



Cobalt Geosciences, LLC
P.O. Box 82243
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May 6, 2020

EJ Poultry
C/O Greg Zetterberg
gregzetterberg@gmail.com

RE: Additional Geotechnical Recommendations
Proposed Commercial Development
2401 Inter Avenue
Puyallup, Washington

In accordance with your authorization, Cobalt Geosciences, LLC has prepared this letter report to discuss groundwater elevations and the use of permeable pavements at the referenced site.

The purpose of our evaluation was to determine the feasibility of utilizing infiltration devices for stormwater runoff management. We previously prepared a Preliminary Geotechnical Investigation dated June 25, 2017 and a stormwater feasibility evaluation dated May 24, 2019.

Previous Test Pits TP-1 through TP-3

We excavated three test pits in June 2017 as part of our preliminary geotechnical investigation. All of the test pits encountered approximately 8 to 18 inches of topsoil and vegetation underlain by about 5 to 5.5 feet of medium stiff to stiff, silt with variable amounts of sand and local woody debris (Alluvium). These materials were underlain by loose to medium dense, very fine to fine grained sand with trace to some silt (Alluvium). These materials locally contained large woody debris and interbeds of silt/clay.

In May 2019, we excavated an area to conduct an in-situ infiltration test along with two hand borings to determine groundwater elevations prior to and following infiltration analysis. These hand borings encountered approximately 9 inches of grass and topsoil underlain by approximately 0.8 feet of fine to medium grained sand with silt (Alluvium?). This layer was underlain by approximately 3.7 feet of loose to medium dense, silty-fine to fine grained sand (Alluvium). This layer was underlain by fine to medium grained sand trace silt (Alluvium), which continued to the termination depths of the hand borings. Groundwater was encountered at 6 feet below grade prior to testing and 5.9 feet below grade following testing.

Based on the previous and recent explorations, the seasonal high regional groundwater elevation is about 5 feet below existing site elevations. We conducted several shallow hand borings in late 2019 and early 2020 to determine the depth to shallow perched groundwater. The results of these explorations can be found below.

Groundwater Elevations

Based on our discussions with Abbey Road Group, we understand that permeable concrete will likely be utilized to manage surface water runoff from new parking areas. Runoff from roof areas and possibly heavy duty pavement sections will likely be routed to a detention system.

We have recently evaluated groundwater elevations using shallow hand boring excavations at numerous locations within the property (Figure 1). The perched groundwater elevations based on elevations (for reference) from the site plan are as follows:

Location	Date	Groundwater Elevation (Feet)	Ground El.
P-1	12/20/19	56.4	~59.5
	1/4/20	56.8	
	1/28/20	56.8	
	2/11/20	57.0	
	3/15/20	56.5	
P-2	12/20/19	56.7	~60.2
	1/4/20	56.8	
	1/28/20	56.9	
	2/11/20	57.5	
	3/15/20	56.7	
P-3	12/20/19	55.7	~59.3
	1/4/20	55.9	
	1/28/20	56.1	
	2/11/20	56.6	
	3/15/20	56.0	
P-4	12/20/19	55.5	~59.1
	1/4/20	55.7	
	1/28/20	56.3	
	2/11/20	56.6	
	3/15/20	55.9	

Perched groundwater due to heavy precipitation is generally 2.5 feet or more below existing site elevations. We anticipate that at least 12 inches of native soils are required to allow clearance between the bottom of angular rock and groundwater.

We should be provided with final plans for review to determine if the intent of our recommendations have been incorporated. We should be on site to confirm soil conditions and provide additional recommendations if necessary. Any system should have adequate overflow to City infrastructure or a detention system.

Permeable Pavements

Typically, pervious pavements are supported by a leveling course and storage reservoir course placed on prepared native soils. These courses typically consist of open graded angular rock, 5/8 to 2 inches in diameter, with a total thickness ranging from 6 to 18 inches.

