluctuate during the year depending on climate, irrigation season, extended periods of precipitation, drought, and other factors such as proximity to waterways.

PRELIMINARY GEOTECHNICAL CONSIDERATIONS

The subsurface conditions at the site consist primarily of loose to medium dense sand. The sand soils encountered below groundwater at the site are susceptible to possible liquefaction resulting from a code-based earthquake. Conventional foundation support on shallow foundations such as spread footings and mat foundations is not feasible without some form of mitigation and/or consideration of earthquake risk. Deep foundations such as piles or drilled shafts could provide adequate support to new structures, although they could not likely be designed to mitigate the effects of liquefaction and lateral spreading at the site.

Liquefaction and Lateral Spreading

Liquefaction is defined as a decrease in the shear resistance of loose, saturated, cohesionless soil (e.g., sand) or low plasticity silt soils, due to the buildup of excess pore pressures generated during an earthquake. This results in a temporary transformation of the soil deposit into a viscous fluid. Liquefaction can result in ground settlement, foundation bearing capacity failure, and lateral spreading of ground.

Based on a review of the Washington Division of Geology and Earth Resources, the site is shown as having a high liquefaction hazard. Based on our analysis, we estimate up to approximately 13 inches of liquefaction-induced settlement could occur in the upper 50 feet (primarily in sandy soils), with a theoretical additional 11 inches of settlement between 50 feet bgs and the refusal depth of the CPT at approximately 85 feet bgs. However, we consider these estimates to be conservative, as it has not been well demonstrated that theoretical settlements at great depth (e.g., greater than 50 feet) will result in settlement at the ground surface. WSDOT is the only local agency that has established a limiting depth for the evaluation of liquefaction, and they recommend considering liquefaction to a depth of up to 80 feet bgs. Similar magnitudes of settlement are expected to occur across the site. With area-wide settlement, differential settlement is expected to be about half of the total settlement.

Due to the magnitude of estimated liquefaction settlement, and proximity to the free-face along the Columbia River, lateral spreading on the order of several feet could occur as a result of a code-based earthquake.

Foundation Alternatives

The soils at the site present a challenge for support of the proposed facility during a code-based earthquake. The site is underlain by loose to medium dense, granular soils that are susceptible to liquefaction to about the depth explored.

Given the presence of shallow groundwater and potentially liquefiable soils, structures would not perform adequately during a code based earthquake without some form of soil improvement, although structure foundations could be designed to perform adequately for static conditions.

If site soils are improved, new structures could be founded on mat foundations or spread footings tied together with grade beams. PBS did consider deep foundations to mitigate the effects of liquefaction. However, deep foundations that penetrate the liquefiable soils would have capacities that are small due to limited embedment into the underlying, non-liquefiable soils while also resisting downdrag loads from settlement of the overlying non-liquefiable and potentially liquefiable soils. In addition, the use of piles would not adequately mitigate lateral spreading. Based on subsurface conditions encountered at this site and our analyses, use of deep foundations to mitigate liquefaction settlement and lateral spreading is not likely economically feasible.

Soil Improvement

Due to the potential for liquefaction, soil improvement may be considered to adequately support structure foundations during a code-based earthquake. The detailed design for soil improvement, such as stone columns or deep soil mixing (DSM), are typically completed by a design-build contractor. Stone columns would provide suitable static support but would not provide adequate resistance to liquefaction in fine-grained silt soils or sandy soils with more than 15% fines. DSM can be used to provide both improved static support of new foundations and mitigate the effects of liquefaction.

Depending on the settlement limitations of the new structures, improving all the potentially liquefiable soils at the site may not be necessary. The risk of surface manifestation of liquefaction can be reduced by a non-liquefiable layer at the surface (i.e. "crust"). Using the estimated ground surface acceleration associated with a design-level earthquake, methods developed by Ishihara (1985), and the liquefiable layer thickness at the site, the crust would need to be on the order of 30 feet thick or more. The current crust thickness is on the order of 5- to 10-feet-thick (depth of groundwater). Using soil improvement techniques to increase the thickness of the crust would allow for the use of shallow foundations or a mat. Because improving the crust does not improve the potentially liquefiable layers at greater depths, liquefaction settlement below the improved soil would probably still occur.

Stone Columns

Installation of stone columns is a common method to mitigate liquefaction. Stone columns incorporate a vibratory probe that is advanced to the target depth, with the void created filled with compacted crushed rock as the probe is extracted, creating a series of stone columns. Advancing the probe as it vibrates can densify loose cohesionless sand, while the replacement with crushed rock acts to improve soft, fine-grained soils that cannot be densified due to their fine-grained nature by reinforcing them with better materials. Stone columns also provide a path for faster dissipation of excess pore water pressures during earthquake events, further reducing liquefaction potential.

Depending on the application, stone columns can be 2 to 3 feet in diameter and installed in a grid at about 6 to 10 feet on-center. The actual diameter and spacing is typically determined by a specialty subcontractor, with the design reviewed by the project geotechnical engineer. We recommend stone columns extend to depths of at least 40 feet bgs or deeper. The extent beyond the intended area of improvement should be approximately one-third the depth of improvement. This would correspond to approximately 25 feet beyond the edge of footings. Stone columns can be used in conjunction with appropriately designed building foundation systems, including spread footings and mats.

Due to the fines content of soils at the site, use of stone columns or vibro-compaction may be less effective than other techniques.

Deep Soil Mixing

As an alternative to the stone columns, a method of mixing cement into the subsurface soils may be used to form columns or walls of cement-amended soils. Using this methodology, either dry or wet cement is injected into the ground with a series of paddles/blades. The paddles rotate during installation creating a generally uniform column of cement-amended soil, which provides greatly increased allowable bearing pressures. The building loads are then supported on shallow foundations resting on the amended soil. In addition, if the columns are installed in an overlapping or touching linear array, the line of columns provides significant shear resistance to lateral soil loads. Often, the linear arrays are arranged in a box pattern forming a series of boxes, or cells, across the site. Experience has shown that the native soil retained in the box pattern has a reduced risk of liquefaction.

Soil mixing would incorporate 2- to 6-foot diameter columns installed in an overlapping pattern having a compressive strength of about 200 pounds per square inch (psi). Treatment area ratios can range from 10 to 30% or more.

LIMITATIONS

This preliminary report has been prepared for the exclusive use of the addressee, and their architects and engineers, for aiding in the design and construction of the proposed development and is not to be relied upon by other parties. It is not to be photographed, photocopied, or similarly reproduced, in total or in part, without express written consent of the client and PBS. It is the addressee's responsibility to provide this report to the appropriate design professionals, building officials, and contractors to ensure correct implementation of the recommendations.

The opinions, comments, and conclusions presented in this report are based upon information derived from our literature review, field explorations, laboratory testing, and engineering analyses. It is possible that soil, rock, or groundwater conditions could vary between or beyond the points explored. If soil, rock, or groundwater conditions are encountered during construction that differ from those described herein, the client is responsible for ensuring that PBS is notified immediately so that we may reevaluate the recommendations of this report.

Unanticipated fill, soil and rock conditions, and seasonal soil moisture and groundwater variations are commonly encountered and cannot be fully determined by merely taking soil samples or completing explorations such as soil borings. Such variations may result in changes to our recommendations and may require additional funds for expenses to attain a properly constructed project; therefore, we recommend a contingency fund to accommodate such potential extra costs.

The scope of work for this subsurface exploration and geotechnical report did not include environmental assessments or evaluations regarding the presence or absence of wetlands or hazardous substances in the soil, surface water, or groundwater at this site.

CLOSING

Please feel free to contact Shaun Cordes at 503.935.5517 or shaun.cordes@pbsusa.com, or Ryan White at 503.539.5028 or ryan.white@pbsusa.com with any questions or comments.

Sincerely,

Shaun Cordes, LG, LEG
Senior Engineering Geologist
PBS Engineering and Environmental Inc.

Ryan White, PE, GE (OR)
Principal Geotechnical Engineer
PBS Engineering and Environmental Inc.

Figures

Attachment A: Field Explorations

Attachment B: Laboratory Testing

SC:RW:rg

Figures

VICINITY MAP

LONGVIEW INDUSTRIAL SITE
LONGVIEW, WASHINGTON

DATE: MAR 2022 · PROJECT: 73543.000

PBS

FIGURE

1

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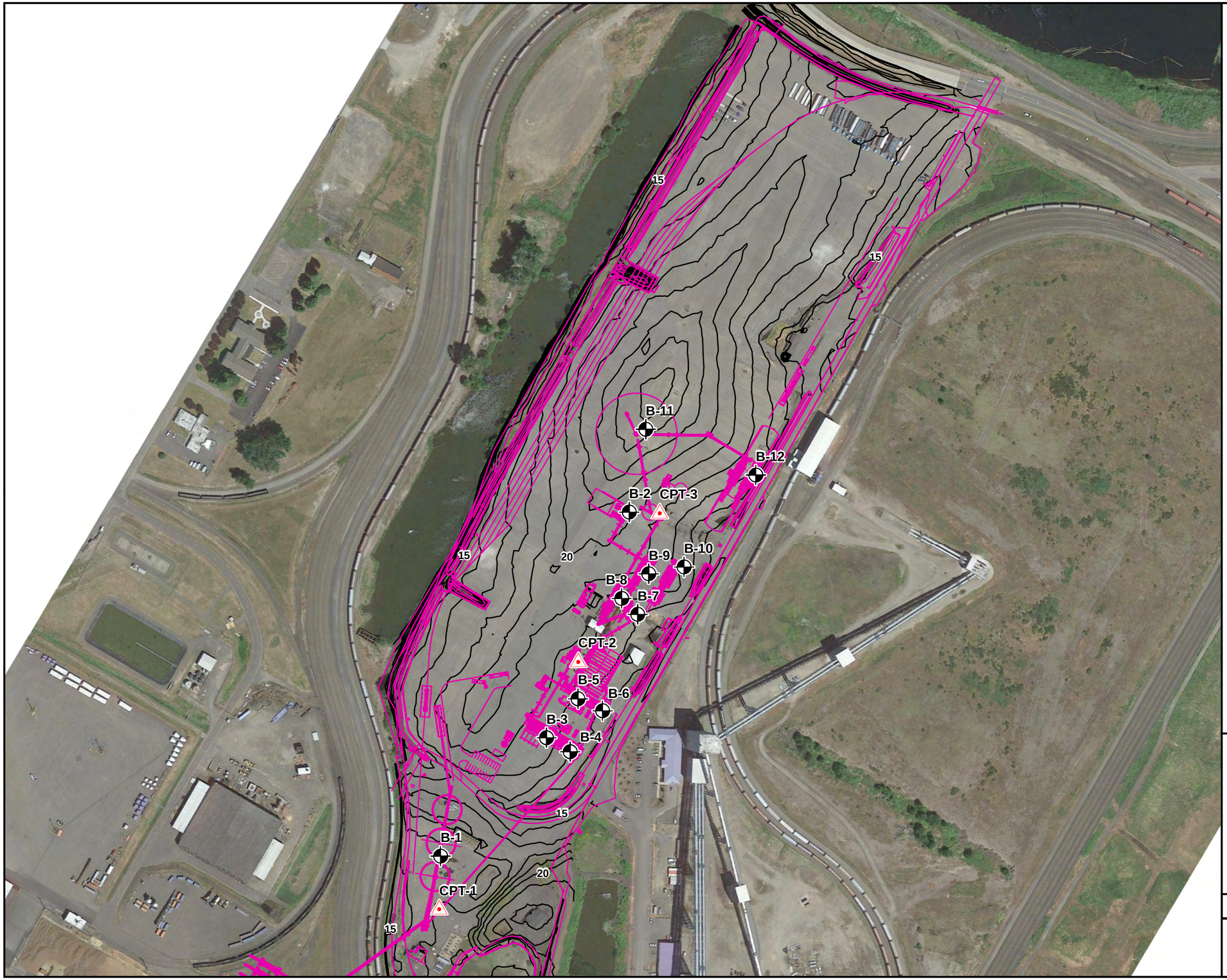

EXPLANATION

- B-1 - Boring name and approximate location
- CPT-1 - Cone penetration test name and approximate location
- Proposed site layout
- 1-foot elevation contours (ALTA/NSPS Land Title Survey, April 2021)

SOURCES: Google Earth 2021

1 inch = 300 feet

0 150 300 Feet 600

SITE PLAN

LONGVIEW INDUSTRIAL SITE
LONGVIEW, WASHINGTON

DATE: MAR 2022 · PROJECT: 73543.000

PBS

FIGURE
2

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Attachment A
Field Explorations

Table A-1
Terminology Used to Describe Soil

Soil Descriptions

Soils exist in mixtures with varying proportions of components. The predominant soil, i.e., greater than 50 percent based on total dry weight, is the primary soil type and is capitalized in our log descriptions (SAND, GRAVEL, SILT, or CLAY). Smaller percentages of other constituents in the soil mixture are indicated by use of modifier words in general accordance with the ASTM D2488-06 Visual-Manual Procedure. "General Accordance" means that certain local and common descriptive practices may have been followed. In accordance with ASTM D2488-06, group symbols (such as GP or CH) are applied on the portion of soil passing the 3-inch (75mm) sieve based on visual examination. The following describes the use of soil names and modifying terms used to describe fine- and coarse-grained soils.

Fine-Grained Soils (50% or greater fines passing 0.075 mm, No. 200 sieve)
The primary soil type, i.e., SILT or CLAY is designated through visual-manual procedures to evaluate soil toughness, dilatency, dry strength, and plasticity. The following outlines the terminology used to describe fine-grained soils, and varies from ASTM D2488 terminology in the use of some common terms.

Primary soil NAME, Symbols, and Adjectives			Plasticity Description	Plasticity Index (PI)
SILT (ML & MH)	**CLAY (CL & CH)**	**ORGANIC SOIL (OL & OH)**		
SILT		Organic SILT	Non-plastic	0 – 3
SILT		Organic SILT	Low plasticity	4 – 10
SILT/Elastic SILT	Lean CLAY	Organic SILT/ Organic CLAY	Medium Plasticity	10 – 20
Elastic SILT	Lean/Fat CLAY	Organic CLAY	High Plasticity	20 – 40
Elastic SILT	Fat CLAY	Organic CLAY	Very Plastic	>40

Modifying terms describing secondary constituents, estimated to 5 percent increments, are applied as follows:

Description	% Composition	
With Sand	% Sand ≥ % Gravel	15% to 25% plus No. 200
With Gravel	% Sand < % Gravel	
Sandy	% Sand ≥ % Gravel	≤30% to 50% plus No. 200
Gravelly	% Sand < % Gravel	

Borderline Symbols, for example CH/MH, are used when soils are not distinctly in one category or when variable soil units contain more than one soil type. **Dual Symbols,** for example CL-ML, are used when two symbols are required in accordance with ASTM D2488.

Soil Consistency terms are applied to fine-grained, plastic soils (i.e., PI ≥ 7). Descriptive terms are based on direct measure or correlation to the Standard Penetration Test N-value as determined by ASTM D1586-84, as follows. SILT soils with low to non-plastic behavior (i.e., PI < 7) may be classified using relative density.

Consistency Term	SPT N-value	Unconfined Compressive Strength	
		tsf	kPa
Very soft	Less than 2	Less than 0.25	Less than 24
Soft	2 – 4	0.25 – 0.5	24 – 48
Medium stiff	5 – 8	0.5 – 1.0	48 – 96
Stiff	9 – 15	1.0 – 2.0	96 – 192
Very stiff	16 – 30	2.0 – 4.0	192 – 383
Hard	Over 30	Over 4.0	Over 383

Soil Descriptions

Coarse - Grained Soils (less than 50% fines)

Coarse-grained soil descriptions, i.e., SAND or GRAVEL, are based on the portion of materials passing a 3-inch (75mm) sieve. Coarse-grained soil group symbols are applied in accordance with ASTM D2488-06 based on the degree of grading, or distribution of grain sizes of the soil. For example, well-graded sand containing a wide range of grain sizes is designated SW; poorly graded gravel, GP, contains high percentages of only certain grain sizes. Terms applied to grain sizes follow.

Material NAME	Particle Diameter	
	Inches	Millimeters
SAND (SW or SP)	0.003 – 0.19	0.075 – 4.8
GRAVEL (GW or GP)	0.19 – 3	4.8 – 75
Additional Constituents:		
Cobble	3 – 12	75 – 300
Boulder	12 – 120	300 – 3050

The primary soil type is capitalized, and the fines content in the soil are described as indicated by the following examples. Percentages are based on estimating amounts of fines, sand, and gravel to the nearest 5 percent. Other soil mixtures will have similar descriptive names.

