Stormwater Site Plan

Love's Travel Stops' Development Project
Easton, WA

September 2019

SCJ ALLIANCE
CONSULTING SERVICES

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Appendices

PROJECT ENGINEER'S CERTIFICATION

"I hereby state that this Stormwater Site Plan / Construction SWPPP for the Love's Travel Stops development project has been prepared by me or under my supervision and meets the requirements of the Stormwater Management Manual for Eastern Washington and the standard of care and expertise which is usual and customary in this community for professional engineers. I understand that Easton's LAMIRD and Kittitas County do not and will not assume liability for the sufficiency, suitability, or performance of drainage facilities prepared by me."

September 26, 2019

Approved By:
Brandon Johnson, PE
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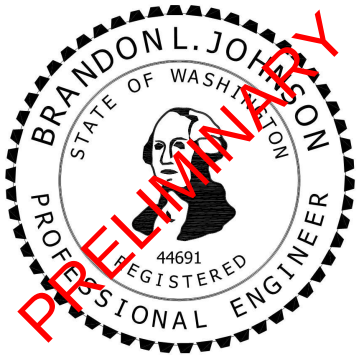
360.669.0700

Date



September 26, 2019

Prepared By:
Zachary Severs
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Date

STORMWATER SITE PLAN

The following report was prepared for the proposed Love's Travel Stops development project in Easton Rural Employment Center's Limited Area of More Intensive Rural Development (LAMIRD) in Kittitas County, Washington. This project was prepared to comply with the minimum technical standards and requirements that are set forth in the *2019 Stormwater Management Manual for Eastern Washington (SWMMEW)*.

SECTION 1: DETERMINATION OF MINIMUM REQUIREMENTS

The proposed Love's Travel Stops redevelopment project will result in more than 5,000 ft^2 of new pollution generating impervious surface (PGIS) and more than 10,000 ft^2 of new non-pollution generating impervious surface (NPGIS). In accordance with *Chapter 2, Section 2.5, of the SWMMEW*, a Stormwater Site Plan is required for this project. As a result, Minimum Requirements 1-8 will need to be addressed. The below table summarizes how each requirement will be met.

MINIMUM REQUIREMENT	COMPLIANCE WITH MINIMUM REQUIREMENT
#1 - Stormwater Site Planning	The contents of this report and all included appendices are intended to satisfy this requirement.
#2 - Construction SWPPP	A Construction SWPPP has been prepared and is enclosed herein as Appendix 6.
#3 - Source Control of Pollution	A Source Control Pollution Prevention Plan will be prepared and included with the project's Operation and Maintenance Manual.
#4 - Drainage Path Preservation	Preservation of the site's previously established natural drainage paths will be maintained to the maximum extent practicable
#5 - Runoff Treatment	The proposed site is classified as a high-use site and will provide Basic & Metal Treatment for PGIS and Oil Control for the fueling stations.
#6 - Flow Control	Flow control is required for the construction of the proposed improvements. A stormwater infiltration galleries will be constructed.
#7 - Operation and Maintenance	An Operations & Maintenance Manual will be prepared and recorded against the property prior to certificate of occupancy.
#8 - Local Requirements	The proposed improvements will meet the local requirements set forth by Easton (unincorporated) and Kittitas County

SECTION 2: PROJECT OVERVIEW

The proposed commercial development project is located within the Tax Parcel Numbers (TPN) 778834 with the parcel located within the Easton Rural Employment Center's LAMIRD. Specifically, the proposed site improvements / construction activities include the following:

- Site preparation, grading, and erosion control activities
- Construction of a new convenience store with attached restaurant, tire shop, & gas filling stations
- Construction of Large On-site Septic System (LOSS)
- Construction of an asphalt parking
- Construction/installation of stormwater facilities and extension of available utilities

SECTION 3: EXISTING CONDITIONS SUMMARY

The site is comprised of one (1) parcel, totally approximately 16.67 acres. The proposed project will disturb approximately 90% of the total site area. The parcel is zoned General Commercial in Easton Rural Employment Center's LAMIRD in Kittitas County.

Currently, the site is occupied by trees, bushes/brush, grasses, and is vacant/undeveloped. The site has remained relatively unchanged since 1998, with portions of the site being used for logging and replanting operations. The site is bordered on the North by Easton State Airport preceded by dense trees, on the West by West Sparks Road, on the East by an RV park, and on the south by an undeveloped/vacant parcel. In general, the site is flat and slopes in an east-to-west direction.

There are three (3) easements that are located on-site, one located along the eastern property line, another located in the northeast corner, and the last located at the west property line. Each easement is for the following purposes: telecommunications, ingress/egress, and power. All existing easements will remain and will not be affected by construction activities and proposed improvements.

The subject parcel is located in FEMA Community Panel Number 5300950226B. The site lies within Zone 'C' which is classified as area of minimum flooding. At the time of the project survey completed by MTN2COAST on May 2019, there wasn't any evidence to suggest that the site was or is being used as a solid waste dump, sump, and/or sanitary fill.

Figure 1: 1998 and 2018 Existing Conditions Exhibits

SECTION 4: PERMANENT STORMWATER CONTROL PLAN

Summary Section

The proposed project will consist of one (1) drainage basin with all stormwater runoff discharging into on-site stormwater retention/infiltration facilities. Water quality treatment is required for site's proposed pollution-generating impervious surfaces. The following tables identify the different on-site land type designations and their respective areas for the project. Please see Appendix 7 for the Developed Basin Area Map.

BASIN #1	AREA (ACRES)	% OF TOTAL AREA
Proposed Stormwater Infiltration Facility	0.90	5.2%
Post Development Impervious Surface Area	12.71	74.2%
Post Development Landscape	3.53	20.6%
Total Tributary Area	17.14	100.0%

Infiltration Rate of Bioretention Soil Mix (BSM) and Subgrade Soils

Per *Chapter 5, BMP T5.31 Bioretention of the 2019 SWMMEW,* the default BSM infiltration rate is 6-inches/hour. Per *Table 5.16: Sizing Methods and Assumptions for Bioretention in the 2019 SWMMEW,* there is a Long-Term Infiltration Rate of BSM Factor of Safety (FOS) of 4, resulting in a maximum infiltration rate of 1.5-inches/hour for PGIS contributing areas greater than 10,000-SF. The stormwater bioretention-infiltration facility utilized a design infiltration rate of 1.5-inches/hour.