We understand that the site may be filled to create a finish grade approximately 0.5 to 1.5 feet higher than the existing elevations. While traffic loads and frequency are unknown at this time, we understand that vehicle traffic will include both heavy trucks as well as passenger vehicles. Based on our experience and review of Federal Highway Administration (FHWA) information, pervious pavements are primarily utilized in light duty traffic areas; therefore, the long term performance under heavy truck loads is not well known. Typically, permeable pavements are not recommended for heavy truck loads.

We recommend removal of loose topsoil prior to placement of imported fill materials. The depth to expose inorganic native soils will vary from 6 to 12 inches in most areas. The area around the existing residence may require additional soil removal.

The exposed subgrades should NOT be re-compacted to 95 percent of the modified proctor as is typical for roadway and parking lot subgrade preparation.

We recommend placement of Tensar TX160 geogrid over the resulting subgrade in all areas. The geogrid should be placed on level surfaces. Clean angular rock or imported sand and gravel with less than 5 percent fines should be placed in any low areas. Geogrid should be placed with at least 6 inches of overlap onto adjacent layers and should extend at least 2 feet beyond the edges of pavement areas.

For the heavy-duty pervious pavement section, we recommend placement of 8 inches of 2 inch clean angular rock over the geogrid. Over this layer, we recommend placement of 6 inches of 5/8 inch clean angular rock. The pervious concrete should be at least 8 inches thick. Note that some overexcavation of native soils may be required to achieve the design finish grade elevations. An additional layer of geogrid and/or local overexcavation of native soils may be required if unstable soils are encountered.

For the normal duty pervious pavement section, we recommend placement of 6 inches of 1.25 to 2 inch clean angular rock over the geogrid. Over this layer, we recommend placement of 6 inches of 5/8 inch clean angular rock. The pervious concrete should be at least 6 inches thick.

In either of the above sections, the reservoir course may be increased to allow for additional stormwater storage, if required.

Additional information regarding permeable pavement design, construction, and maintenance can be found in the Pierce County Stormwater and Site Development Manual (2015).

Erosion and Sediment Control

Erosion and sediment control (ESC) is used to reduce the transportation of eroded sediment to wetlands, streams, lakes, drainage systems, and adjacent properties. Erosion and sediment control measures should be implemented, and these measures should be in general accordance with local regulations. At a minimum, the following basic recommendations should be incorporated into the design of the erosion and sediment control features for the site:

- Schedule the soil, foundation, utility, and other work requiring excavation or the disturbance of the site soils, to take place during the dry season (generally May through September). However, provided precautions are taken using Best Management Practices (BMP's), grading activities can be completed during the wet season (generally October through April).
- All site work should be completed and stabilized as quickly as possible.
- Additional perimeter erosion and sediment control features may be required to reduce the possibility of sediment entering the surface water. This may include additional silt fences, silt

fences with a higher Apparent Opening Size (AOS), construction of a berm, or other filtration systems.

- Any runoff generated by dewatering discharge should be treated through construction of a sediment trap if there is sufficient space. If space is limited other filtration methods will need to be incorporated.

Closure

The information presented herein is based upon professional interpretation utilizing standard practices and a degree of conservatism deemed proper for this project. We emphasize that this report is valid for this project as outlined above and for the current site conditions and should not be used for any other site. Our recommendations are based on limited knowledge of proposed traffic loading conditions. We are not responsible for long-term performance of permeable concrete or asphalt.