Example: Coarse-Grained Soil Descriptions with Fines

>5% to < 15% fines (Dual Symbols)	≥15% to < 50% fines
Well graded GRAVEL with silt: GW-GM	Silty GRAVEL: GM
Poorly graded SAND with clay: SP-SC	Silty SAND: SM

Additional descriptive terminology applied to coarse-grained soils follow.

Example: Coarse-Grained Soil Descriptions with Other Coarse-Grained Constituents

Coarse-Grained Soil Containing Secondary Constituents	
With sand or with gravel	≥ 15% sand or gravel
With cobbles; with boulders	Any amount of cobbles or boulders.

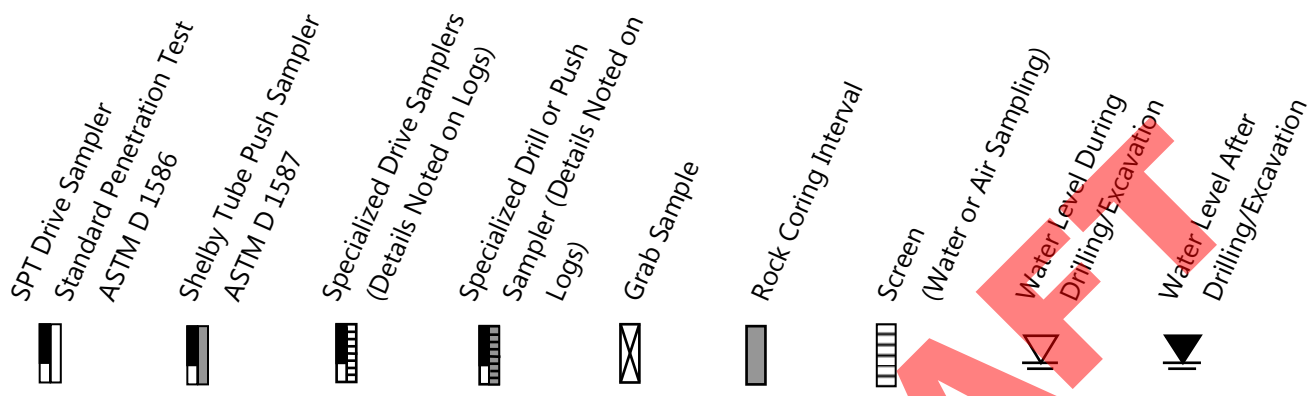
Cobble and boulder deposits may include a description of the matrix soils, as defined above.

Relative Density terms are applied to granular, non-plastic soils based on direct measure or correlation to the Standard Penetration Test N-value as determined by ASTM D1586-84.

Relative Density Term	SPT N-value
Very loose	0 – 4
Loose	5 – 10
Medium dense	11 – 30
Dense	31 – 50
Very dense	> 50

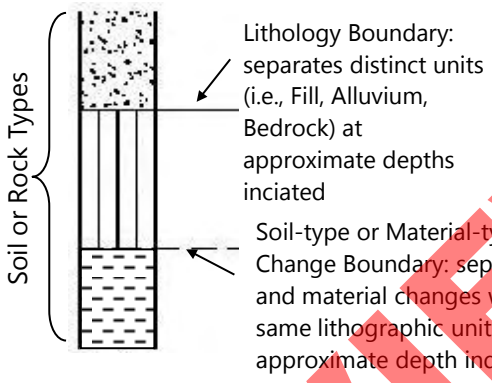
Table A-2
Key To Test Pit and Boring Log Symbols

SAMPLING DESCRIPTIONS

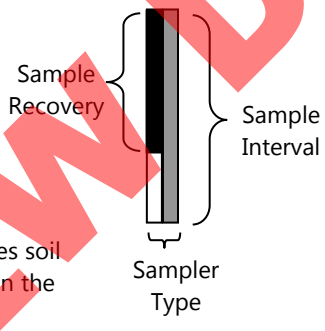


LOG GRAPHICS

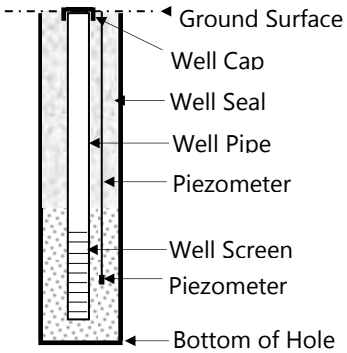
Soil and Rock



Sampling Symbols



Instrumentation Detail

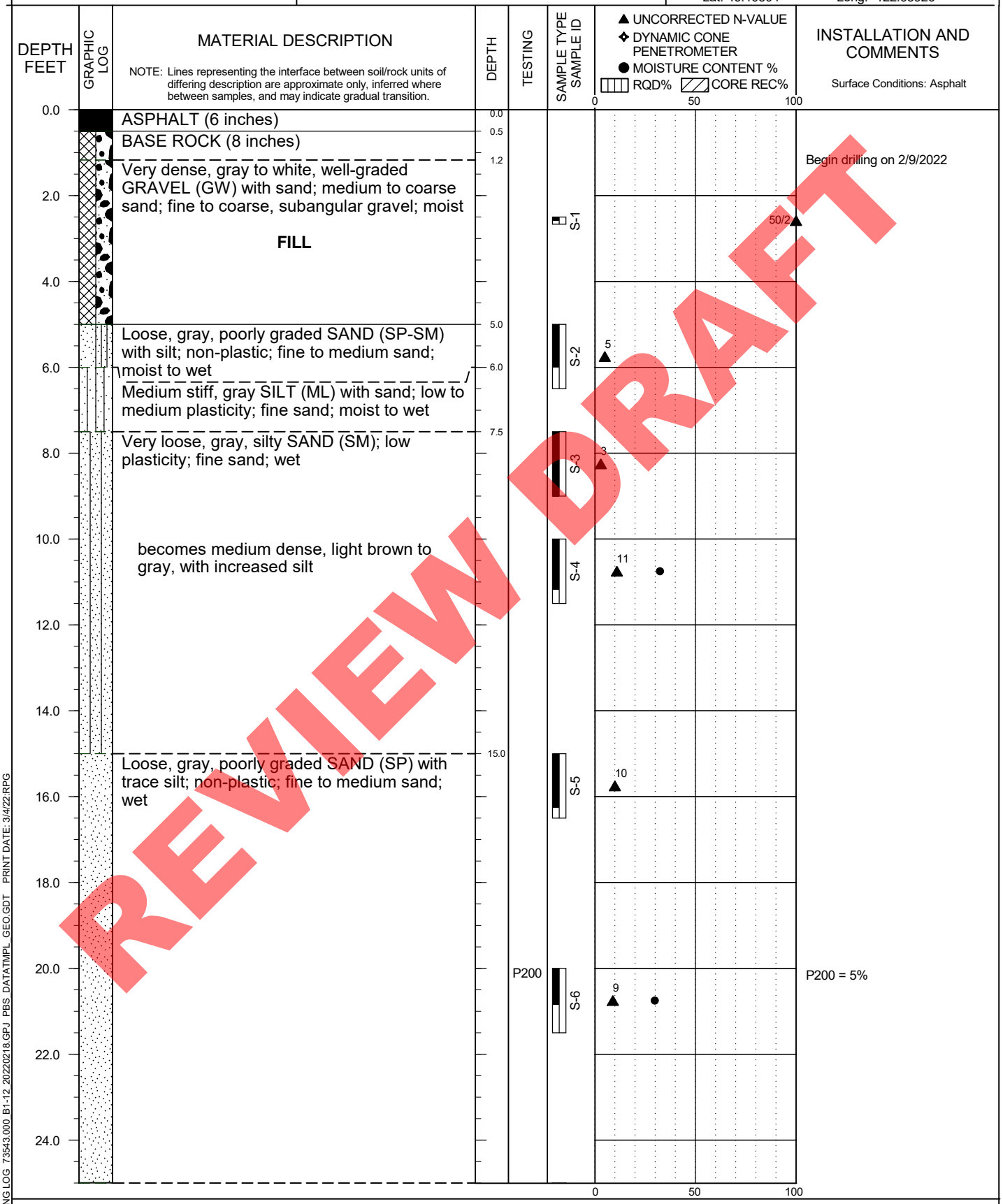


Geotechnical Testing Acronym Explanations

PP	Pocket Penetrometer	HYD	Hydrometer Gradation
TOR	Torvane	SIEV	Sieve Gradation
DCP	Dynamic Cone Penetrometer	DS	Direct Shear
ATT	Atterberg Limits	DD	Dry Density
PL	Plasticity Limit	CBR	California Bearing Ratio
LL	Liquid Limit	RES	Resilient Modulus
PI	Plasticity Index	VS	Vane Shear
P200	Percent Passing US Standard No. 200 Sieve	bgs	Below ground surface
OC	Organic Content	MSL	Mean Sea Level
CON	Consolidation	HCL	Hydrochloric Acid
UC	Unconfined Compressive Strength		

Details of soil and rock classification systems are available on request.

PBS	LONGVIEW INDUSTRIAL SITE LONGVIEW, WASHINGTON	**BORING B-1**
	PBS PROJECT NUMBER: 73543.000	APPROX. BORING B-1 LOCATION: (See Site Plan) Lat: 46.10304 Long: -122.93926



BORING LOG 73543.000 B1-12 20220218.GPJ PBS_DATATMPL_GEO.GDT PRINT DATE: 3/4/22:RPG

DRILLING METHOD: Mud Rotary
DRILLED BY: Holt Services, Inc.
LOGGED BY: J. Powell

BIT DIAMETER: 4 7/8 inches
HAMMER EFFICIENCY PERCENT: 89.9
LOGGING COMPLETED: 2/10/2022

FIGURE A1

DEPTH FEET	MATERIAL DESCRIPTION	DEPTH	SAMPLE TYPE / SAMPLE ID	UNCORRECTED N-VALUE / DYNAMIC CONE PENETROMETER / MOISTURE CONTENT % / RQD% / CORE REC%	INSTALLATION AND COMMENTS
	NOTE: Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition.			0 50 100	Surface Conditions: Asphalt
26.0	Medium dense, gray, well-graded SAND (SW); fine to coarse sand; wet	25.0	S-7	19	
28.0					
30.0	Medium dense, gray, well-graded SAND (SW) with gravel; fine to coarse sand; fine, subrounded gravel; wet	30.0	S-8	26	
32.0					
34.0			S-9	22	
36.0					
38.0					
40.0	Medium dense, gray, poorly graded SAND (SP); fine to medium sand; wet	40.0	S-10	23	
42.0					
44.0					
46.0			S-11	23	
48.0					
50.0					

DRILLING METHOD: Mud Rotary
DRILLED BY: Holt Services, Inc.
LOGGED BY: J. Powell

BIT DIAMETER: 4 7/8 inches
HAMMER EFFICIENCY PERCENT: 89.9
LOGGING COMPLETED: 2/10/2022

FIGURE A1

LONGVIEW INDUSTRIAL SITE
LONGVIEW, WASHINGTON

PBS PROJECT NUMBER:
73543.000

BORING B-1
(continued)

APPROX. BORING B-1 LOCATION:
(See Site Plan)
Lat: 46.10304 Long: -122.93926

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH	TESTING	SAMPLE TYPE SAMPLE ID	UNCORRECTED N-VALUE / DYNAMIC CONE PENETROMETER / MOISTURE CONTENT % / RQD% / CORE REC%	INSTALLATION AND COMMENTS
50.0		NOTE: Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition.	50.0			0 50 100	Surface Conditions: Asphalt
		Medium dense, gray, poorly graded SAND (SP-SM) with silt; non-plastic; fine to medium sand; wet			S-12	24	
52.0							
54.0							
					S-13	29	
56.0							
58.0							
60.0					S-14	26	
62.0							
64.0							
		Medium dense, gray, poorly graded SAND (SP); fine to medium sand; wet	65.0		S-15	26	
66.0							
68.0							
70.0		Medium dense, gray, poorly graded SAND (SP-SM) with silt and gray-blue and red gravel; non-plastic; fine to medium sand; fine, subangular gravel; wet	70.0		S-16	23	
72.0							
74.0						0 50 100	

DRILLING METHOD: Mud Rotary
DRILLED BY: Holt Services, Inc.
LOGGED BY: J. Powell

BIT DIAMETER: 4 7/8 inches
HAMMER EFFICIENCY PERCENT: 89.9
LOGGING COMPLETED: 2/10/2022

FIGURE A1

PBS	LONGVIEW INDUSTRIAL SITE LONGVIEW, WASHINGTON	**BORING B-1** (continued)
	PBS PROJECT NUMBER: 73543.000	APPROX. BORING B-1 LOCATION: (See Site Plan) Lat: 46.10304 Long: -122.93926

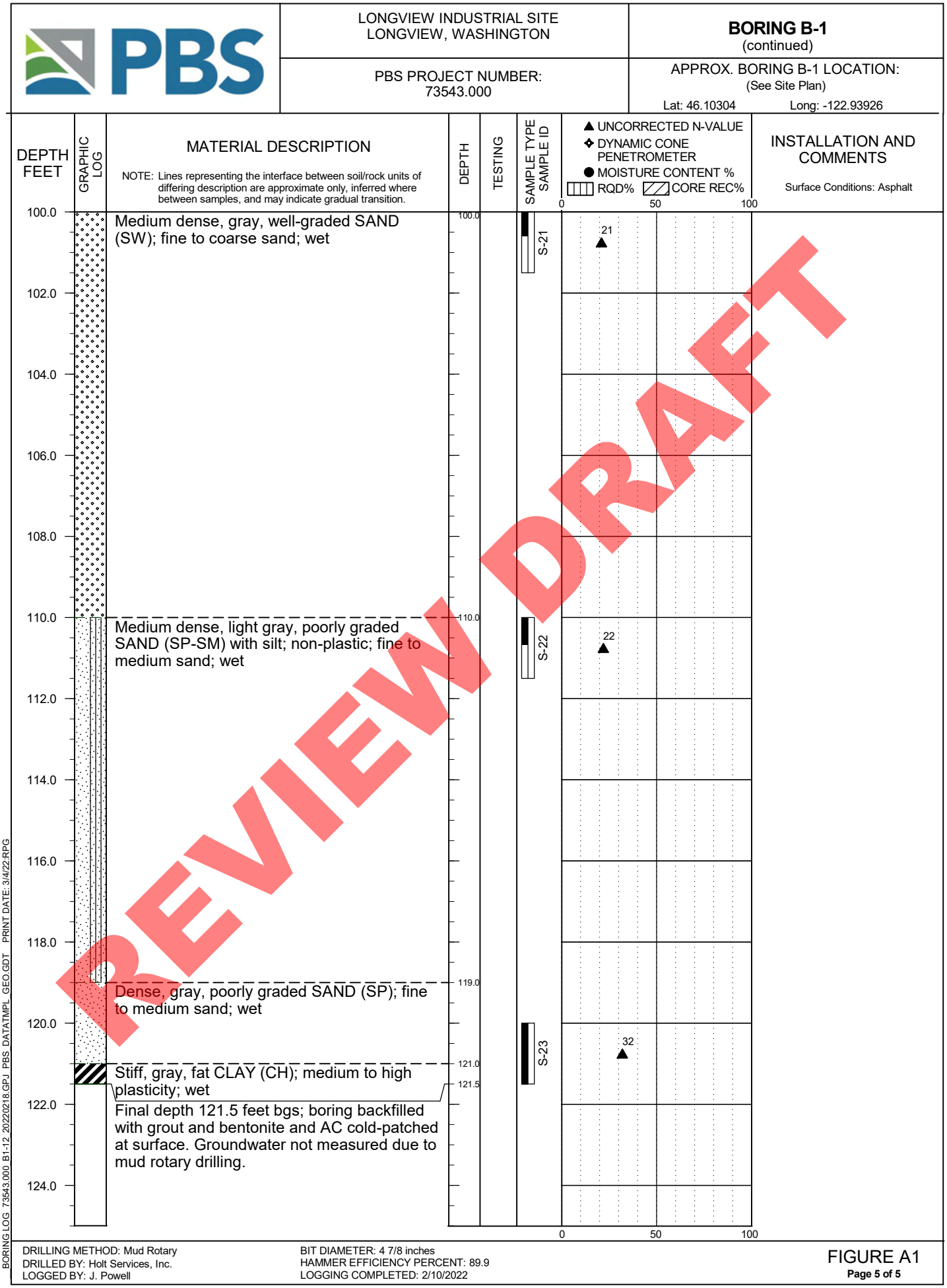
DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH	TESTING	SAMPLE TYPE SAMPLE ID	UNCORRECTED N-VALUE / DYNAMIC CONE PENETROMETER / MOISTURE CONTENT % / RQD% / CORE REC%	INSTALLATION AND COMMENTS
		NOTE: Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition.				0 50 100	Surface Conditions: Asphalt
76.0		Medium dense, gray, poorly graded SAND (SP); fine to medium sand; wet	75.0		S-17	24	
78.0							
80.0					S-18	22	
82.0							
84.0							
		Medium dense, gray, poorly graded SAND (SP-SM) with silt; fine to medium sand; wet	85.0		S-19	22	
86.0							
88.0							
90.0					S-20	20	Finish drilling on 2/9/2022; resume on 2/10/2022
92.0							
94.0							
96.0							
98.0							
100.0						0 50 100	