Terracon performed a subsurface exploration & geotechnical engineering services on May 21, 2019 with the report being completed on August 22, 2019 for our proposed project site. From the soil boring logs, the top layer of soil was classified as a silty sand with gravel reaching depths of 5.0-feet below ground surface (bgs) with the average depth approximately 3.0-3.5 bgs. The soil type below the silty sand with gravel was classified as sandy gravel which extends approximately 8.0-9.0-feet bgs. All bore test pits terminated around 8.0-9.0-feet bgs. Per Terracon's report, the infiltration rates for each soil type was determined by the grain size characteristics which is an acceptable method for determining infiltration rates *per Appendix B, Chapter 6 of the 2019 SWMMEW*. From this, Terracon determined the short-term infiltration rates for both observed soil types encountered on-site: 9.0-inches/hour for the silty sand with gravel and >100-inches/hour for the sandy gravel. Both the water quality facility and flow control facilities designed that all underlying soils were silty sand with gravel. Per Terracon's report, a Correction Factor (CF) of 0.5 should be applied to determine the long-term design infiltration rate. From this, the design infiltration rate is: 9.0 inches/hour*0.5 = 4.5-inches/hour which was used for sizing the flow control facilities.

No groundwater was encountered during Terracon's subsurface exploration & geotechnical engineering services on May 21, 2019.

See Appendix 5 for Terracon's geotechnical report for additional information.

Water Quality Facilities

For Water Quality Design Volume, we designed to meet *Method 2 of Section 2.7.6 Core Element #5: Runoff Treatment in the 2019 SWMMEW*, which is the SCS Type 1A 6-month, 24-hour storm event. We were able to calculate the 6 month, 24-hour storm event by determining the 2-year, 24-hour storm event and using the equation 4.1 below which can be found in *Section 4.3.7 of the 2019 SWMMEW:*

$$P_{wqs}=C_{wqs}*P_{2yr24hr}$$

Where:

P_{wqs} = 6-month, 24-hour storm event (inches)
C_{wqs}= Coefficient from table 4.3.4 for converting the 2-year, 24-hour to the 6-month, 24-hour= 0.70
$P_{2yr24hr}$ = 2-year, 24-hour storm event from Figure 4.7 Isopluvial Map = 3.5 inches

Therefore:

$$P_{wqs}=0.70*3.5 \text{ inches}$$
$$P_{wqs}=2.45 \text{ inches}$$

We will also need to apply a multiplication factor for converting from 24-hour to the regional storm precipitation depth per *Table 4.6 of the 2019 SWMMEW*. Our site falls within region 1 which has a 1.16 factor. From this, our design WQ design 6-month, 24-hour storm event is:

$$P_{wqs}=2.45 \text{ inches}*1.16 = \mathbf{\underline{2.84\text{-inches}}}$$

Per *Chapter 2, Section 2.6 of the 2019 SWMMEW,* our proposed site is considered a high-use site. From this, our site is required to provide Basic, Metal, and Oil Control Treatments. Below is how we are addressing each treatment requirement.

The project consists of one (1) drainage basin. The drainage basin's stormwater runoff will be directed to four (4) bioretention ponds located throughout the site. All ponds will be lined with a 24-inch bioretention soil mix that meets the requirements of a Bioretention Cell per *Figure V-7.4.1a of the Volume V, Chapter 7 of the 2012 SWMMWW.* Enhanced water quality treatment for the SWMMWW is reciprocal to Metal Treatment for the SWMMEW, thus the bioretention soil mix will meet the requirements for Metal Treatment for our project along with Basic Treatment. Per *Minimum Requirement #5 Runoff Treatment,* the proposed bioretention soil mix will satisfy the *2019 SWMMEW, Chapter 2, Metal Treatment and Basic Treatment Requirements.*

The bioretention ponds were sized to retain the entire 6-month, 24-hour storm event. Autodesk's *Storm and Sewer Analysis 2018*, a computer program using the Santa Barbara Unit Hydrograph Method, was used to determine the required bioretention pond size for the project. In the event that a storm greater than the 6-month, 24-hour occurs, water will rise above the Maximum Water Surface Elevation (WSEL) and enter overflow structures that discharge into three (3) flow control facilities which are explained further in this report, *Flow Control Facilities.* The below table outlines the water quality facility dimensions and amount of storage at the listed elevations:

Basin #1, On-site Bioretention Facility Dimensions and Storage Capacity for the 6-month, 24-hour Storm Event			
Pond Depth (ft.)	Surface Area (ft^2)	Incremental Volume (ft^3)	Cumulative Volume (ft^3)
0.0 (Bottom of Pond)	20,566	-	-
1.0	25,705	23,136	23,136
2.0	32,103	28,904	52,040
2.01 (Max. WQ WSEL)	32,172	321	52,361
3.0	39,401	35,429	87,792
3.01 (Top of Freeboard)	39,476	394	88,184
Note: Basin #1 consist of four (4) bioretention ponds hydraulically connected via storm drain piping. The areas/volumes in the above table are the cumulative of all four (4) ponds.			

Stormwater and gasoline/diesel fuel spills from under the canopies of the passenger vehicle fuel island and truck fuel island will be conveyed to oil/water separators prior to continuing to the stormwater infiltration facility. The truck diesel fueling stations and passenger vehicle fueling stations are both proposing a Containment Solutions® Fiberglass OWS-CS-10, 3000 Gallon oil/water separators. Per *Minimum Requirement #5 Runoff Treatment,* the proposed oil/water separators satisfy the *2019 SWMMEW, Chapter 2, Oil Control Requirements*.

Flow Control Facilities

For flow control facility sizing, we utilized the 100-year, 24-hour storm event and a SCS Type 1A 24-hour rainfall intensity. From the *2019 SWMMEW, Chapter 4, Figure 4.12: 100-Year, 24-Hour Isopluvial Map,* the rainfall depth was determined to be 5.0-inches for the project area. Please see Appendix 2 for the 100-Year, 24-Hour Isopluvial Maps. We will also need to apply a multiplication factor for converting from 24-hour to the regional storm precipitation depth per *Table 4.6 of the 2019 SWMMEW*. Our site falls within region 1 which has a 1.16 factor. From this, our design flow control for the 100-year, 24-hour storm event is:

P_{wqs}=5.0 inches*1.16 = **5.80-inches**

As mention in the *Water Quality Facilities* section of this report, the WQ bioretention ponds were designed to retain, treat, and infiltrate the 6-month, 24-hour storm event. In the event that a larger storm event occurs, stormwater will overflow into three (3) underground gravel infiltration galleries. These galleries will consist of one (1) 24-inch diameter perforated pipe which will allow stormwater to enter the gravel galleries and begin infiltrating with the gravel utilizing a porosity=0.40. The galleries utilized an infiltration rate of 4.50-inches/hour which was determined in the above section, *Infiltration Rate of Bioretention Soil Mix (BSM) and Subgrade Soils* with additional information located in Terracon's Geotechnical Report in Appendix 5. The galleries are located at: north truck parking area (North), passenger vehicle parking area (Passenger), and south truck parking area (South). See appendix 3 for more precise locations of the infiltration galleries.