Sincerely,

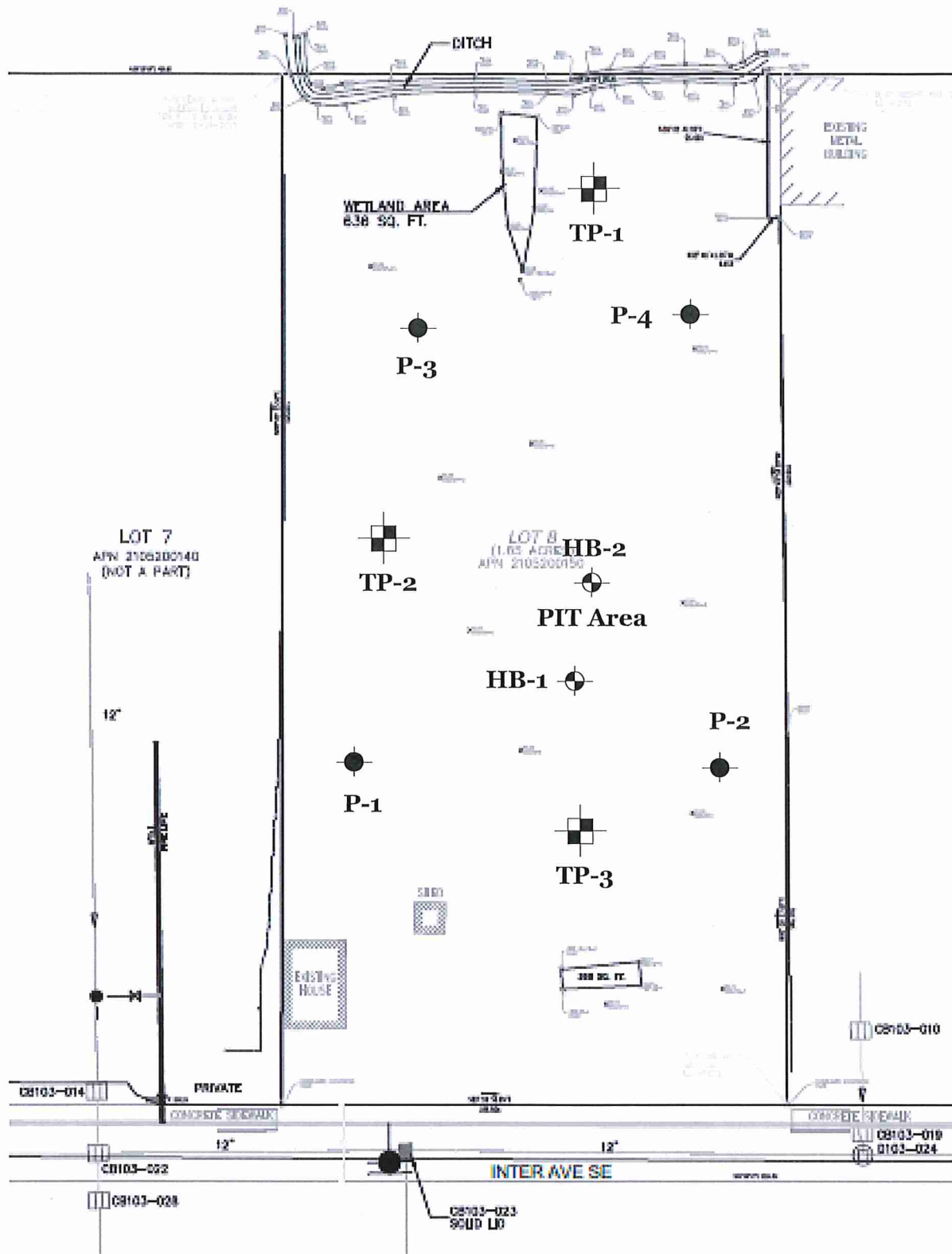
Cobalt Geosciences, LLC



Exp. 6/26/2020

Phil Haberman, PE, LG, LEG
Principal

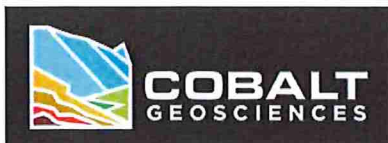
PH/sc



● Probe Location
P-1

HB-1 Approximate
Hand Boring
Location

TP-1 Approximate Test Pit
Location (2017)



Stormwater Feasibility Evaluation
2401 Inter Avenue
Puyallup, Washington

SITE PLAN
FIGURE 1

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