BORING LOG 73543.000 B1-12 20220218.GPJ PBS_DATATMPL_GEO.GDT PRINT DATE: 3/4/22:RPG

DRILLING METHOD: Mud Rotary
DRILLED BY: Holt Services, Inc.
LOGGED BY: J. Powell

BIT DIAMETER: 4 7/8 inches
HAMMER EFFICIENCY PERCENT: 89.9
LOGGING COMPLETED: 2/10/2022

FIGURE A1


LONGVIEW INDUSTRIAL SITE
LONGVIEW, WASHINGTON
PBS PROJECT NUMBER:
73543.000
BORING B-1
(continued)
APPROX. BORING B-1 LOCATION:
(See Site Plan)
Lat: 46.10304
Long: -122.93926
DEPTH FEET
GRAPHIC LOG
MATERIAL DESCRIPTION
NOTE: Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition.
DEPTH
TESTING
SAMPLE TYPE
SAMPLE ID
UNCORRECTED N-VALUE
DYNAMIC CONE PENETROMETER
MOISTURE CONTENT %
RQD%
CORE REC%
INSTALLATION AND COMMENTS
Surface Conditions: Asphalt
100.0
102.0
104.0
106.0
108.0
110.0
112.0
114.0
116.0
118.0
120.0
122.0
124.0
Medium dense, gray, well-graded SAND (SW); fine to coarse sand; wet
Medium dense, light gray, poorly graded SAND (SP-SM) with silt; non-plastic; fine to medium sand; wet
Dense, gray, poorly graded SAND (SP); fine to medium sand; wet
Stiff, gray, fat CLAY (CH); medium to high plasticity; wet
Final depth 121.5 feet bgs; boring backfilled with grout and bentonite and AC cold-patched at surface. Groundwater not measured due to mud rotary drilling.
S-21
S-22
S-23
21
22
32
0
50
100
REVIEW DRAFT
BORING LOG 73543.000 B1-12 20220218.GPJ PBS_DATATMPL_GEO.GDT PRINT DATE: 3/4/22:RPG
DRILLING METHOD: Mud Rotary
DRILLED BY: Holt Services, Inc.
LOGGED BY: J. Powell
BIT DIAMETER: 4 7/8 inches
HAMMER EFFICIENCY PERCENT: 89.9
LOGGING COMPLETED: 2/10/2022
FIGURE A1
Page 5 of 5

LONGVIEW INDUSTRIAL SITE
LONGVIEW, WASHINGTON

BORING B-2

PBS PROJECT NUMBER:
73543.000

APPROX. BORING B-2 LOCATION:
(See Site Plan)
Lat: 46.10601 Long: -122.93711

DEPTH FEET	MATERIAL DESCRIPTION	DEPTH	TESTING	SAMPLE TYPE / SAMPLE ID	INSTALLATION AND COMMENTS
0.0	ASPHALT (6 inches)	0.0			Surface Conditions: Asphalt
	BASE ROCK (6 inches)	0.5			
2.0	Dense, brown-gray, silty GRAVEL (GM) with sand and occasional woody organics; non-plastic; fine to coarse sand; fine to coarse, subangular gravel; moist	1.0		S-1	
	FILL				
4.0					
6.0	Dense, gray, silty SAND (SM); non-plastic; fine to medium sand; moist	5.0		S-2	
8.0	Medium dense, gray, poorly graded SAND (SP-SM) with silt; non-plastic; fine to medium sand; moist	7.5		S-3	
10.0				S-4	
12.0					
14.0					
16.0	Loose, gray, silty SAND (SM); non-plastic; fine to medium sand; wet	15.0	P200	S-5	P200 = 23% Slight organic odor
18.0					
20.0	becomes medium dense, with fine to coarse sand			S-6	
22.0	Final depth 21.5 feet bgs; boring backfilled with grout and bentonite and AC cold-patched at surface. Groundwater not measured due to mud rotary drilling.	21.5			
24.0					

NOTE: Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition.

▲ UNCORRECTED N-VALUE
◇ DYNAMIC CONE PENETROMETER
● MOISTURE CONTENT %
RQD% CORE REC%

0 50 100

S-1: 35
S-2: 37
S-3: 16
S-4: 13
S-5: 7
S-6: 12

DRILLING METHOD: Mud Rotary
DRILLED BY: Holt Services, Inc.
LOGGED BY: J. Powell

BIT DIAMETER: 4 7/8 inches
HAMMER EFFICIENCY PERCENT: 89.9
LOGGING COMPLETED: 2/14/2022

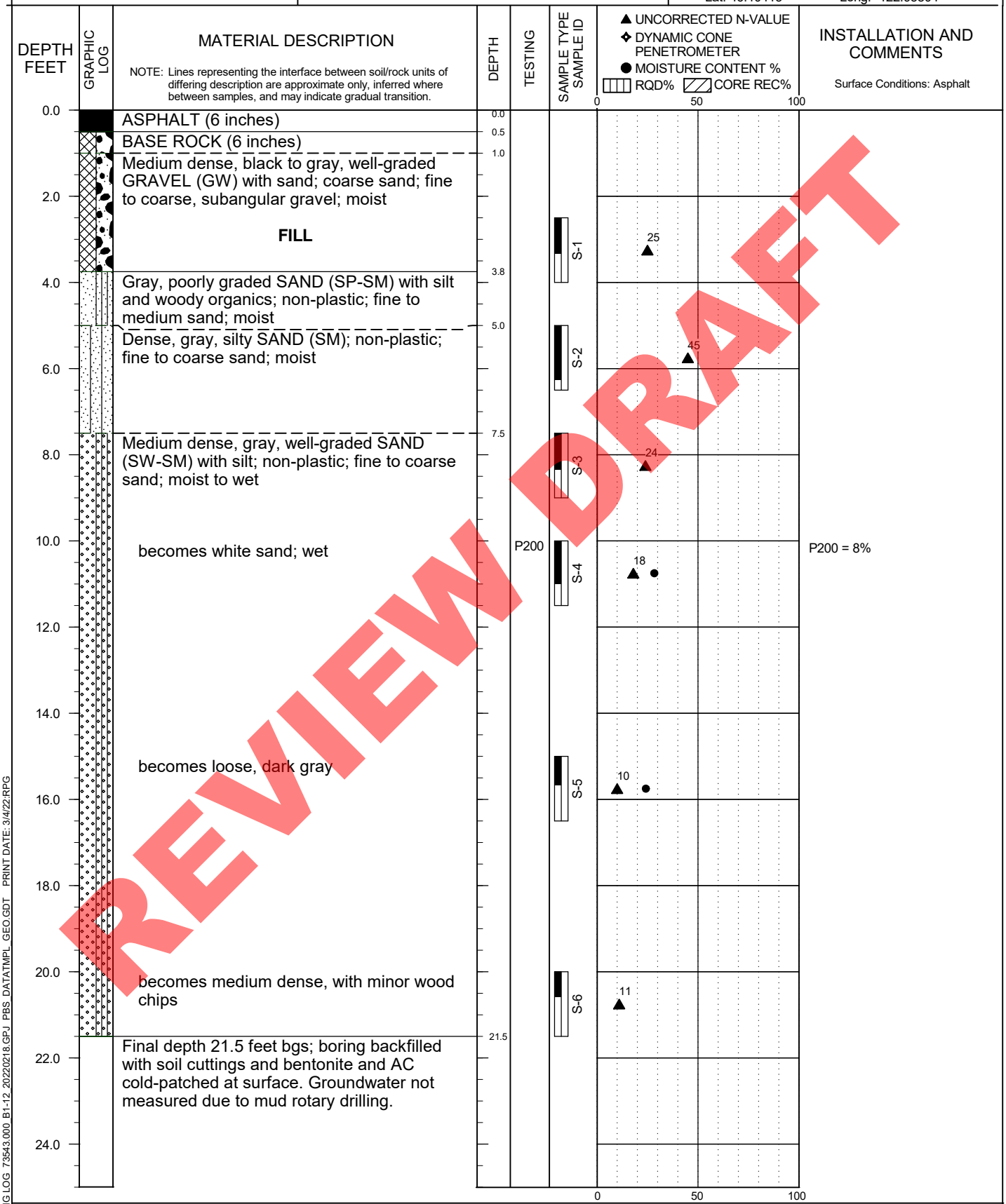
FIGURE A2

LONGVIEW INDUSTRIAL SITE
LONGVIEW, WASHINGTON

BORING B-3

PBS PROJECT NUMBER:
73543.000

APPROX. BORING B-3 LOCATION:
(See Site Plan)
Lat: 46.10413 Long: -122.93804



DRILLING METHOD: Mud Rotary
DRILLED BY: Holt Services, Inc.
LOGGED BY: J. Powell

BIT DIAMETER: 4 7/8 inches
HAMMER EFFICIENCY PERCENT: 89.9
LOGGING COMPLETED: 2/10/2022

FIGURE A3

LONGVIEW INDUSTRIAL SITE
LONGVIEW, WASHINGTON

BORING B-4

PBS PROJECT NUMBER:
73543.000

APPROX. BORING B-4 LOCATION:
(See Site Plan)
Lat: 46.10397 Long: -122.93769

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH	TESTING	SAMPLE TYPE SAMPLE ID	UNCORRECTED N-VALUE / DYNAMIC CONE PENETROMETER / MOISTURE CONTENT % / RQD% / CORE REC%	INSTALLATION AND COMMENTS
0.0		ASPHALT (6 inches)	0.0				Surface Conditions: Asphalt
		BASE ROCK (6 inches)	0.5				
		Medium dense, gray-brown, sandy SILT (ML) with gravel and minor woody organics; low plasticity; fine to coarse sand; fine to coarse, subrounded to subangular gravel; moist	1.0	P200 SIEV	S-1	14	P200 = 25%
4.0							
		Medium dense, gray, poorly graded SAND (SP-SM) with silt; non-plastic; fine to medium sand; moist	5.0		S-2	13	
6.0							
		Loose, gray-brown, silty SAND (SM); non-plastic; fine to medium sand; wet	7.5		S-3	8	
8.0							
10.0		Loose, gray-brown, poorly graded SAND (SP-SM) with silt; non-plastic; fine to medium sand; wet woody organics in top of sample	10.0	P200	S-4	7	P200 = 12%
12.0							
14.0					S-5	6	
16.0							
18.0							
20.0		Loose, gray-brown, well-graded SAND (SW-SM) with silt; non-plastic; fine to coarse sand; wet	20.0		S-6	9	
			21.5				
22.0		Final depth 21.5 feet bgs; boring backfilled with grout and bentonite and AC cold-patched at surface. Groundwater not measured due to mud rotary drilling.					
24.0							

0 50 100

DRILLING METHOD: Mud Rotary
DRILLED BY: Holt Services, Inc.
LOGGED BY: J. Powell

BIT DIAMETER: 4 7/8 inches
HAMMER EFFICIENCY PERCENT: 89.9
LOGGING COMPLETED: 2/14/2022

FIGURE A4

LONGVIEW INDUSTRIAL SITE
LONGVIEW, WASHINGTON

PBS PROJECT NUMBER:
73543.000

BORING B-5

APPROX. BORING B-5 LOCATION:
(See Site Plan)
Lat: 46.10445 Long: -122.93752

DEPTH FEET	MATERIAL DESCRIPTION	DEPTH	TESTING	SAMPLE TYPE / SAMPLE ID	INSTALLATION AND COMMENTS
0.0	ASPHALT (6 inches)	0.0			Surface Conditions: Asphalt
	BASE ROCK (6 inches)	0.5			
	Dense, dark to light brown-orange, silty GRAVEL (GM) with sand; non-plastic; fine to coarse sand; fine to coarse, subangular gravel; moist	1.0			
2.0	**FILL**			S-1	42
4.0					
	Medium dense, gray, silty SAND (SM) with gravel; non-plastic; fine to coarse sand; fine, subrounded gravel; moist	5.0		S-2	29
6.0					
	becomes gray, green, and orange; with fine to coarse, subrounded to subangular gravel; wet			S-3	27
8.0					
10.0	Medium dense, gray, well-graded SAND (SW) with gravel and trace silt; non-plastic; fine to coarse sand; fine to coarse, subrounded gravel; wet	10.0	P200	S-4	17 P200 = 5%
12.0					
14.0					
	becomes loose, with gray, green, white, and red sand and minor organics			S-5	8
16.0					
18.0					
20.0	Medium dense, silty SAND (SM); non-plastic; fine to medium sand; wet woody organics in top of sample	20.0		S-6	13
	Final depth 21.5 feet bgs; boring backfilled with grout and bentonite and AC cold-patched at surface. Groundwater not measured due to mud rotary drilling.	21.5			
22.0					
24.0					

NOTE: Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition.

▲ UNCORRECTED N-VALUE
◇ DYNAMIC CONE PENETROMETER
● MOISTURE CONTENT %
RQD% CORE REC%
0 50 100

DRILLING METHOD: Mud Rotary
DRILLED BY: Holt Services, Inc.
LOGGED BY: J. Powell

BIT DIAMETER: 4 7/8 inches
HAMMER EFFICIENCY PERCENT: 89.9
LOGGING COMPLETED: 2/14/2022

FIGURE A5

LONGVIEW INDUSTRIAL SITE
LONGVIEW, WASHINGTON

BORING B-6

PBS PROJECT NUMBER:
73543.000

APPROX. BORING B-6 LOCATION:
(See Site Plan)
Lat: 46.10432 Long: -122.93732

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH	TESTING	SAMPLE TYPE SAMPLE ID	UNCORRECTED N-VALUE / DYNAMIC CONE PENETROMETER / MOISTURE CONTENT % / RQD% / CORE REC%	INSTALLATION AND COMMENTS
		NOTE: Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition.				0 50 100	Surface Conditions: Asphalt
0.0		ASPHALT (6 inches)	0.0				
		BASE ROCK (6 inches)	0.5				
2.0		Dense, black to gray, silty GRAVEL (GM) with sand; non-plastic; fine to coarse sand; fine to coarse, subangular gravel; moist **FILL**	1.0				
4.0		Dense, gray, poorly graded SAND (SP); fine to medium sand; moist	3.0		S-1	39	
6.0		Medium dense, gray, poorly graded SAND (SP-SM) with silt; fine sand; moist	5.0		S-2	19	
8.0		becomes loose; wet			S-3	10	
10.0		increased silt			S-4	10	
12.0							
14.0							
		Loose, gray, poorly graded SAND (SP); fine to medium sand; wet	15.0	P200	S-5	6	P200 = 4%
16.0							
18.0							
20.0		Loose, dark gray, well-graded SAND (SW-SM) with silt; non-plastic; fine to coarse sand; wet	20.0		S-6	10	
		Final depth 21.5 feet bgs; boring backfilled with soil cuttings and bentonite and AC cold-patched at surface. Groundwater not measured due to mud rotary drilling.	21.5				
22.0							
24.0							