Autodesk's *Storm and Sewer Analysis 2018*, a computer program using the Santa Barbara Unit Hydrograph Method, was used to determine the required pond size for the project. The below tables

outline the stormwater facility dimensions and amount of storage at the listed elevations. Note: volumes listed in the table include the volume of the perforated pipe.

Infiltration Gallery (North), On-site Infiltration Facility Dimensions and Storage Capacity for the 100-year 24-hour Storm Event with a gravel porosity=0.40			
Gallery Depth (ft.)	Surface Area (ft^2)	Incremental Volume (ft^3)	Cumulative Volume (ft^3)
0.0 (Bottom of Gallery)	25,000	-	-
0.5	25,000	5,000	5,000
1.0	25,000	5,090	10,090
1.5	25,000	5,143	15,233
2.0	25,000	5,143	20,376
2.31 (Max. WSEL)	25,000	3,173	23,549
2.5	25,000	1,917	25,466
3.0 (Top of Gallery)	25,000	5,000	30,466

Infiltration Gallery (Passenger), On-site Infiltration Facility Dimensions and Storage Capacity for the 100-year 24-hour Storm Event with a gravel porosity=0.40			
Gallery Depth (ft.)	Surface Area (ft^2)	Incremental Volume (ft^3)	Cumulative Volume (ft^3)
0.0 (Bottom of Gallery)	14,400	-	-
0.5	14,400	2,880	2,880
1.0	14,400	2,923	5,803
1.5	14,400	2,949	8,752
2.0	14,400	2,949	11,701
2.35 (Max. WSEL)	14,400	2,053	13,754
2.5	14,400	870	14,624
3.0 (Top of Gallery)	14,400	2,880	17,504

Infiltration Gallery (South), On-site Infiltration Facility Dimensions and Storage Capacity for the 100-year 24-hour Storm Event with a gravel porosity=0.40			
Gallery Depth (ft.)	Surface Area (ft^2)	Incremental Volume (ft^3)	Cumulative Volume (ft^3)
0.0 (Bottom of Gallery)	8,000	-	-
0.5	8,000	1,600	1,600
1.0	8,000	1,657	3,257
1.5	8,000	1,692	4,949
2.0	8,000	1,692	6,641
2.38 (Max. WSEL)	8,000	1,269	7,910
2.5	8,000	388	8,298
3.0 (Top of Gallery)	8,000	1,600	9,898

Conveyance System Design

Stormwater runoff from the basin will be collected and conveyed via a catch basin and pipe systems. The conveyance system will be sized to collect and convey the 25-year, 24-hour storm event. Sizing & capacity calculations for the conveyance system will be completed during final design.

SECTION 5: OFF-SITE ANALYSIS REPORT

The project is proposing to tie-in to the West Sparks Road with two (2) ingress/egress locations. The stormwater runoff that is generated from these improvements will be collected via catch basins and storm drain pipe. Once the stormwater enters the conveyance system, their respective stormwater runoffs will enter retention/infiltration ponds and be treated and infiltrated on-site. Please see appendix 3 for the stormwater plan sheets and appendix 4 for the retention/infiltration pond sizing.

Currently, there isn't run-on from adjacent parcels. On-site generated stormwater runoff will be collected, treated, and retained/infiltrated on-site. Historic drainage courses will not be altered. Consequently, downstream impacts to the conveyance system are not anticipated.

SECTION 6: CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN

A Construction Stormwater Pollution Prevention Plan narrative has been prepared and is enclosed herein as Appendix 6.

SECTION 7: SPECIAL REPORTS & STUDIES

A geotechnical report was prepared by Terracon dated August 22, 2019 and is enclosed herein as Appendix 5.

SECTION 8: OTHER PERMITS

A *National Pollution Discharge Elimination System (NPDES) Notice of Intent (NOI)* will be secured with the Department of Ecology before commencing with construction activities. Permits from the City of Moses Lake will also be applied for and issued before starting on-site construction activities.

SECTION 9: DECLARATION OF COVENANT FOR FLOW CONTROL & WQ FACILITIES

The proposed flow control and water quality facilities for this project will be privately maintained. If required, an Agreement to Maintain Stormwater Facilities will be prepared and recorded against the property.

END OF STORMWATER SITE PLAN

APPENDIX 1

SITE VICINITY MAP

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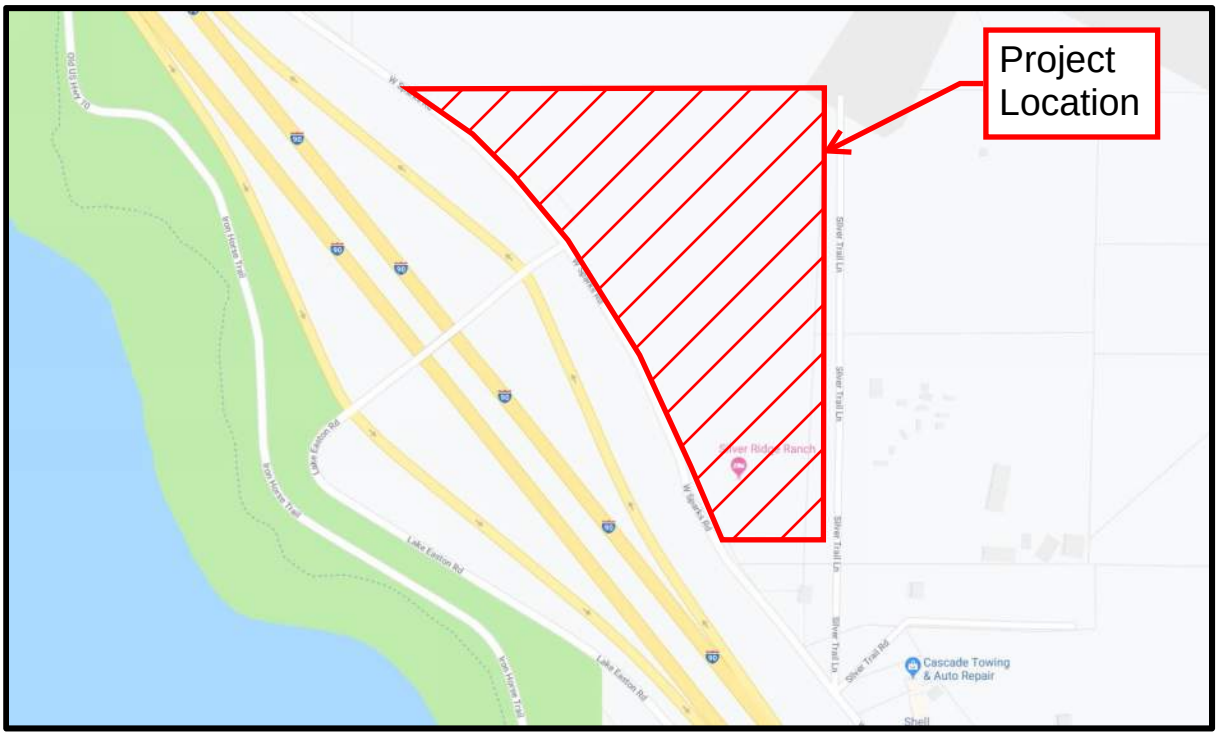
SITE VICINITY MAP



APPENDIX 2

DETERMINATION OF MINIMUM REQUIREMENTS WORKSHEET

Figure 2.1: Flow Chart for Determining Applicable Core Elements for New Development Projects

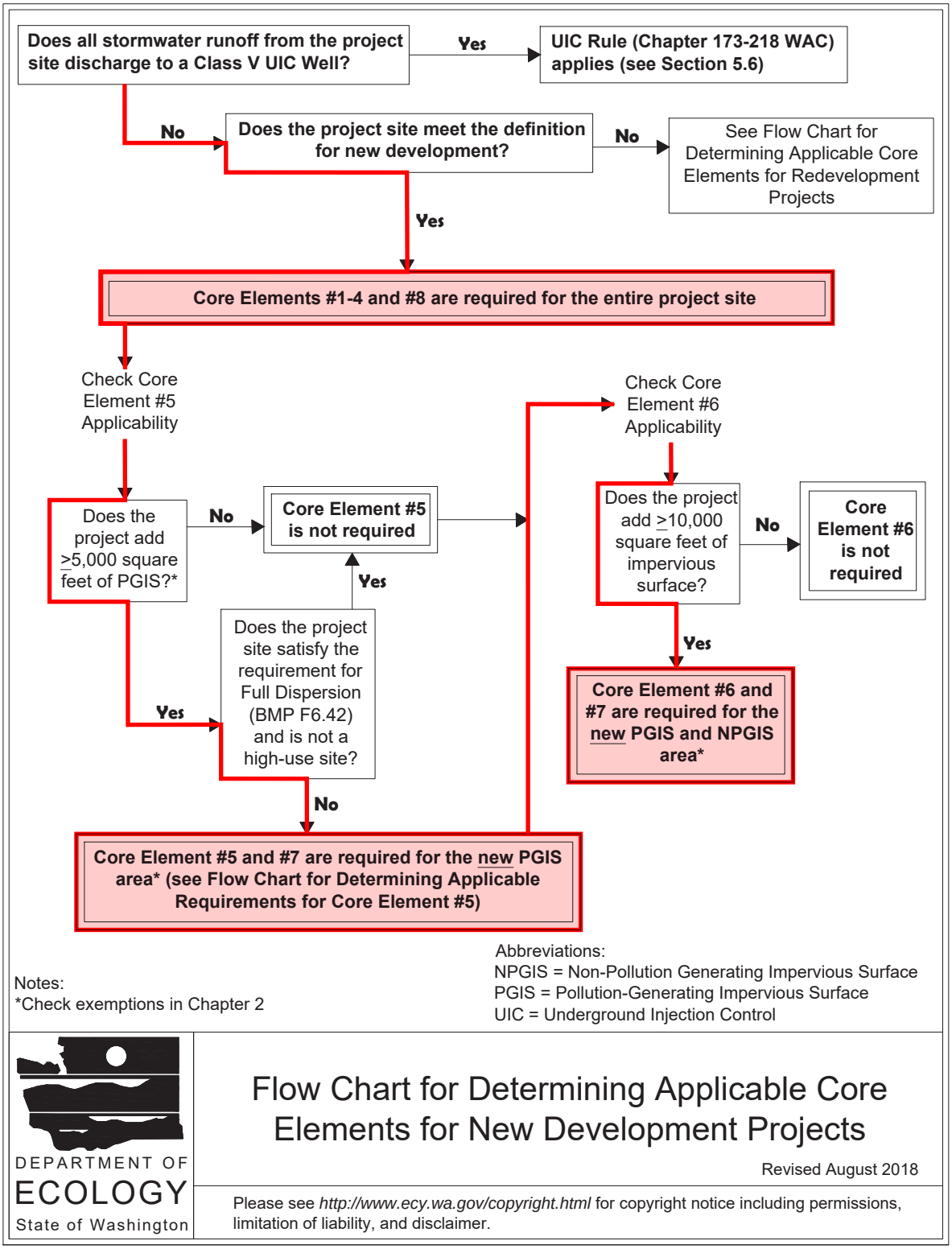


Figure 2.3: Flow Chart for Determining Applicable Requirements for Core Element #5 for New Development and Redevelopment Projects