DRILLING METHOD: Mud Rotary
DRILLED BY: Holt Services, Inc.
LOGGED BY: J. Powell

BIT DIAMETER: 4 7/8 inches
HAMMER EFFICIENCY PERCENT: 89.9
LOGGING COMPLETED: 2/10/2022

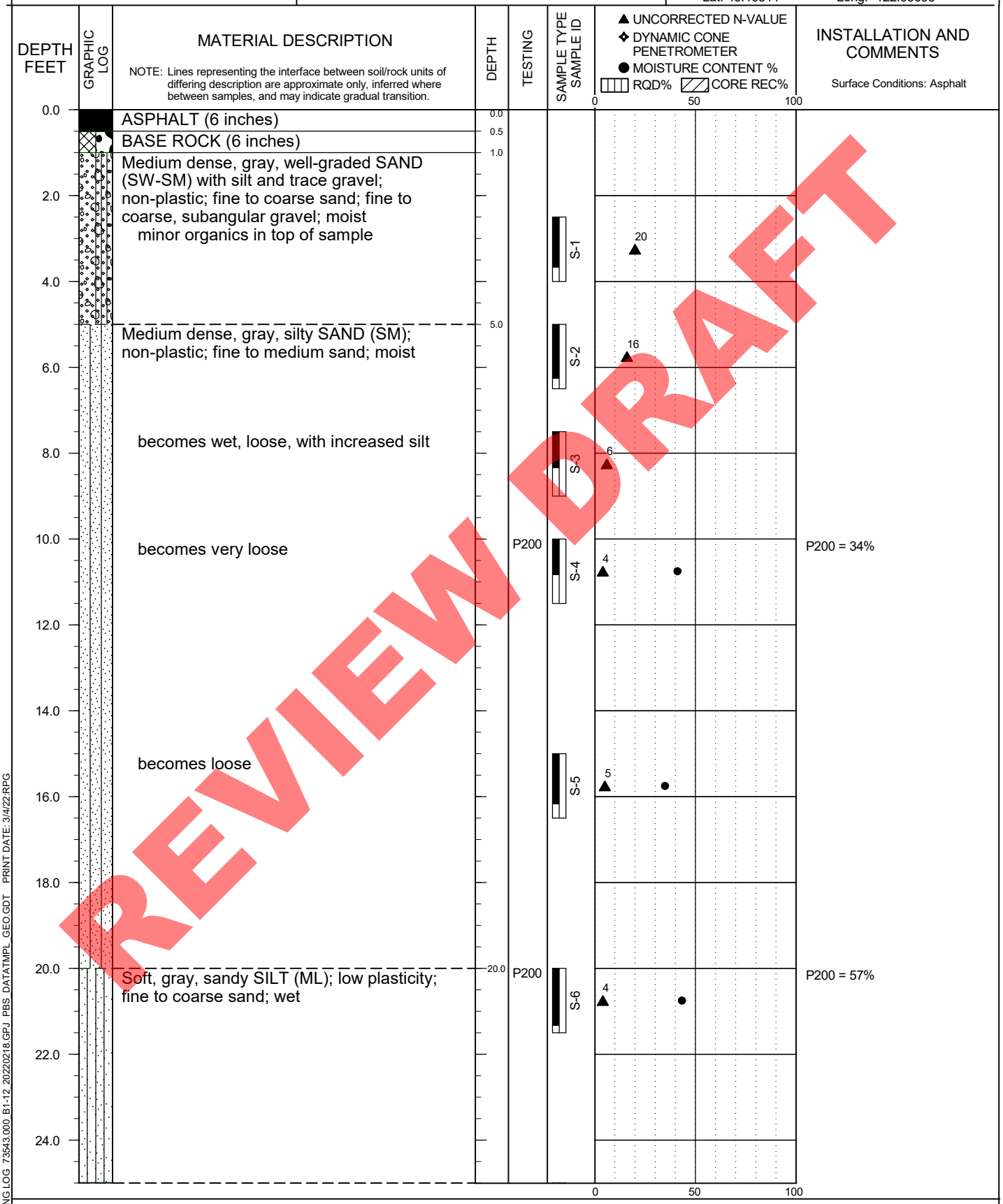
FIGURE A6

LONGVIEW INDUSTRIAL SITE
LONGVIEW, WASHINGTON

BORING B-7

PBS PROJECT NUMBER:
73543.000

APPROX. BORING B-7 LOCATION:
(See Site Plan)
Lat: 46.10511 Long: -122.93693



DRILLING METHOD: Mud Rotary
DRILLED BY: Holt Services, Inc.
LOGGED BY: J. Powell

BIT DIAMETER: 4 7/8 inches
HAMMER EFFICIENCY PERCENT: 89.9
LOGGING COMPLETED: 2/11/2022

FIGURE A7

LONGVIEW INDUSTRIAL SITE
LONGVIEW, WASHINGTON

PBS PROJECT NUMBER:
73543.000

BORING B-7
(continued)

APPROX. BORING B-7 LOCATION:
(See Site Plan)
Lat: 46.10511 Long: -122.93693

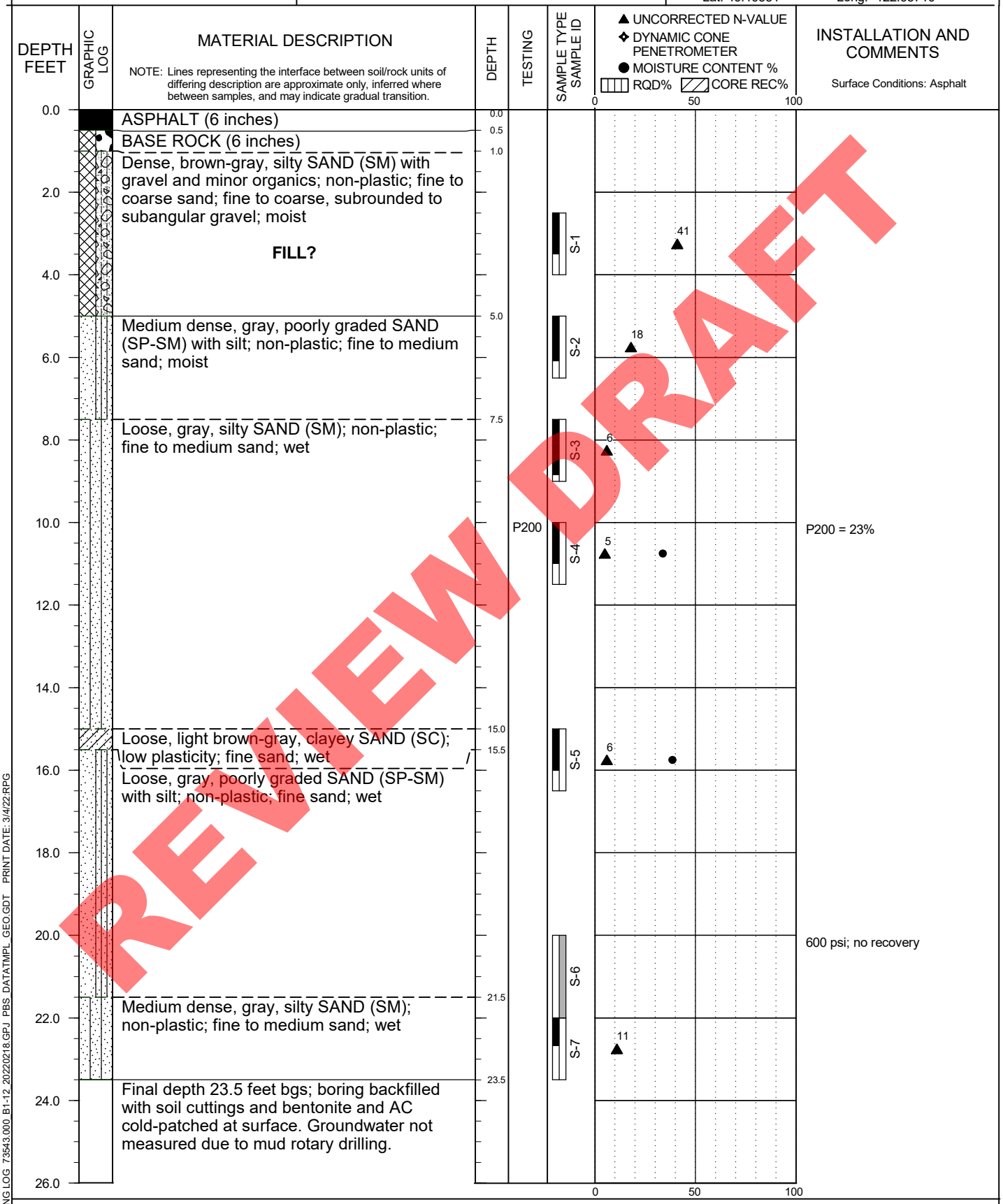
DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH	TESTING	SAMPLE TYPE / SAMPLE ID	UNCORRECTED N-VALUE / DYNAMIC CONE PENETROMETER / MOISTURE CONTENT % / RQD% / CORE REC%	INSTALLATION AND COMMENTS
		NOTE: Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition.				0 50 100	Surface Conditions: Asphalt
26.0		Loose, gray, silty SAND (SM); non-plastic; fine to medium sand; wet	25.0		S-7	9	
28.0							
30.0		Medium dense, gray, poorly graded SAND (SP-SM) with silt; non-plastic; fine to medium sand; wet	30.0		S-8	8	
32.0							
34.0							
36.0		Medium dense, gray to gray-green, poorly graded SAND (SP-SM) with silt and gravel; non-plastic; fine to medium sand; fine to coarse, subrounded gravel; wet	35.0		S-9	25	
38.0							
40.0		Medium dense, gray, poorly graded SAND (SP-SM) with silt; non-plastic; fine to medium sand; wet	40.0		S-10	13	
42.0		Final depth 41.5 feet bgs; boring backfilled with soil cuttings, grout, and bentonite and AC cold-patched at surface. Groundwater not measured due to mud rotary drilling.	41.5				
44.0							
46.0							
48.0							
50.0						0 50 100	

DRILLING METHOD: Mud Rotary
DRILLED BY: Holt Services, Inc.
LOGGED BY: J. Powell

BIT DIAMETER: 4 7/8 inches
HAMMER EFFICIENCY PERCENT: 89.9
LOGGING COMPLETED: 2/11/2022

FIGURE A7

PBS	LONGVIEW INDUSTRIAL SITE LONGVIEW, WASHINGTON	**BORING B-8**
	PBS PROJECT NUMBER: 73543.000	APPROX. BORING B-8 LOCATION: (See Site Plan) Lat: 46.10531 Long: -122.93710



BORING LOG 73543.000 B1-12 20220218.GPJ PBS_DATATMPL_GEO.GDT PRINT DATE: 3/4/22:RPG

DRILLING METHOD: Mud Rotary
DRILLED BY: Holt Services, Inc.
LOGGED BY: J. Powell

BIT DIAMETER: 4 7/8 inches
HAMMER EFFICIENCY PERCENT: 89.9
LOGGING COMPLETED: 2/11/2022

FIGURE A8

LONGVIEW INDUSTRIAL SITE
LONGVIEW, WASHINGTON

BORING B-9

PBS PROJECT NUMBER:
73543.000

APPROX. BORING B-9 LOCATION:
(See Site Plan)
Lat: 46.10546 Long: -122.93686

DEPTH FEET	MATERIAL DESCRIPTION	DEPTH	TESTING	SAMPLE TYPE / SAMPLE ID	UNCORRECTED N-VALUE / DYNAMIC CONE PENETROMETER / MOISTURE CONTENT % / RQD% / CORE REC%	INSTALLATION AND COMMENTS
	NOTE: Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition.				0 50 100	Surface Conditions: Asphalt
0.0	ASPHALT (6 inches)	0.0				
	BASE ROCK (6 inches)	0.5				
	Medium dense, brown to gray; poorly graded SAND (SP-SM) with silt and trace gravel; non-plastic; fine to medium sand; fine, subangular gravel; moist	1.0		S-1	27	
2.0						
4.0						
	Dense, light gray-brown, well-graded SAND (SW-SM) with silt and gravel; non-plastic; fine to coarse sand; fine, subrounded gravel; moist	5.0	P200 SIEV	S-2	41	P200 = 12%
6.0						
	Medium dense, gray, poorly graded SAND (SP-SM) with silt; non-plastic; fine to medium sand; moist	7.5		S-3	17	
8.0						
	Loose, gray, silty SAND (SM); non-plastic; fine to medium sand; wet	9.5		S-4	9	
10.0						
12.0						
14.0	increased silt		P200	S-5	5	P200 = 36%
16.0						
18.0						
20.0				S-6	5	Slight organic odor
22.0						
24.0						

DRILLING METHOD: Mud Rotary
DRILLED BY: Holt Services, Inc.
LOGGED BY: J. Powell

BIT DIAMETER: 4 7/8 inches
HAMMER EFFICIENCY PERCENT: 89.9
LOGGING COMPLETED: 2/11/2022

FIGURE A9

PBS	LONGVIEW INDUSTRIAL SITE LONGVIEW, WASHINGTON	**BORING B-9** (continued)
	PBS PROJECT NUMBER: 73543.000	APPROX. BORING B-9 LOCATION: (See Site Plan) Lat: 46.10546 Long: -122.93686

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH	TESTING	SAMPLE TYPE SAMPLE ID	UNCORRECTED N-VALUE / DYNAMIC CONE PENETROMETER / MOISTURE CONTENT % / RQD% / CORE REC% (0 – 50 – 100)	INSTALLATION AND COMMENTS
		NOTE: Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition.					Surface Conditions: Asphalt
26.0		Soft, gray SILT (ML) with sand; low plasticity; fine sand; wet	25.0	P200	S-7	2	P200 = 86%
28.0							
30.0					S-8		200 psi; no recovery
32.0		Loose, gray, silty SAND (SM); low plasticity; fine to medium sand; wet	32.0		S-9	8	
34.0							
36.0					S-10	9	
38.0							
40.0		Medium dense, gray, well-graded SAND (SW-SM) with silt and gravel; non-plastic; fine to coarse sand; fine to coarse, subrounded gravel; wet	40.0		S-11	23	
42.0		Final depth 41.5 feet bgs; boring backfilled with grout and bentonite and AC cold-patched at surface. Groundwater not measured due to mud rotary drilling.	41.5				
44.0							
46.0							
48.0							
50.0							

DRILLING METHOD: Mud Rotary
DRILLED BY: Holt Services, Inc.
LOGGED BY: J. Powell

BIT DIAMETER: 4 7/8 inches
HAMMER EFFICIENCY PERCENT: 89.9
LOGGING COMPLETED: 2/11/2022

FIGURE A9

LONGVIEW INDUSTRIAL SITE
LONGVIEW, WASHINGTON

BORING B-10

PBS PROJECT NUMBER:
73543.000

APPROX. BORING B-10 LOCATION:
(See Site Plan)
Lat: 46.10557 Long: -122.93634

DEPTH FEET	MATERIAL DESCRIPTION	DEPTH	SAMPLE TYPE / SAMPLE ID
0.0	ASPHALT (6 inches)	0.0	
	BASE ROCK (6 inches)	0.5	
2.0	Dense, brown-gray, silty GRAVEL (GM) with sand; non-plastic; fine to coarse sand; fine to coarse, subangular gravel; moist	1.0	
	FILL		
4.0	Dense, gray, poorly graded SAND (SP-SM) with silt and sand; non-plastic; fine to medium sand; moist	3.5	S-1
6.0	Medium dense, brown-gray, silty SAND (SM); non-plastic; fine to medium sand; moist	5.0	S-2
8.0	Medium dense, brown-gray, poorly graded SAND (SP-SM) with silt; non-plastic; fine to medium sand; moist	7.5	S-3
10.0	Loose, gray, silty SAND (SM); non-plastic; fine to medium sand; wet	10.0	S-4
12.0			
14.0			S-5
16.0			
18.0			
20.0	Loose, gray, poorly graded SAND (SP-SM) with silt; non-plastic; fine to medium sand; wet	20.0	S-6
22.0	Final depth 21.5 feet bgs; boring backfilled with grout and bentonite and AC cold-patched at surface. Groundwater not measured due to mud rotary drilling.	21.5	
24.0			

NOTE: Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition.