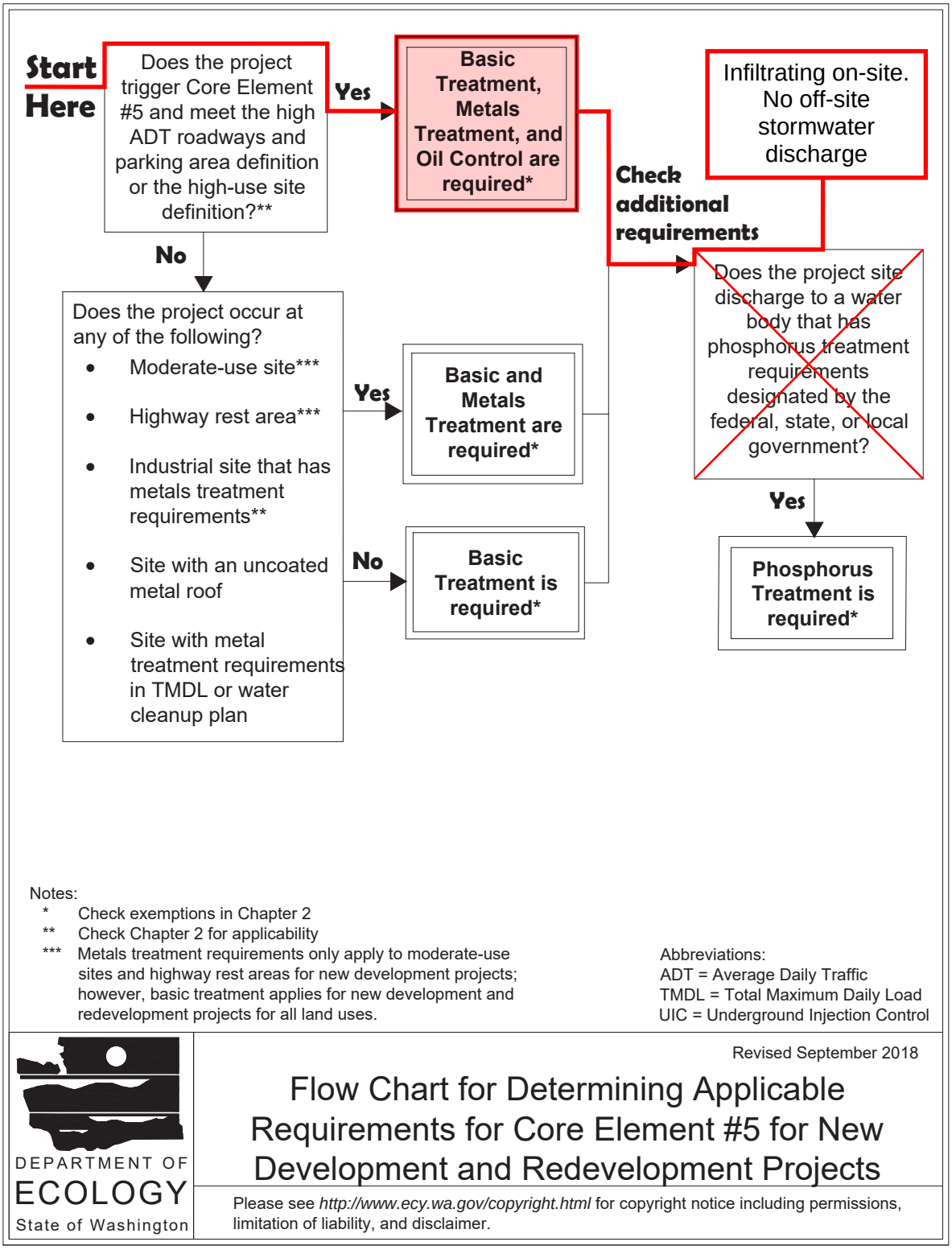
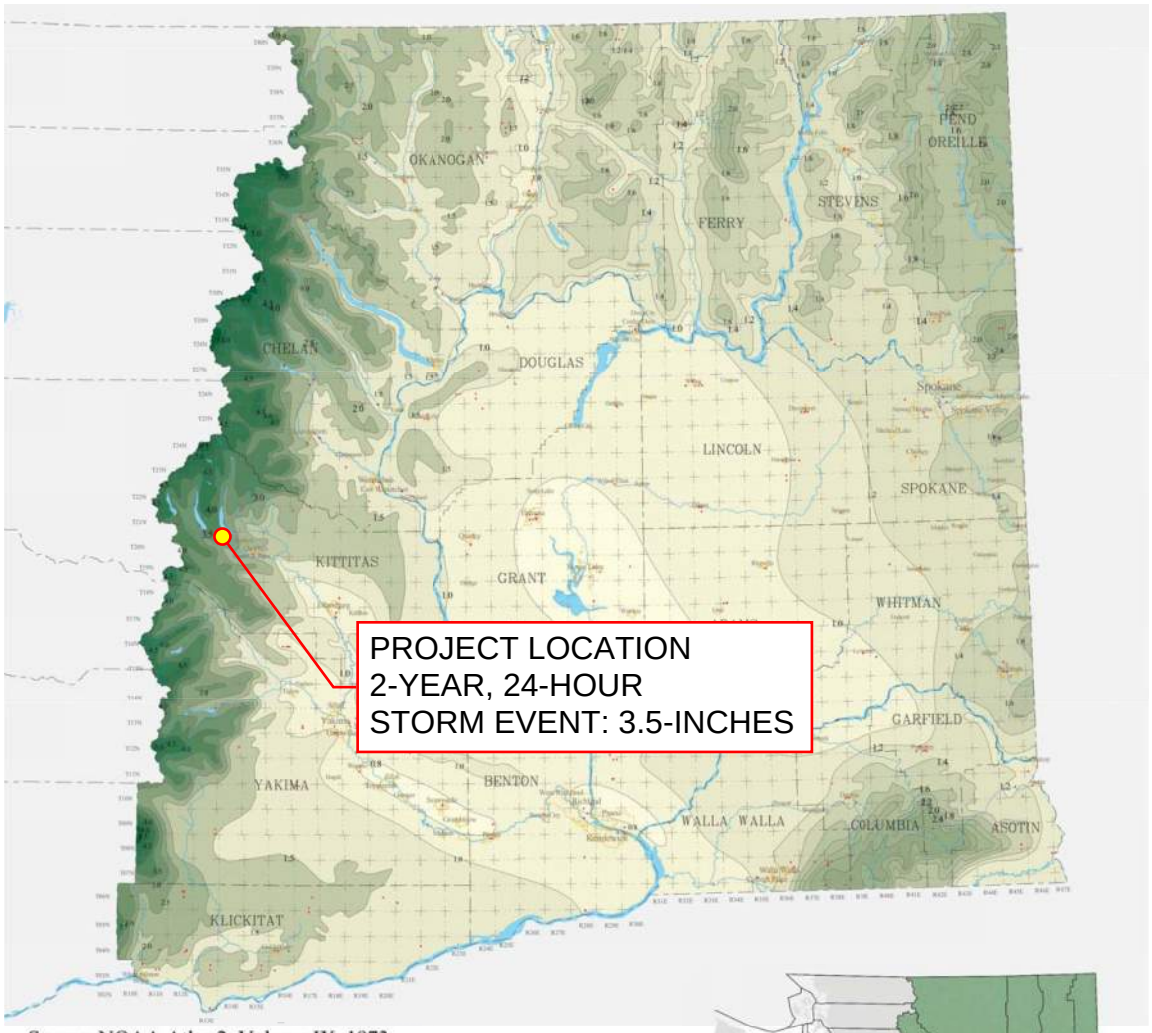