TESTING

▲ UNCORRECTED N-VALUE
◇ DYNAMIC CONE PENETROMETER
● MOISTURE CONTENT %
RQD% CORE REC%

0 50 100

39
13
13
5
6
10

INSTALLATION AND COMMENTS

Surface Conditions: Asphalt

DRILLING METHOD: Mud Rotary
DRILLED BY: Holt Services, Inc.
LOGGED BY: J. Powell

BIT DIAMETER: 4 7/8 inches
HAMMER EFFICIENCY PERCENT: 89.9
LOGGING COMPLETED: 2/11/2022

FIGURE A10

LONGVIEW INDUSTRIAL SITE
LONGVIEW, WASHINGTON

BORING B-11

PBS PROJECT NUMBER:
73543.000

APPROX. BORING B-11 LOCATION:
(See Site Plan)
Lat: 46.10671 Long: -122.93693

DEPTH FEET	MATERIAL DESCRIPTION	DEPTH	SAMPLE TYPE / SAMPLE ID	INSTALLATION AND COMMENTS
0.0	ASPHALT (6 inches)	0.0		Surface Conditions: Asphalt
	BASE ROCK (6 inches)	0.5		
2.0	Very dense, brown, gray and black, silty GRAVEL (GM) with sand; non-plastic; fine to coarse sand; fine to coarse, subangular gravel; moist	1.0	S-1	50/5
	FILL			Rig chatter; driller notes hard drilling, possible boulder
4.0				
6.0	Medium dense, gray; poorly graded SAND (SP-SM) with silt and gravel; non-plastic; fine to medium sand; moist	5.0	S-2	30
8.0	Medium dense, gray and white, well-graded SAND (SW-SM) with silt and gravel; non-plastic; fine to coarse sand; fine to coarse, subrounded gravel; moist	7.5	S-3	28
10.0	Medium dense, gray, silty SAND (SM); non-plastic; fine to coarse sand; moist	10.0	S-4	17
12.0				
14.0	becomes fine to medium sand; wet		S-5	11
16.0				
18.0				
20.0			S-6	13
22.0	Final depth 21.5 feet bgs; boring backfilled with grout and bentonite and AC cold-patched at surface. Groundwater not measured due to mud rotary drilling.	21.5		
24.0				

▲ UNCORRECTED N-VALUE
◇ DYNAMIC CONE PENETROMETER
● MOISTURE CONTENT %
RQD% CORE REC%
0 50 100

DRILLING METHOD: Mud Rotary
DRILLED BY: Holt Services, Inc.
LOGGED BY: J. Powell

BIT DIAMETER: 4 7/8 inches
HAMMER EFFICIENCY PERCENT: 89.9
LOGGING COMPLETED: 2/14/2022

FIGURE A11

PBS

LONGVIEW INDUSTRIAL SITE
LONGVIEW, WASHINGTON

PBS PROJECT NUMBER:
73543.000

BORING B-12

APPROX. BORING B-12 LOCATION:
(See Site Plan)
Lat: 46.10635 Long: -122.93557

DEPTH FEET	MATERIAL DESCRIPTION	DEPTH	TESTING	SAMPLE TYPE / SAMPLE ID	UNCORRECTED N-VALUE / DYNAMIC CONE PENETROMETER / MOISTURE CONTENT % / RQD% / CORE REC%	INSTALLATION AND COMMENTS
	NOTE: Lines representing the interface between soil/rock units of differing description are approximate only, inferred where between samples, and may indicate gradual transition.				0 50 100	Surface Conditions: Asphalt
0.0	ASPHALT (6 inches)	0.0				
	BASE ROCK (6 inches)	0.5				
	Very dense, gray, well-graded GRAVEL (GW-GM) with silt and sand; non-plastic; coarse sand; fine to coarse, subangular gravel; moist	1.0				
2.0	**FILL**	2.8		S-1	11-22-50/5	
	Very dense, gray-brown, well-graded SAND (SW-SM) with silt and gravel; non-plastic; fine to coarse sand; fine, subrounded to subangular gravel; moist					
4.0		5.0		S-2	14	
	Medium dense, gray-brown, silty SAND (SM) with gravel; non-plastic; fine to coarse sand; fine to coarse, subrounded gravel; moist					
6.0						
	Medium stiff, gray-brown, sandy SILT (ML); low plasticity; fine to medium sand; moist to wet	7.5	P200	S-3	8 ●	P200 = 56%
8.0						
10.0	Loose, gray, silty SAND (SM); non-plastic; fine to medium sand; wet	10.0		S-4	7	
12.0						
14.0						
	Loose, gray, well-graded SAND (SW-SM) with silt; non-plastic; fine to coarse sand; wet	15.0		S-5	7	
16.0						
18.0						
20.0	Medium dense, gray, poorly graded SAND (SP-SM) with silt; non-plastic; fine to medium sand; wet	20.0		S-6	13	
	Final depth 21.5 feet bgs; boring backfilled with grout and bentonite and AC cold-patched at surface. Groundwater not measured due to mud rotary drilling.	21.5				
22.0						
24.0					0 50 100	

DRILLING METHOD: Mud Rotary
DRILLED BY: Holt Services, Inc.
LOGGED BY: J. Powell

BIT DIAMETER: 4 7/8 inches
HAMMER EFFICIENCY PERCENT: 89.9
LOGGING COMPLETED: 2/14/2022

FIGURE A12

PBS
ENGINEERING • ENVIRONMENTAL • SURVEY

Project: **Longview Industrial Site**
Location: **Longview, WA**

CCPT-
Total depth: 77.76 ft

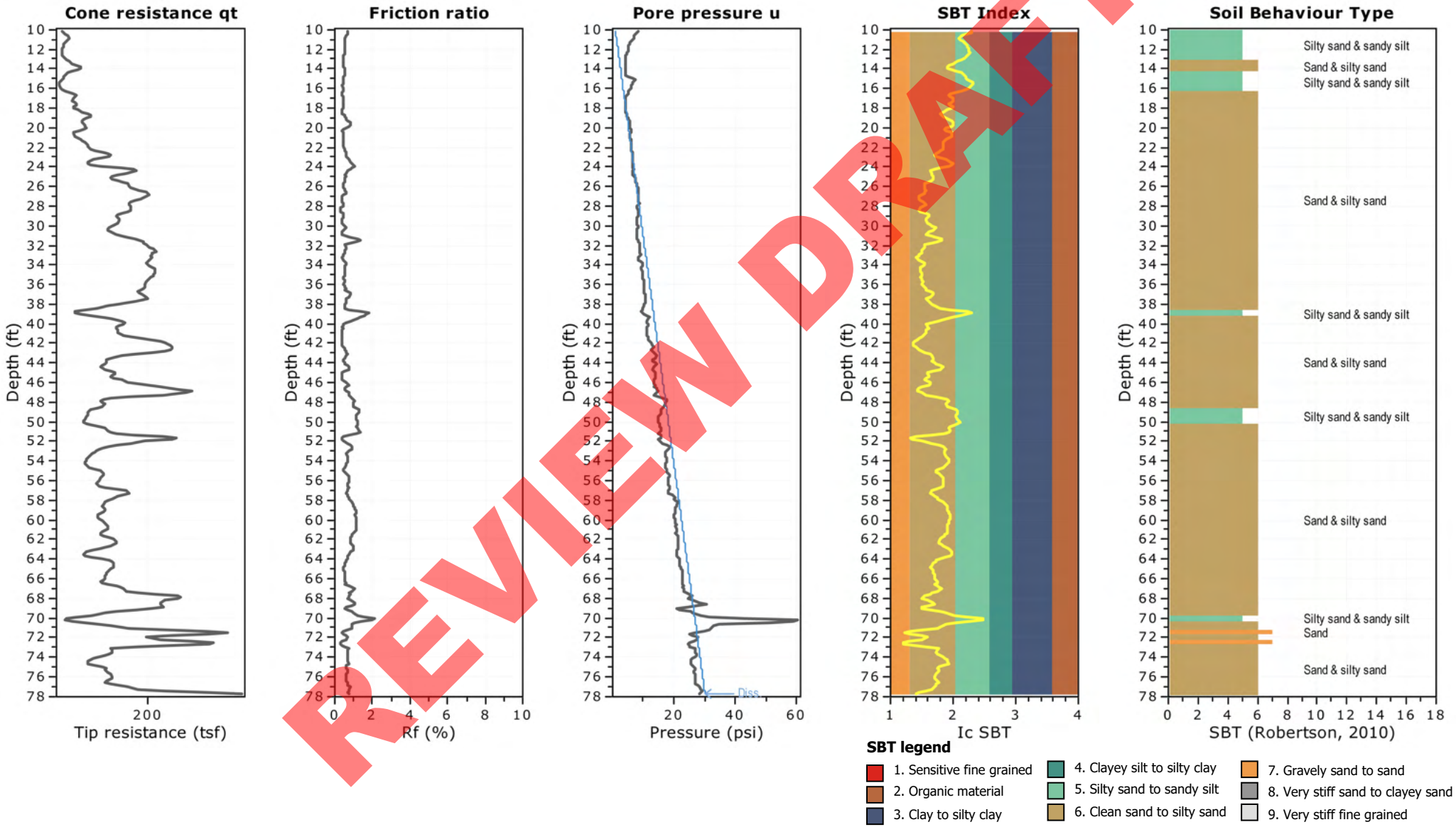


FIGURE A13

PBS
ENGINEERING • ENVIRONMENTAL • SURVEY

Project: **Longview Industrial Site**
Location: **Longview, WA**

CPT-
Total depth: 83.66 ft

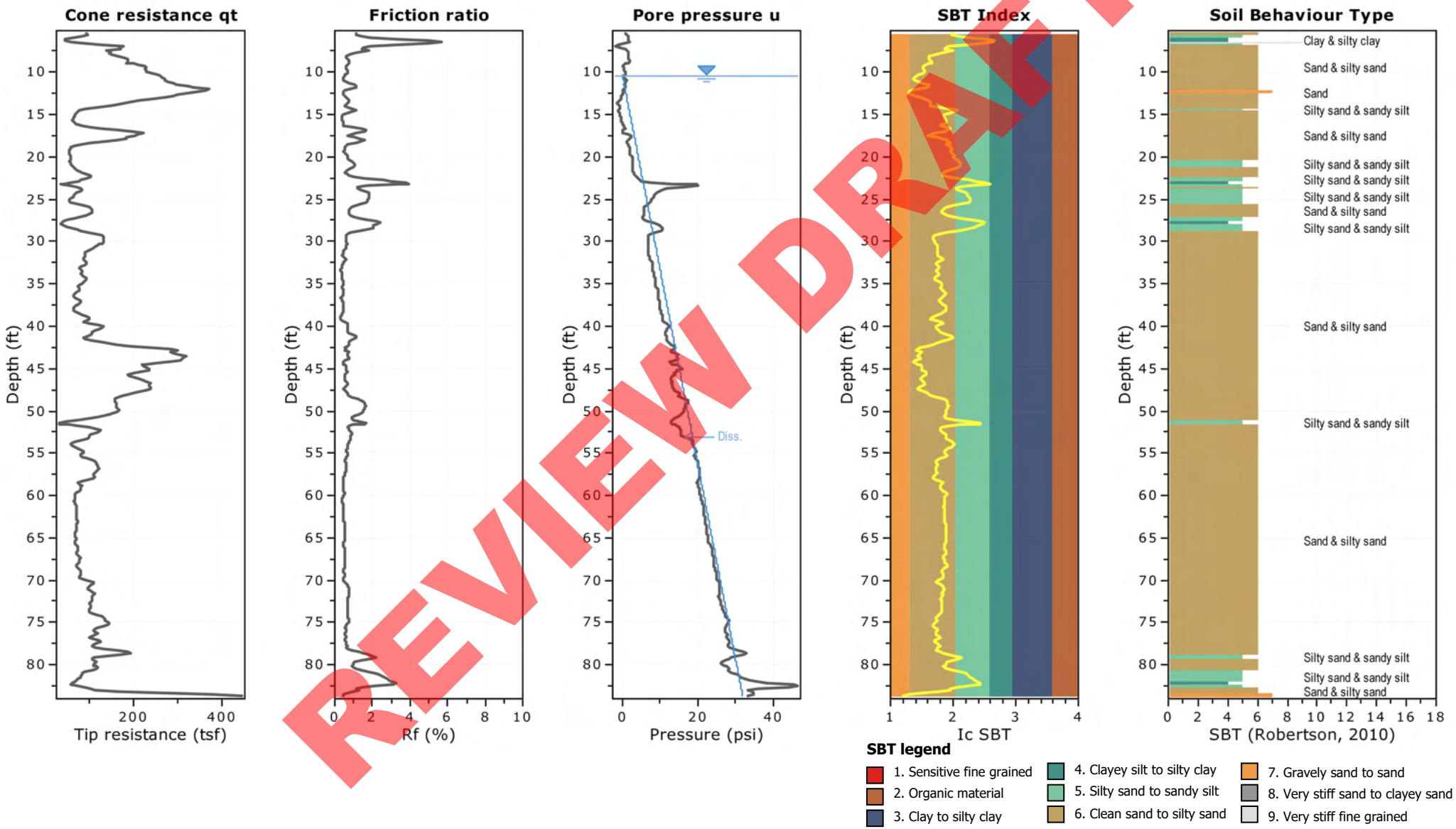


FIGURE A14

PBS
ENGINEERING • ENVIRONMENTAL • SURVEY

Project: **Longview Industrial Site**
Location: **Longview, WA**

CPT-3
Total depth: 81.36 ft

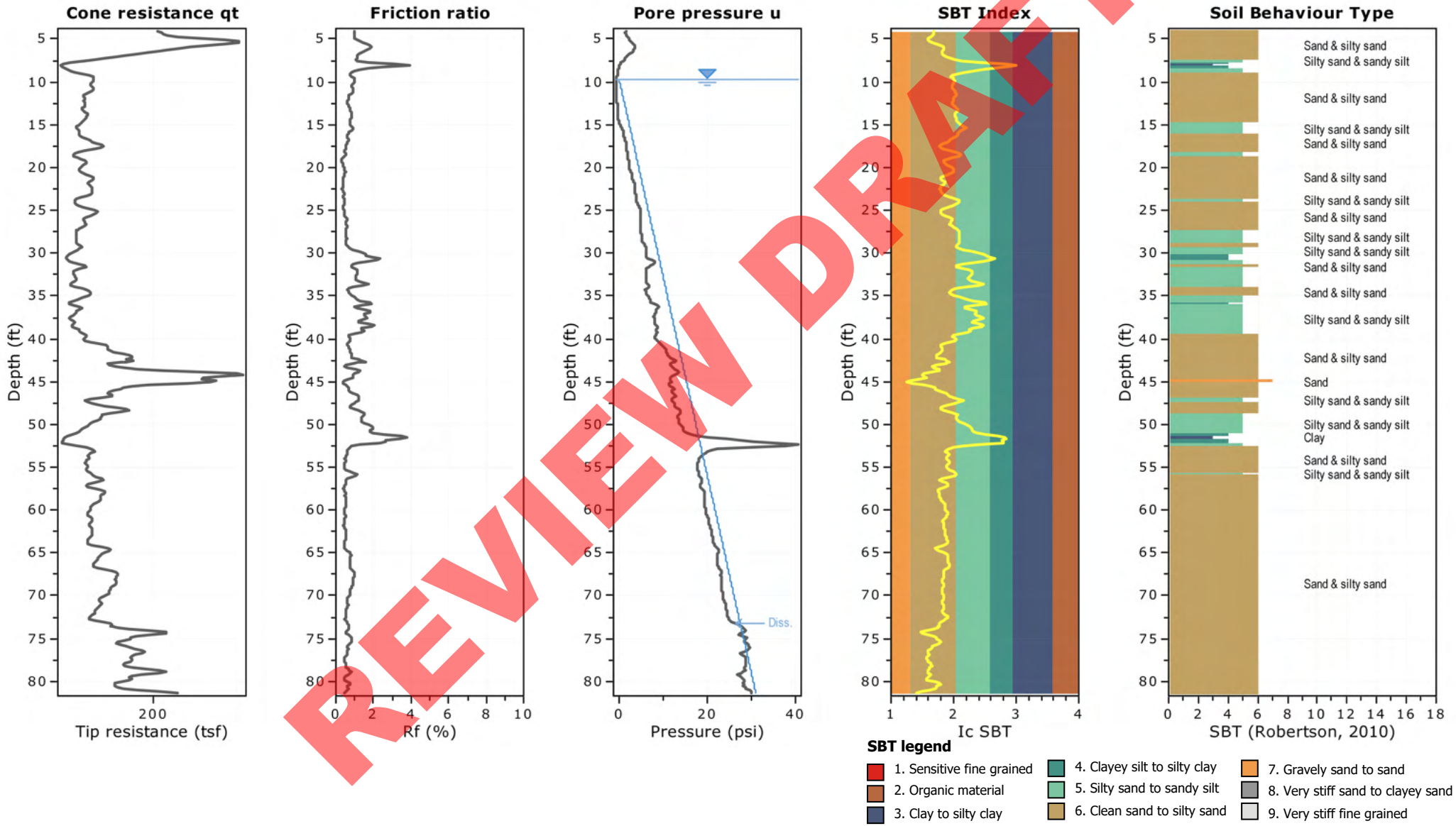
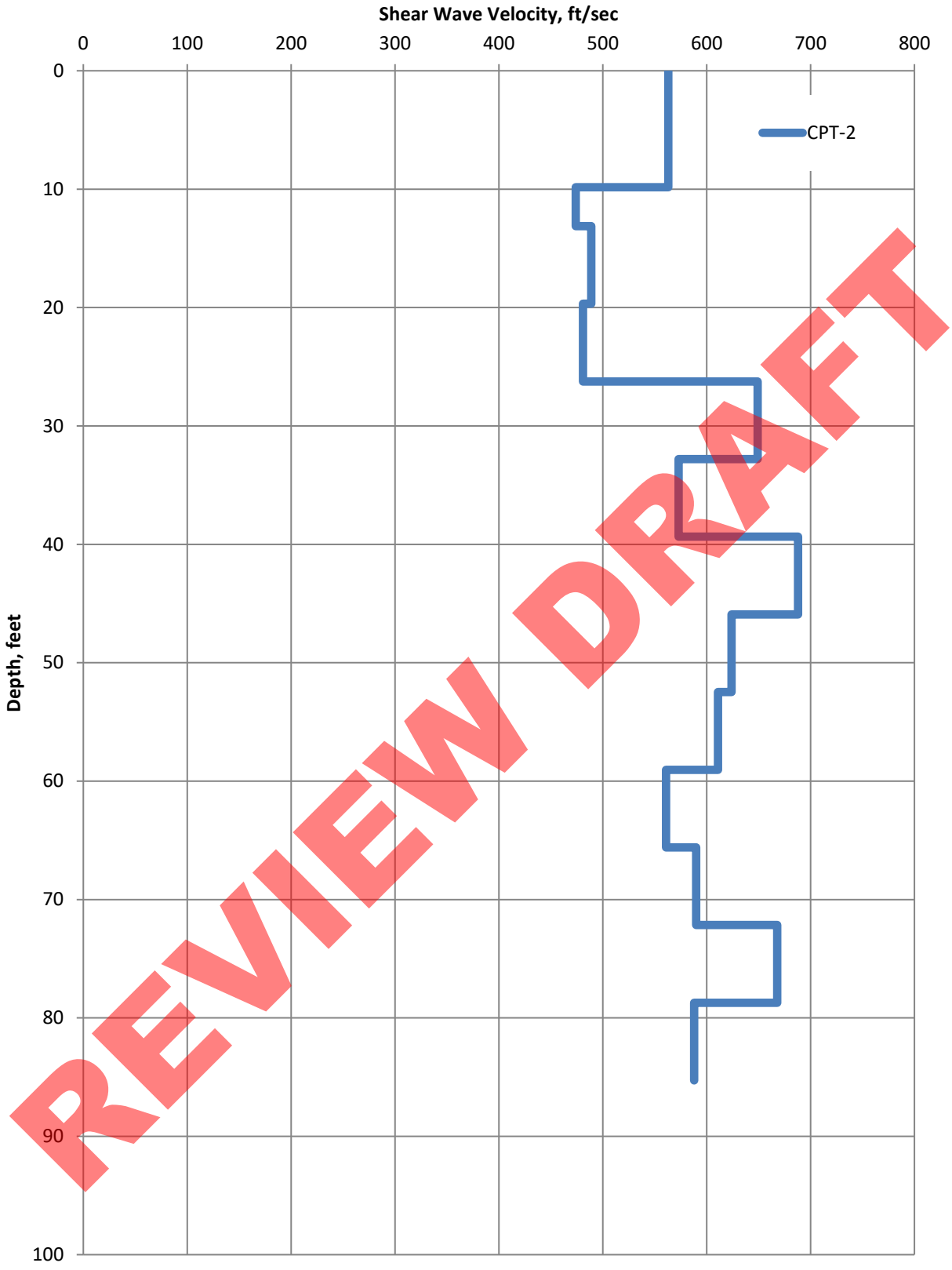