Figure 4.7: 2-Year, 24-Hour Isopluvial Map



DEPARTMENT OF ECOLOGY
State of Washington

2-Year, 24-Hour Isopluvial Map

Revised March 2005

Figure 4.10: 25-Year, 24-Hour Isopluvial Map

DEPARTMENT OF ECOLOGY
State of Washington

25-Year, 24-Hour Isopluvial Map

Revised March 2005

Figure 4.12: 100-Year, 24-Hour Isopluvial Map

DEPARTMENT OF ECOLOGY
State of Washington

100-Year, 24-Hour Isopluvial Map

Revised March 2005

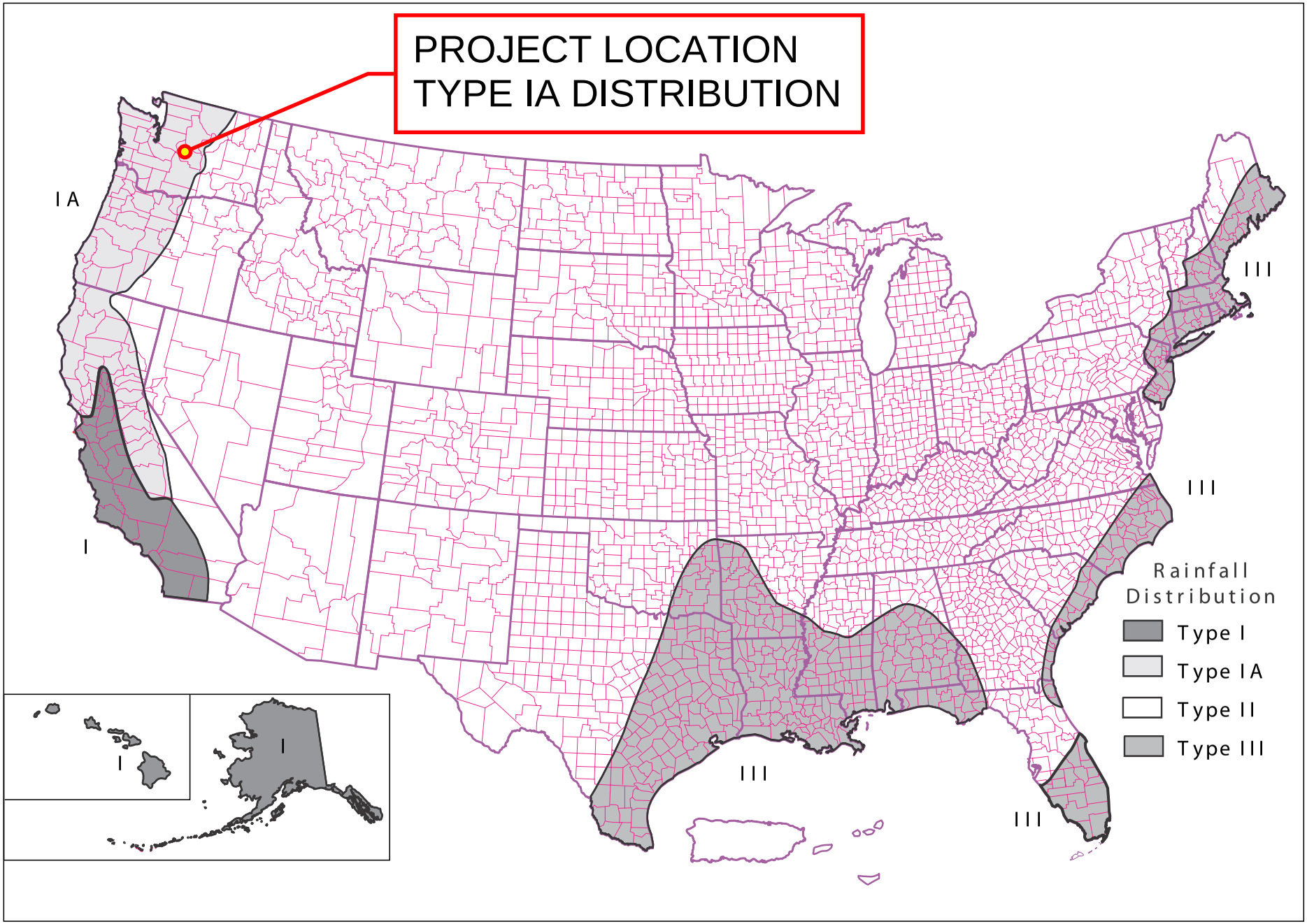


Figure 9.82 *The SCS rainfall distribution geographic boundaries*

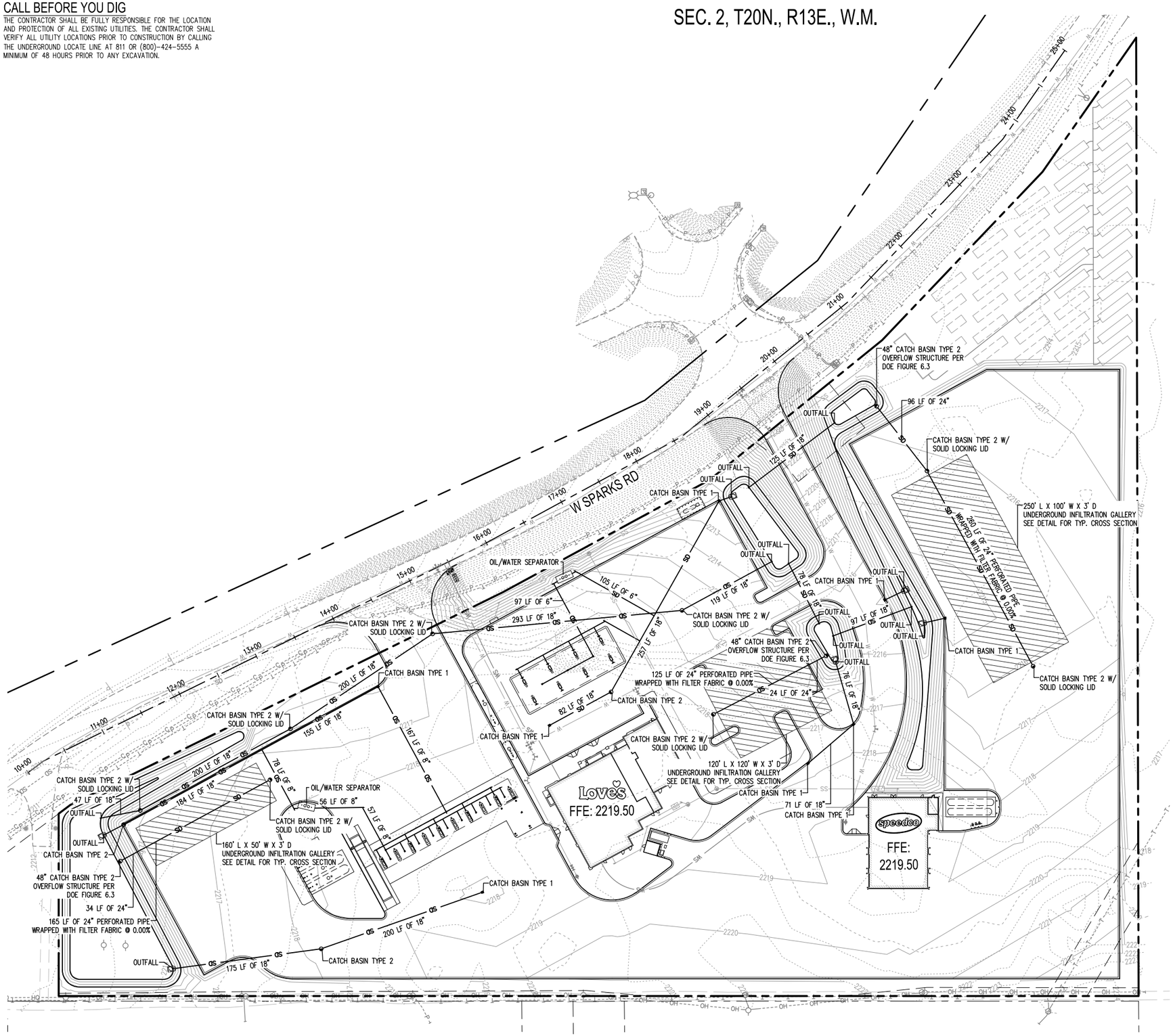
APPENDIX 3

STORMWATER PLAN SHEETS

CALL BEFORE YOU DIG

THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 811 OR (800)-424-5555 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION.

SEC. 2, T20N., R13E., W.M.



0 60 120

SCALE IN FEET

LEGEND

- PROPERTY LINE
- EASEMENT
- EXISTING CONTOURS (MAJOR/MINOR)
- PROPOSED CONTOURS (MAJOR/MINOR)
- EXISTING CHANNELIZATION
- EXISTING GUARDRAIL
- EXISTING POWER LINE
- EXISTING OVERHEAD POWER LINE
- EXISTING PHONE LINE
- EXISTING CABLE LINE
- EXISTING STORM CULVERT
- CEMENT CONCRETE CURB & GUTTER
- PROPOSED STORM LINE
- PROPOSED CATCH BASIN
- PROPOSED BUILDING

VERTICAL DATUM NAVD 88

REVISIONS	DATE	BY

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SHEET TITLE: PRELIMINARY STORMWATER PLAN

PROJECT NAME: LOVE'S TRAVEL STOPS
EASTON, WA

SEAL:

DESIGNER:	Z. SEVERS
DRAWN BY:	C. DAHM
APPROVED BY:	B. JOHNSON
DATE:	SEPTEMBER, 2019
JOB NO:	1398.18
DRAWING FILE NO:	1398.18 SD-01
DRAWING NO:	SD-01
SHEET NO:	6 OF 14

Sep 26, 2019 @ 22:53am – User: zach.severs
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CALL BEFORE YOU DIG

THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 811 OR (800)-424-5555 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION.

SEC. 2, T20N., R13E., W.M.