FIGURE A15



PBS

SHEAR WAVE VELOCITY PROFILE

LONGVIEW BIOMASS

LONGVIEW, WASHINGTON

MAR 2022

73543.000

FIGURE

A16

Attachment B

Laboratory Testing

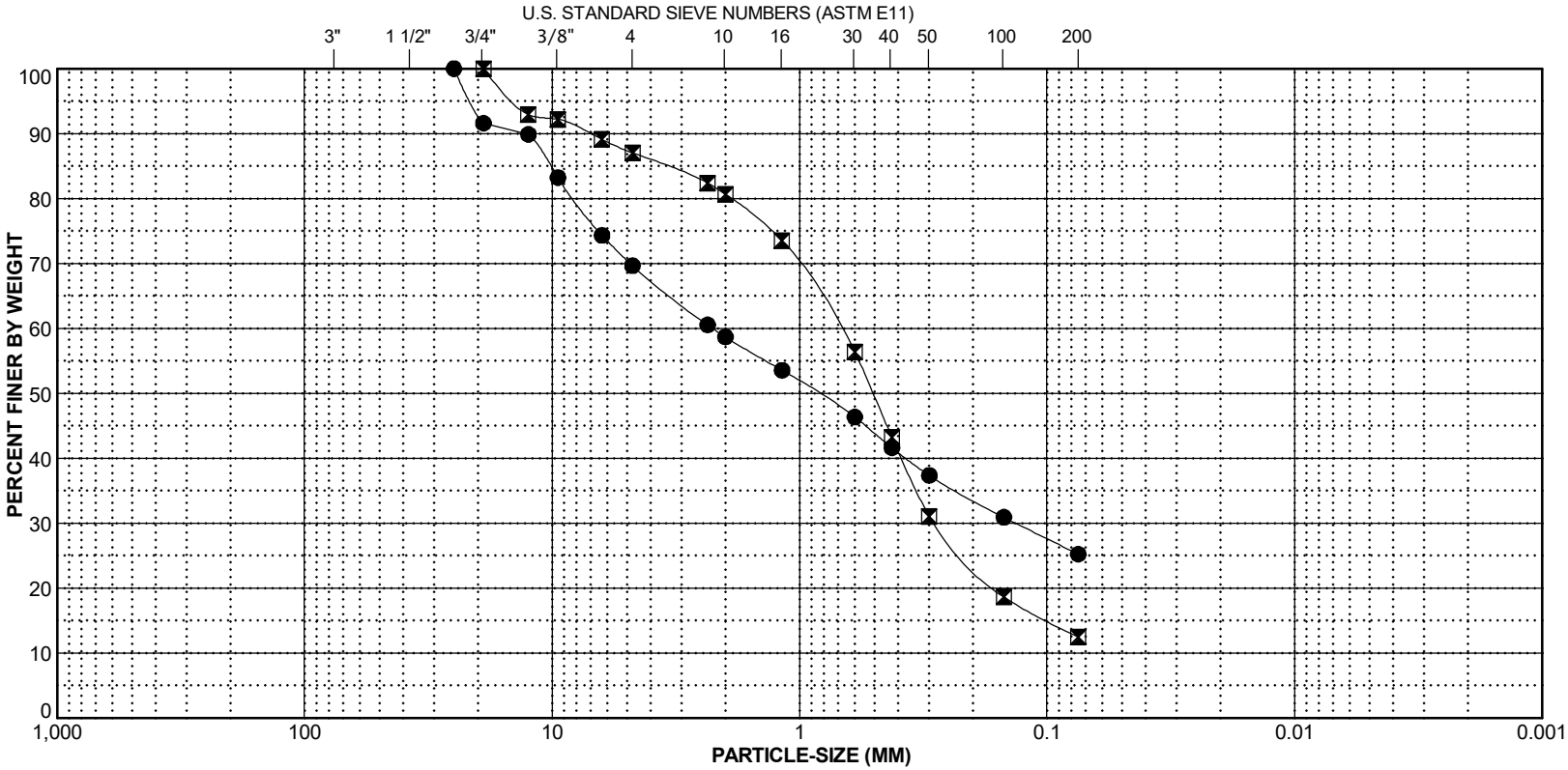
PARTICLE-SIZE ANALYSIS TEST RESULTS

LONGVIEW INDUSTRIAL SITE
LONGVIEW, WASHINGTON

PBS PROJECT NUMBER:
73543.000

TEST METHOD: ASTM C136/D422

BOULDERS	COBBLES	GRAVEL		SAND			FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY



KEY	EXPLORATION NUMBER	SAMPLE NUMBER	SAMPLE DEPTH (FEET)	MOISTURE CONTENT (PERCENT)	D90 (MM)	D60 (MM)	D30 (MM)	D10 (MM)	D5 (MM)	GRAVEL (PERCENT)	SAND (PERCENT)	FINES (PERCENT)
●	B-4	S-1	2.5	22	12.9	2.3	0.1			30	44	25
⊠	B-9	S-2	5.0	12	7.1	0.7	0.3			13	75	12

FIGURE B1

SUMMARY OF LABORATORY DATA

LONGVIEW INDUSTRIAL SITE
LONGVIEW, WASHINGTON

PBS PROJECT NUMBER:
73543.000

SAMPLE INFORMATION				MOISTURE CONTENT (PERCENT)	DRY DENSITY (PCF)	SIEVE			ATTERBERG LIMITS		
EXPLORATION NUMBER	SAMPLE NUMBER	SAMPLE DEPTH (FEET)	ELEVATION (FEET)			GRAVEL (PERCENT)	SAND (PERCENT)	P200 (PERCENT)	LIQUID LIMIT (PERCENT)	PLASTIC LIMIT (PERCENT)	PLASTICITY INDEX (PERCENT)
B-1	S-4	10		32.3							
B-1	S-6	20		29.7				5			
B-2	S-2	5		13.2							
B-2	S-5	15		35.3				23			
B-3	S-4	10		28.3				7			
B-3	S-5	15		24.1							
B-4	S-1	2.5		22.4		30	44	25			
B-4	S-4	10		36.2				12			
B-4	S-5	15		32.4							
B-5	S-4	10		18.8				5			
B-6	S-4	10		29.9							
B-6	S-5	15		27.5				4			
B-7	S-4	10		41.0				34			
B-7	S-5	15		34.8							
B-7	S-6	20		43.2				57			
B-8	S-4	10		33.7				23			
B-8	S-5	15		38.5							
B-9	S-2	5		12.4		13	75	12			
B-9	S-5	15		39.8				36			
B-9	S-7	25		43.9				86			
B-10	S-4	10		35.9							
B-11	S-5	15		28.1							
B-12	S-3	7.5		36.9				55			

FIGURE B2
Page 1 of 1

Attachment D: Traffic Study

DRAX

Longview Pellet Plant FEED

Truck Tipper Traffic Study

Document no. Rev. A: 417058-43742-MH-REP-0001
July 26, 2022

Unit 200 – 2930 Virtual Way
Vancouver, B.C., V5M 0A5
Canada

T: +1 604 734 1200
Worley Canada Services Ltd.

Disclaimer

PROJECT 417058-43742-MH-REP-0001 - Longview Pellet Plant FEED - Truck Tipper Traffic Study

Rev	Description	Originator	Reviewer	Worley Approver	Revision Date	Customer Approver	Approval Date
A	Issued for Client Review	S. Brundrett	V. Krishna	DocuSigned by: Dominic Fernando 33515E91721740D... D. Fernando	26 July 2022		

Table of Contents

List of Figures

List of Tables

1. Introduction

Drax is in the process of developing a new white wood pellet manufacturing facility to be located in Longview, Washington, USA. Pellets are produced for industrial and utility scale power generation. The plant will receive and process green wood feedstock to produce 450,000 MTPA of pellets. The selected site is immediately adjacent to the Port of Longview which will be the primary logistical export route.

The design of this facility is heavily based on the new Demopolis facility currently in operation in Alabama with much of the key equipment items following the same layout and specification. Within this phase of the project, Worley is preparing front-end engineering level design, estimate, and schedule for this.

Figure 1-1 indicates the location of the plant site area in Washington State adjacent to the Columbia River in Cowlitz County, just south of Longview city limits.

Figure 1-1 Longview, Washington Pellet Plant Site Location

2. Purpose

The purpose of this document is to verify that two drive over truck tippers will be enough to provide a smooth and continuous truck unloading process without excessive wait times. It recommends including space for a third truck tipper and verifying specific assumptions to reaffirm two truck tippers are sufficient. The document does not model truck arrivals and provides no recommendations for truck waiting areas due to queues.

3. Background

Longview wood pellet plant is planned to receive a variety of preprocessed wood materials to make wood pellets. Most of the feedstock is naturally wet, ranging in moisture content from 45% to 60%. It will consist of sawdust, woodchips, shavings and hog. The shavings are a predried material. To unload shavings using a truck tipper, a dust collection housing and system is required. As a result, two scenarios are considered in this report.

- Shavings are received in a truck tipper that has a dust collection system.
- Shavings are received at the dry fibre storage area with walking floor truck and trailers.

All the material will be received in bulk haul trailers. The approximate incoming material for producing pellets is reported in Table 3-1 in bone dry tonnes of pellet material and bark to fuel the furnace.

Table 3-1 Annual Incoming Wood Material Supply (Reported in Bone Dry Tonnes per Year)

Material Intake	Bone Dry Tonnes per Year (BDTY)
Sawdust, Woodchips, Shavings	450,000
Bark (Hog)	75,000
Total	525,000

The percentage of sawdust, woodchips and shavings is shown Table 3-2 defined on a bone-dry basis.

Table 3-2 Make-up of Incoming Material

Material Intake	Percent of Incoming Material
Sawdust	80%
Chips	15%
Shavings	5%
Total	100%

4. Truck Tipper Arrangements

There are several different types of truck tipper arrangements that could be considered for Longview depending on dust control requirements, traffic volume, and constraints related to space and subsurface conditions. The following bullets and figures provide an overview:

- Driver over style truck tippers vs. back-on style truck tippers.
  - Back-on style tippers would require trucks to turn around in front of the tipper but allow for lower ramps.
  - Drive-over style tippers involve driving around the tipper and not reversing the truck, but a ramp on both sides, with higher elevations or deeper excavations.
- Truck Tippers with dumper hoppers and without hoppers.
- Underground tipper hoppers to minimize ramp lengths.
- Near surface tipper hoppers to minimize excavation depths.
- Dust collection systems for either back-on or drive-over tippers.

This report evaluates the use of two drive-over tippers rather than three back-on tippers due to potential traffic congestion and safety concerns related to backing up in three lanes. Drax confirmed the decision to proceed with drive-over tippers, not back-on tippers. The tippers will have hoppers for automatic reclaim and stacking. Dust collection systems and elevation of dumpers are not the focus of this report.

- Figure 4-1 shows a back-on style truck tipper with dust collection system from a vendor, Bruks.
- Figure 4-2 and Figure 4-3 show back on truck tippers without hoppers from Drax's Demopolis facility.
- Figure 4-4 to Figure 4-6 show back on truck tippers with hoppers from Drax's Morehouse facility.
- Figure 4-7 and Figure 4-8 show sections of Bruks' drive over truck tipper and hopper with dimensions.

Figure 4-1 Back-on Style Truck Tipper with Dumper Hopper and Dust Collection (courtesy of Bruks)

Figure 4-2 Back-on Style Truck Tipper with no Dumper Hopper or Dust Collection (Demopolis)

Figure 4-3 Elevation View of Back-on Style Truck Tipper with no Dumper Hopper or Dust Collection (Demopolis)

Figure 4-4 Back-on Style Truck Tipper with Near Grade Dumper Hopper (Drax Morehouse Facility)

Figure 4-5 Elevation View of Back-on Style Truck Tipper with Near Grade Dumper Hopper (Drax Morehouse Facility)

Figure 4-6 Rear View of Back-on Style Truck Tipper with Near Grade Dumper Hopper (Drax Morehouse Facility)

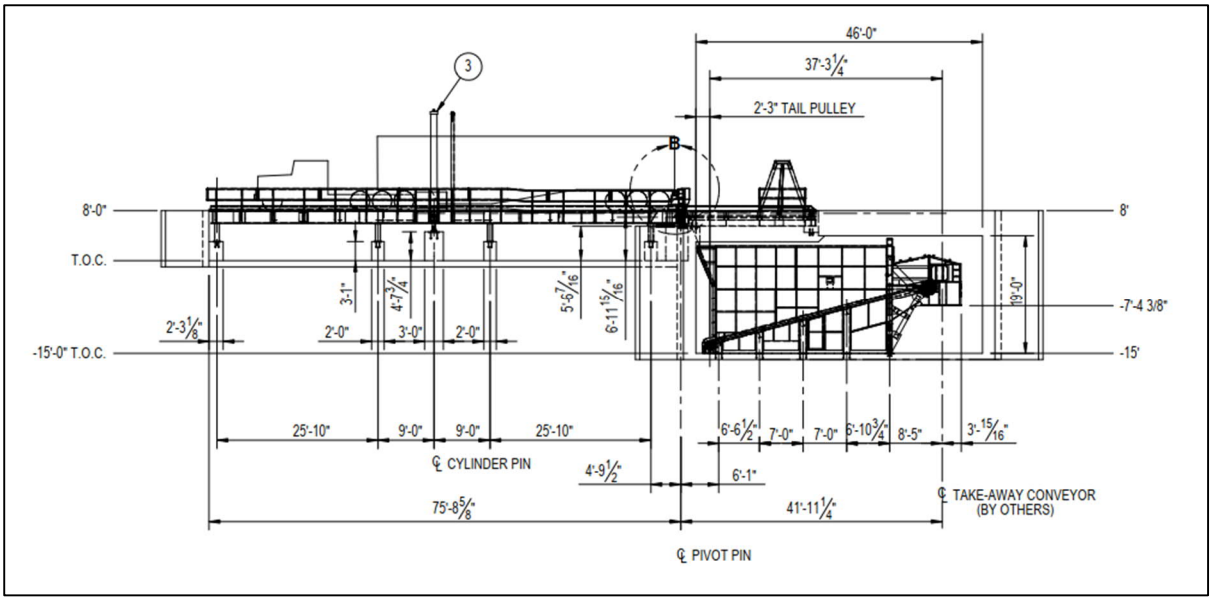


Figure 4-7 Section View of a Drive Over Truck Tipper with Dumper Hopper, No Ramps (courtesy of Bruks)

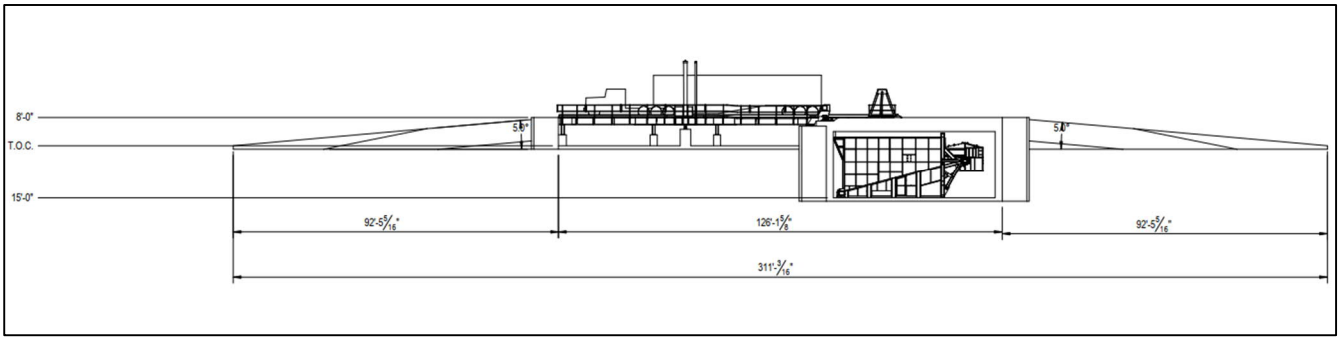


Figure 4-8 Section View of a Drive Over Truck Tipper with Below Grade Dumper Hopper, with Ramps (courtesy of Bruks)

5. Truck Delivery Count

Sawdust, woodchips, shavings, and bark will be delivered in bulk haul trailers. The estimated dimensions and volumetric capacities of the average delivery truck are shown in Table 5-1. The total number of trucks is calculated based on 14 bone dried tonnes per truck (provided by Drax), which resulted in an annual total of 37,500 trucks as shown in Table 5-2. The quantity of daily truck deliveries was cross checked based on the average moisture and estimated density values; in which case the total number of trucks is also approximately 37,500.

Table 5-1 Estimated Truck Dimensions and Nominal Volumetric Capacity

Truck	Value	Unit
Height	9	feet
Width	8.5	feet
Length	53	feet
Max Volume	4050	ft3/truck
Nominal (90% full)	3645	ft3/truck

Table 5-2 Annual Truck Count

Material	Average Moisture	Bulk Density (lbs/ft3)	Bulk Density (kg/m3)	Bone Dry Tonnes Delivered (tonnes)	Wet Tonnes Delivered (tonnes)	Wet Material Delivered (million lbs)	Volume Material Delivered (million ft3)	Trucks per year
Sawdust	53%	18	300	360,000	757,895	1,667	93	25,413
Chips	50%	16	245	67,500	135,000	297	19	5,093
Shavings	10%	8	120	22,500	25,000	55	7	1,886
Bark	55%	20	350	75,000	166,667	367	18	5,030
Total				525,000	1,084,561	2,386	136	37,422
Total Trucks Based on 14 ODT's per Truck.								37,500

6. Delivery Capacity vs. Forecast

It is planned to receive fibre and hog deliveries approximately 16 hours a day, 5 days per week for 48 weeks per year according to Drax schedule. As shown in Table 6-1, there will be approximately 128 sawdust and wood chip truck deliveries per day and 29 shavings and bark/hog truck deliveries per day, which includes only eight shavings truck deliveries per day.

Table 6-1 Daily Truck Count

Material	Trucks per year	Trucks per week	Trucks per day	Total Trucks per day
Sawdust	25,413	529	106	Sawdust and Chips:
Chips	5,093	106	22	128
Shavings	1,886	39	8	Shavings and Bark:
Bark	5,030	105	21	29
Total	37,422	780	157	

6.1 Delivery Frequency Peak Period

Truck deliveries will be concentrated at certain times of the day based on the operations of fibre supplier and delivery contractors. To project the frequency of deliveries throughout the day, Drax provided typical delivery time data from their northern operations as shown in Appendix A. Drax confirmed that the data will fit the Longview operations and approved the use of this data for this study. It identifies that most deliveries will occur during the morning and will taper off in the early afternoon.

For this analysis, it is highlighted that approximately 50% of the truck deliveries will occur in a continuous seven-hour period. Therefore, during this peak period it is estimated that approximately 11 to 12 trucks will arrive per hour for seven hours straight.

6.2 Truck Tipper Capacity

Truck tipper capacity is based on the truck tipper cycle time, which was provided by Bruks, a supplier of truck tippers. They noted that drive over truck tippers have a cycle time of seven to ten minutes for each truck, which is approximately equivalent to eight and six trucks per hour, respectively. Bruks also advised that the cycle time for back on truck tippers is ten to twelve minutes, or six and five trucks per hour, respectively.

This study only considers the cycle time of drive over truck tippers at ten to seven minutes per truck corresponding to a capacity of six to 8.5 trucks per hour. If both truck tippers are made available to the fibre truck deliveries, the combined capacity of two truck tippers is 12 to 17 trucks per hour (compared to the peak truck arrival frequency of 11 to 12 trucks per hour).

6.3 Truck Tipper Availability

The difference between how many trucks arrive vs capacity of the truck tipper indicates the availability of the truck tipper and hence the likelihood or extent of waiting time for trucks to unload their fibre or hog. In Table 6-2 to Table 6-5, fibre trucks and hog (and shavings) trucks are divided between truck tipper No. 1 and truck tipper No. 2 (see first two rows) to provide perspective on the tipper availability for those materials. However, since the shavings/bark tipper should also receive fibre, the combined truck tipper capacity in the last row reflects overall capacity.

6.3.1 Including Shavings Trucks

To avoid shavings trucks from driving further into the process area, past the fibre storage area and potential collision with site mobile equipment, it is planned to unload shavings trucks on the truck tipper. However, since there are few shavings trucks and high cost to control dust during tipping of shavings as well as cost to convey the shavings to the dry fibre storage area, truck tipping time has been analyzed with and without shavings trucks.

6.3.1.1 High Range of Cycle Time

Table 6-2 shows the availability of the truck tippers at the high range of the cycle time (more conservative) during the peak period. If only one tipper is used to receive fibre, then there would be three more truck deliveries per hour than can be accommodated by the truck tipper. At the end of seven hours, there would be a queue of seven trucks waiting to unload.

Utilizing both truck tippers for fibre at this cycle time shows that the deliveries generally match the capacity of the truck tippers. As a result, any abnormal delays may cause a trucking queue until after the peak period is over.

Table 6-2 Higher Range of Cycle Time and Corresponding Average (Sawdust, Woodchips, Shavings and Bark) Trucks per Hour During Peak Hours

Material	Tipper	Style	Cycle time (min)	Delivery capacity (trucks/hr)	Tipper utilization (hrs/day)	Peak window deliveries (trucks/hr)	Peak window deliveries exceeding capacity (trucks/hr)
Fibre	No. 1	Drive Over	10	6.0	21.3	9.1	3.1
Shave/Bark	No. 2	Drive Over	10	6.0	4.8	2.1	-3.9
Combined	Both			12	13.1	11.2	-0.8

6.3.1.2 Low Range of Cycle Time

Table 6-3 shows the availability of the truck tippers at the low range of the cycle time (least conservative) during the peak period. If only one tipper is used to receive fibre, then there would be about one more truck deliveries per hour than can be accommodated by the truck tipper. At the end of seven hours, there would be a queue of about 7 trucks waiting to unload.

Utilizing both truck tippers for fibre at this cycle time shows that the deliveries are lower than the capacity of the truck tippers by almost six trucks per hour. In this case, even some abnormal delays would not necessarily cause truck queueing during the peak period. While not thoroughly investigated, one factor that may contribute to having a low (range of) cycle time could be having the receiving hopper below grade, so no incline ramp up is required for the trucks to drive up before they get on to the truck tipper. Incline ramps could be 200 feet long.

Table 6-3 Lower Range of Cycle Time and Corresponding Average (Sawdust, Woodchips, Shavings and Bark) Trucks per hour During Peak Hours

Material	Tipper	Style	Cycle time (min)	Delivery capacity (trucks/hr)	Tipper utilization (hrs/day)	Peak window deliveries (trucks/hr)	Peak window deliveries exceeding capacity (trucks/hr)
Fibre	No. 1	Drive Over	7	8.6	14.9	9.1	0.6
Shave/Bark	No. 2	Drive Over	7	8.6	3.4	2.1	-6.5
Combined	Both			17	9.2	11.2	-5.9

6.3.2 Not Including Shavings Trucks

Removing the shavings trucks from the total number of deliveries does not significantly improve the availability of the truck tippers because there are so few (eight) shavings trucks per day. Table 6-4 and Table 6-5 identify the number of deliveries that exceed the tippers capacity for the high cycle range time and the low cycle range time, respectively.

Table 6-4 Higher Range of Cycle Time and Corresponding Average (Sawdust, Woodchips, and Bark, No Shavings) Trucks per Hour During Peak Hours

Material	Tipper	Style	Cycle time (min)	Delivery capacity (trucks/hr)	Tipper utilization (hrs/day)	Peak window deliveries (trucks/hr)	Peak window deliveries exceeding capacity (trucks/hr)
Fibre	No. 1	Drive Over	10	6.0	21.3	9.1	3.1
Bark	No. 2	Drive Over	10	6.0	4.8	1.5	-4.5
Combined	Both			12	13.1	10.6	-1.4

Table 6-5 Lower Range of Cycle Time and Corresponding Average (Sawdust, Woodchips, and Bark, No Shavings) Trucks per Hour During Peak Hours

Material	Tipper	Style	Cycle time (min)	Delivery capacity (trucks/hr)	Tipper utilization (hrs/day)	Peak window deliveries (trucks/hr)	Peak window deliveries exceeding capacity (trucks/hr)
Fibre	No. 1	Drive Over	7	8.6	14.9	9.1	0.6
Bark	No. 2	Drive Over	7	8.6	3.4	1.5	-7.1
Combined	Both			17	9.2	10.6	-6.5

6.3.3 Truck Tipper Availability at Design Capacity

In the basis of design, the *guaranteed* pellet production capacity is 450,000 BDTY. However, the *design* pellet production capacity is 600,000 BDTY. This section summarizes the truck tipper availability for the design capacity. It is assumed that 33% more bark will also be required; 100,000 BDTY of bark instead of 75,000 BDTY of bark. As a result, for the design capacity, approximately 45 to 50 more additional trucks are expected per day.

When shavings are included, the combined capacity of the truck tippers is exceeded at the high range of the cycle time and there would be queues during the peak window. After the seven-hour peak window there could be over 17 trucks waiting. At the low range of the cycle time, the combined truck tipper capacity would be higher than the expected number of trucks during the peak window and no queues would be expected during normal operation.

Table 6-6 Higher Range of Cycle Time and Corresponding Average (Sawdust, Woodchips, Shavings and Bark) Trucks per Hour During Peak Hours at Design Capacity

Material	Tipper	Style	Cycle time (min)	Delivery capacity (trucks/hr)	Tipper utilization (hrs/day)	Peak window deliveries (trucks/hr)	Peak window deliveries exceeding capacity (trucks/hr)
Fibre	No. 1	Drive Over	10	6.0	28.5	12.2	6.2
Shave/Bark	No. 2	Drive Over	10	6.0	5.3	2.3	-3.7
Combined	Both			12	16.9	14.5	2.5

Table 6-7 Lower Range of Cycle Time and Corresponding Average (Sawdust, Woodchips, Shavings and Bark) Trucks per Hour During Peak Hours at Design Capacity

Material	Tipper	Style	Cycle time (min)	Delivery capacity (trucks/hr)	Tipper utilization (hrs/day)	Peak window deliveries (trucks/hr)	Peak window deliveries exceeding capacity (trucks/hr)
Fibre	No. 1	Drive Over	7	8.6	20.0	12.2	3.6
Shave/Bark	No. 2	Drive Over	7	8.6	3.7	2.3	-6.3
Combined	Both			17.1	11.8	14.5	-2.6

7. Analysis and Summary

A summary of the key findings from the analysis includes the following:

- Approximately 157 trucks are expected daily based on 450,000 BDTY of incoming fibre and 75,000 BDTY of incoming bark, 5 days a week, 48 weeks per year receiving window.
- It is assumed 50% of the deliveries will arrive during a seven-hour peak period based on Drax data, which is equal to approximately eleven to twelve deliveries per hour.
- Cycle time for drive over truck tippers is seven to ten minutes (per vendor), which equals capacity of twelve to 17 trucks per hour for two truck tippers.
- Three back-on truck tippers were not considered (in lieu of two driver-over tippers) due to traffic congestion from truck turnarounds and back-ups as agreed by Drax.
- At the low range of cycle time, two truck tippers provide about 50% excess capacity during peak period.
- At the high range of the cycle time, two truck tippers may provide 10% excess capacity during peak period.
- Maintenance, upset conditions or operator (driver) efficiency/error, could cause queues that would persist until the peak delivery period is over.
- Removing shavings trucks from the delivery schedule does not significantly improve truck tipper availability.
- Driving shavings trucks/loaders to the dry fibre storage area involves a relatively narrow pass between future railroad and proposed fibre stacking area, which may cause safety concerns (refer to Figure 8-1).

8. Recommendations

Based on the preceding analysis, the following actions are recommended to confirm that only two truck tippers will be sufficient for the expected number of deliveries.

- Confirm expected size of trucks and hence corresponding number of deliveries from third-party fibre suppliers/truckers.
- Further evaluate peak delivery window duration and number of deliveries with the third-party fibre suppliers/truckers.
- Further investigate influencing low and high range of cycle times with vendor to determine if the low range of cycle time can consistently be achieved.
- Consider allowing extra space for a future third tipper depending on the outcome of the above.
- Operations should evaluate receiving shavings via walking floor trucks or dust collection truck tipper (with loader tramming).

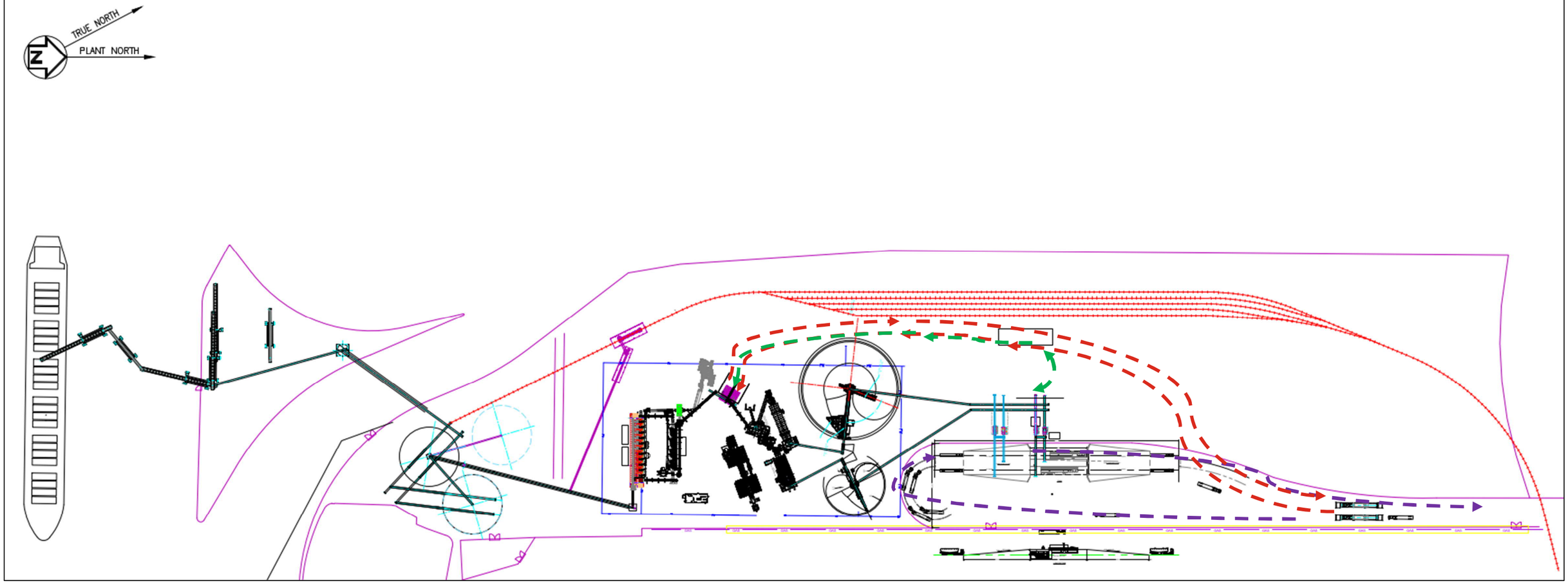


Figure 8-1 General Traffic Patterns for Fibre, Hog and Shavings Trucks

Legend:	Traffic Pattern
Shavings walking floor truck option.	
Fibre / hog trucks (and shavings trucks with dust collection option)	
Shavings loader tramming for tipping option with dust collection.	

Appendix A. June and July 2022 Fiber Delivery Timing Records: Northern Operations

Count of Load ID	Colu																				
	⊞<202	⊟Jun				Jun Total	⊟Jul											Jul Total	Grand Total		
Row Labels		27-Jun	28-Jun	29-Jun	30-Jun		01-Jul	02-Jul	03-Jul	04-Jul	05-Jul	06-Jul	07-Jul	08-Jul	09-Jul	10-Jul	11-Jul				
0		39	58	46	45	188	9		1	2	14	10	8	10	8	2	1	65	253	5.5%	
1		1	13	9	8	31	6		1	2	6	10	6	8	2	1	2	44	75	1.6%	
2			8	6	6	20	7		1	2	7	6	6	7	1	1	2	40	60	1.3%	
3		2	5	7	6	20	3		1	3	6	2	3	4	2	1	3	28	48	1.0%	
4		2	2	2	3	9			1	3	3	2	2	3	2	1	4	21	30	0.7%	
5		5	3	6	10	24	3			7	13	10	9	11	1	1	7	62	86	1.9%	
6		14	17	16	20	67	2			16	23	19	22	27	2	1	15	127	194	4.2%	
7		41	48	54	39	182	6	2	2	24	33	39	30	27	1	4	33	201	383	8.4%	
8		29	34	22	28	113	2	2	1	24	33	34	29	31	1	6	21	184	297	6.5%	Peak
9		32	30	36	32	130	2	1	2	32	35	35	27	31	4	4	24	197	327	7.1%	7 hrs,
10		29	36	32	25	122	1	1	1	32	37	33	36	39	4	4	11	199	321	7.0%	48%
11		30	35	29	24	118	2	2	1	26	38	30	28	35	4	5		171	289	6.3%	of
12		26	35	34	29	124	1	1	1	35	26	39	36	30	4	1		174	298	6.5%	count
13		35	42	25	26	128	1	3	1	27	37	32	29	28	3	3		164	292	6.4%	
14		32	30	25	24	111			1	35	28	30	24	24	4	3		149	260	5.7%	
15		20	21	24	19	84	1	1	2	23	25	22	28	21	1	4		128	212	4.6%	
16		20	16	16	13	65	1		1	19	20	21	15	18	1			96	161	3.5%	
17		12	21	22	13	68		2	4	10	19	14	20	11	1	2		83	151	3.3%	
18		18	15	17	11	61	1		1	17	17	17	21	12	1	2		89	150	3.3%	
19		20	24	16	16	76		2	4	17	21	19	16	13	1	3		96	172	3.8%	
20		19	12	17	13	61		2	2	17	16	14	13	12	2	3		81	142	3.1%	
21		16	15	12	17	60		1	2	18	10	18	11	11	1	1		73	133	2.9%	
22		19	15	14	10	58	1	1	2	11	14	12	15	12	1	3		72	130	2.8%	
23		10	12	14	8	44	1	1	4	14	9	14	15	9	1	3		71	115	2.5%	
(blank)																					
Grand Total		471	547	501	445	1964	50	22	37	416	490	482	449	434	53	59	123	2615	4579		

Load ID	Ws Load ID	Ws Ticket	Date In	Hour	Destination ID	Source ID	SOURCE_NAME	Product ID	Species ID	Species Group ID	GROSS_TON	TARE_TON	NET_TON
833630	221353	AR127266	2022-07-11 10:39	10	PPM	DUNKLY	Dunkley	SHV	SPF	SW	24.09	19.21	4.88
833613	150622	49305	2022-07-11 10:38	10	PPA	TKOARM	Tolko - Armstrong	CMP	SPF	SW	19.25	14.34	4.91
833587	229487	7460958	2022-07-11 10:29	10	PPE	WHRDRV	Weyerhaeuser - Drayt	GRDY	SPF	SW	41.6	19.86	21.74
833618	192166	34366	2022-07-11 10:23	10	LPLP	LPLPOFR2	LPLPOFR2 - Gudeit Off	SAW	SPF	SW	44.25	18.9	25.35
833615	221352	AR139308	2022-07-11 10:19	10	PPM	DUNKLY	Dunkley	SAW	SPF	SW	46.73	19.25	27.48
833614	192165	28841	2022-07-11 10:15	10	LPLP	LPLPOFR2	LPLPOFR2 - Gudeit Off	SAW	SPF	SW	44.08	19.2	24.88
833616	162262	28110822	2022-07-11 10:13	10	HPLP	DHMANU	DH Manufacturing	SHV	SPF	SW	18.72	14.29	4.43
833610	167865	74754	2022-07-11 10:11	10	SPLP	WFPIR	West Fraser - PIR	SHV	SPF	SW	30.7	19.71	10.99
833606	221351	AR98343	2022-07-11 10:09	10	PPM	DUNKLY	Dunkley	HOG	SPF	SW	51.06	21.82	29.24
833609	192164	36450	2022-07-11 10:03	10	LPLP	LPLPOFL2-HUSKAH	LPLPOFL2-HUSKAH	LOGG	SPF	SW	33.66	19.15	14.51
833602	221350	AR127265	2022-07-11 10:00	10	PPM	DUNKLY	Dunkley	SHV	SPF	SW	24.67	19.2	5.47
833617	162261	33522	2022-07-11 9:59	9	HPLP	TSACWD	Tahtsa - Corewood	CHP	SPF	SW	41.16	20.86	20.3
833601	221349	95420	2022-07-11 9:56	9	PPM	CRRIER	Carrier Lumber	SHV	SPF	SW	25.72	19.46	6.26
833608	162260	2040	2022-07-11 9:55	9	HPLP	PVRMFG	PVR	CHPP	SPF	SW	17.7	14.11	3.59
833577	229485	7302713	2022-07-11 9:54	9	PPE	WFSUND	West Fraser - Sundre	SAW	SPF	SW	63.15	21.28	41.87
833559	229484	10126	2022-07-11 9:48	9	PPE	WHRDRV	Weyerhaeuser - Drayt	SHV	SPF	SW	30.56	18.56	12
833597	167864	59133	2022-07-11 9:42	9	SPLP	KITWGA	Kitwanga	HOG	SPF	SW	51.15	24.72	26.43
833598	308707	1007006	2022-07-11 9:41	9	PBL	HAMBAB	Hampton - Babine	HOG	SPF	SW	49.51	19.44	30.07
833555	229483	12184	2022-07-11 9:40	9	PPE	WHRDRV	Weyerhaeuser - Drayt	HOGM	SPF	SW	50.88	23.47	27.41
833595	192161	716220	2022-07-11 9:36	9	LPLP	GORWES	Gorman - Westbank	SHV	SPF	SW	27.71	18.41	9.3
833588	221348	AR139307	2022-07-11 9:36	9	PPM	DUNKLY	Dunkley	SAW	SPF	SW	45.24	19.26	25.98
833593	308706	32645	2022-07-11 9:35	9	PBL	HAMDEC	Hampton - Decker	HOG	SPF	SW	40.91	18.63	22.28
833586	167863	74753	2022-07-11 9:33	9	SPLP	WFPIR	West Fraser - PIR	SAW	SPF	SW	46.39	20.12	26.27
833590	308705	1008876	2022-07-11 9:32	9	PBL	WFFRLK	West Fraser - Fraser L	SHV	SPF	SW	37.89	18.61	19.28
833589	192160	877785	2022-07-11 9:28	9	LPLP	VAAMID	Vaagen - Midway	SAW	SPF	SW	57.62	19.08	38.54
833553	229482	7456159	2022-07-11 9:28	9	PPE	PARKLD	Parkland	SHV	SPF	SW	37.44	18.89	18.55
833584	221347	95388	2022-07-11 9:25	9	PPM	CRRIER	Carrier Lumber	SAW	SPF	SW	42.17	18.99	23.18
833580	192159	36640	2022-07-11 9:21	9	LPLP	LPLPOFL2-HUSKAH	LPLPOFL2-HUSKAH	LOGG	SPF	SW	34.48	18.81	15.67
833582	162259	27110722	2022-07-11 9:19	9	HPLP	DHMANU	DH Manufacturing	SHV	SPF	SW	18.48	14.28	4.2
833572	221346	AR98342	2022-07-11 9:18	9	PPM	DUNKLY	Dunkley	HOG	SPF	SW	47.76	21.85	25.91
833578	192158	LPLPO5R2	2022-07-11 9:17	9	LPLP	LPLPOFR2	LPLPOFR2 - Gudeit Off	SAW	SPF	SW	46.16	19.95	26.21
833571	221345	AR127264	2022-07-11 9:16	9	PPM	DUNKLY	Dunkley	SHV	SPF	SW	25.39	19.23	6.16
833574	308704	1006567	2022-07-11 9:14	9	PBL	HAMBAB	Hampton - Babine	SHV	SPF	SW	33.98	20.75	13.23
833567	192157	33813	2022-07-11 9:05	9	LPLP	TKOARM	Tolko - Armstrong	SAW	SPF	SW	43.66	19.19	24.47
833569	192156	34365	2022-07-11 9:02	9	LPLP	LPLPOFR2	LPLPOFR2 - Gudeit Off	SAW	SPF	SW	43.87	18.93	24.94
833531	229481	12185	2022-07-11 8:58	8	PPE	WHRDRV	Weyerhaeuser - Drayt	HOGM	SPF	SW	51.93	21.24	30.69
833538	229480	H100000318	2022-07-11 8:55	8	PPE	WFHINT	West Fraser - Hinton P	HOGM	SPF	SW	58.42	21.27	37.15

833575	162258	33521	2022-07-11 8:54	8	HPLP	TSACWD	Tahtsa - Corewood	CHP	SPF	SW	40.54	20.88	19.66
833562	192155	25840	2022-07-11 8:54	8	LPLP	LPLPOFR2	LPLPOFR2 - Gudeit Off	SAW	SPF	SW	45.2	19.24	25.96
833528	229479	7461628	2022-07-11 8:52	8	PPE	WHRDRV	Weyerhaeuser - Drayt	GRDY	SPF	SW	45.49	19.44	26.05
833565	162257	2039	2022-07-11 8:52	8	HPLP	PVRMFG	PVR	CHPP	SPF	SW	17.79	14.1	3.69
833557	167862	74752	2022-07-11 8:42	8	SPLP	WFPIR	West Fraser - PIR	SHV	SPF	SW	30.15	19.71	10.44
833556	192151	36449	2022-07-11 8:40	8	LPLP	LPLPOFL2-HUSKAH	LPLPOFL2-HUSKAH	LOGG	SPF	SW	35.19	19.14	16.05
833549	192150	921061	2022-07-11 8:37	8	LPLP	TKOARM	Tolko - Armstrong	SAW	SPF	SW	42.23	18.49	23.74
833541	150621	215477	2022-07-11 8:37	8	PPA	TKOARM	Tolko - Armstrong	SHV	SPF	SW	34.79	17.53	17.26
833550	221344	AR139306	2022-07-11 8:36	8	PPM	DUNKLY	Dunkley	SHV	SPF	SW	25.15	18.82	6.33
833547	221343	AR98341	2022-07-11 8:34	8	PPM	DUNKLY	Dunkley	HOG	SPF	SW	43.58	21.86	21.72
833554	162256	26110722	2022-07-11 8:31	8	HPLP	DHMANU	DH Manufacturing	SHV	SPF	SW	18.58	14.29	4.29
833546	221342	AR127263	2022-07-11 8:28	8	PPM	DUNKLY	Dunkley	SHV	SPF	SW	24.42	19.24	5.18
833517	229478	7460957	2022-07-11 8:27	8	PPE	WHRDRV	Weyerhaeuser - Drayt	GRDY	SPF	SW	48.39	19.82	28.57
833619	182159	221577	2022-07-11 8:25	8	PWL	TKOLAK	Tolko - Lakeview	SAW	SPF	SW	45.49	20.24	25.25
833542	308703	1006566	2022-07-11 8:19	8	PBL	HAMBAB	Hampton - Babine	SAW	SPF	SW	49.35	21.04	28.31
833612	182158	221410	2022-07-11 8:19	8	PWL	CECONS	C & E Construction	GRDB	SPF	SW	44.72	19.81	24.91
833545	167861	57726	2022-07-11 8:17	8	SPLP	SEATON	Seaton	CHP	SPF	SW	56.12	25.19	30.93
833534	192146	921060	2022-07-11 8:03	8	LPLP	TKOARM	Tolko - Armstrong	SAW	SPF	SW	40.85	18.24	22.61
833604	182157	221672	2022-07-11 8:00	8	PWL	TKOSOD	Tolko - Soda Creek	SAW	SPF	SW	56.24	20.85	35.39
833533	221341	AR126086	2022-07-11 7:59	7	PPM	CBOOPP	Cariboo Pulp and Pape	FIN	SPF	SW	41.95	19.46	22.49
833495	229477	11928	2022-07-11 7:56	7	PPE	WHRDRV	Weyerhaeuser - Drayt	CHP	SPF	SW	43.95	18.67	25.28
833523	221340	AR98340	2022-07-11 7:53	7	PPM	DUNKLY	Dunkley	HOG	SPF	SW	48.32	21.84	26.48
833526	192144	36639	2022-07-11 7:51	7	LPLP	LPLPOFL2-HUSKAH	LPLPOFL2-HUSKAH	LOGG	SPF	SW	34.04	18.83	15.21
833525	221339	AR139305	2022-07-11 7:50	7	PPM	DUNKLY	Dunkley	SHV	SPF	SW	25.74	18.84	6.9
833532	162255	2038	2022-07-11 7:48	7	HPLP	PVRMFG	PVR	CHPP	SPF	SW	17.94	14.1	3.84
833491	229476	12183	2022-07-11 7:46	7	PPE	WHRDRV	Weyerhaeuser - Drayt	HOGM	SPF	SW	51.09	23.54	27.55
833515	150620	18796	2022-07-11 7:45	7	PPA	REIMER	Reimer	SHV	CD	SW	29.2	17.8	11.4
833527	162254	25080722	2022-07-11 7:45	7	HPLP	DHMANU	DH Manufacturing	SHV	SPF	SW	18.5	14.28	4.22
833529	192143	206184	2022-07-11 7:44	7	LPLP	ASPSAV	Aspen Planers - Savon	CMP	SPF	SW	48.01	19.88	28.13
833493	229475	7456635	2022-07-11 7:43	7	PPE	SPRACH	Spruceland - Acheson	SHV	SPF	SW	27.36	19.82	7.54
833521	221338	AR127262	2022-07-11 7:42	7	PPM	DUNKLY	Dunkley	SHV	SPF	SW	26.05	19.26	6.79
833520	192142	34364	2022-07-11 7:41	7	LPLP	LPLPOFR2	LPLPOFR2 - Gudeit Off	SAW	SPF	SW	44.2	18.97	25.23
833536	162253	33520	2022-07-11 7:41	7	HPLP	TSACWD	Tahtsa - Corewood	CHP	SPF	SW	38.12	20.8	17.32
833490	229474	11584	2022-07-11 7:41	7	PPE	WHRDRP	Weyerhaeuser - Drayt	HOGM	SPF	SW	55.98	22.18	33.8
833512	150619	22461	2022-07-11 7:39	7	PPA	REIMER	Reimer	SHV	CD	SW	27.41	17.63	9.78
833489	229473	7084141	2022-07-11 7:35	7	PPE	WHREDS	Weyerhauser - Edson	GRDY	SPF	SW	40.96	19.45	21.51

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