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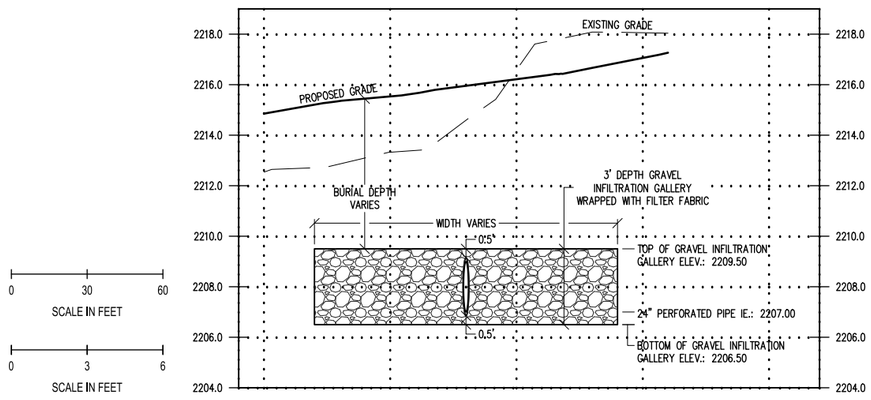
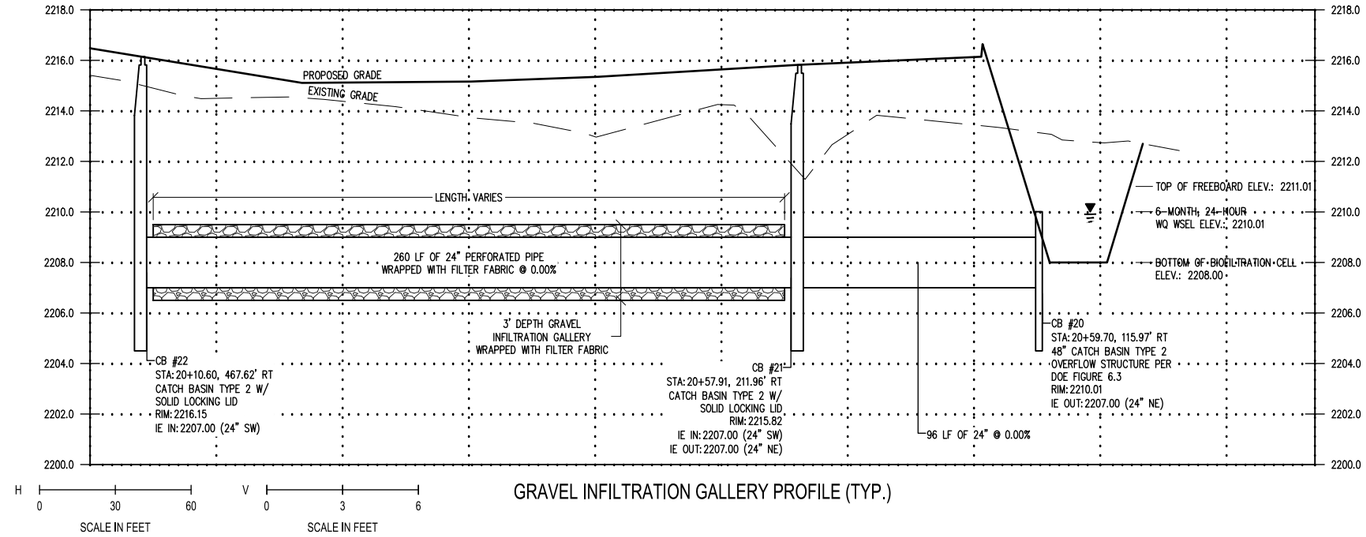
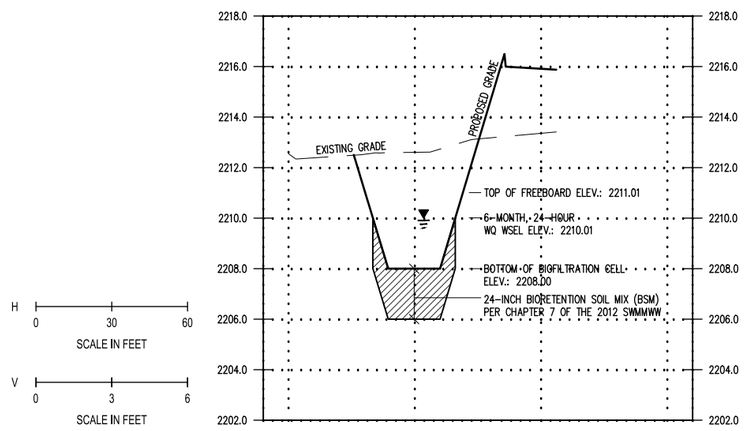
SCALE IN FEET



GRAVEL INFILTRATION GALLERY CROSS SECTION (TYP.)



GRAVEL INFILTRATION GALLERY PROFILE (TYP.)



POND CROSS SECTION (TYP.)

VERTICAL DATUM
NAVD 88

BY	DATE	REVISIONS

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SHEET TITLE: PRELIMINARY STORMWATER PROFILES

PROJECT NAME: LOVE'S TRAVEL STOPS
EASTON, WA

SEAL:

DESIGNER:	Z. SEVERS
DRAWN BY:	C. DAHM
APPROVED BY:	B. JOHNSON
DATE:	SEPTEMBER, 2019
JOB NO:	1398.18
DRAWING FILE NO:	1398.18 SD-02
DRAWING NO:	SD-02
SHEET NO:	7 OF 14

APPENDIX 4

WQ BIORETENTION & UNDERGROUND INFILTRATION GALLERY DESIGN CALCULATIONS

SN	Element ID	Description	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Inlet Invert Offset	Outlet Invert Elevation	Outlet Invert Offset	Total Drop	Average Slope	Pipe Shape	Pipe Diameter or Height	Pipe Width
					(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(%)		(inches)	(inches)
1	Link_Placeholder_01		TRUCK_NORTH	Outfall_Placeholder_01	10.00	3.00	3.00	0.00	0.00	3.00	30.0000	CIRCULAR	18.000	18.00
2	Link_Placeholder_02		PASSENGER	Outfall_Placeholder_02	10.00	3.00	3.00	0.00	0.00	3.00	30.0000	CIRCULAR	18.000	18.00
3	Link_Placeholder_03		TRUCK_SOUTH	Outfall_Placeholder_03	10.00	3.00	3.00	0.00	0.00	3.00	30.0000	CIRCULAR	18.000	18.00

Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	Lengthening Factor	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Max Flow Velocity (ft/sec)	Travel Time (min)	Design Flow Capacity (cfs)	Max Flow / Design Flow Ratio	Max Flow Depth / Total Depth Ratio	Total Time Surcharged (min)	Max Flow Depth (ft)	Reported Condition
0.0150	0.5000	0.5000	0.0000	0.00	NO	1.00	0.00	0 00:00	0.00		49.86	0.00	0.00	0.00	0.00	Calculated
0.0150	0.5000	0.5000	0.0000	0.00	NO	1.00	0.00	0 00:00	0.00		49.86	0.00	0.00	0.00	0.00	Calculated
0.0150	0.5000	0.5000	0.0000	0.00	NO	1.00	0.00	0 00:00	0.00		49.86	0.00	0.00	0.00	0.00	Calculated

Outfalls

SN	Element ID	X Coordinate	Y Coordinate	Description	Invert Elevation	Boundary Type	Flap Gate	Fixed Water Elevation	Peak Inflow	Peak Lateral Inflow	Maximum HGL Depth Attained	Maximum HGL Elevation Attained
					(ft)			(ft)	(cfs)	(cfs)	(ft)	(ft)
1	Outfall_Placeholder_01	5338.52	3858.35		0.00	NORMAL	NO		0.00	0.00	0.00	0.00
2	Outfall_Placeholder_02	4225.84	3576.47		0.00	NORMAL	NO		0.00	0.00	0.00	0.00
3	Outfall_Placeholder_03	3246.69	3784.17		0.00	NORMAL	NO		0.00	0.00	0.00	0.00

SN	Element ID	X Coordinate	Y Coordinate	Description	Invert Elevation	Max (Rim) Elevation	Max (Rim) Offset	Initial Water Elevation	Initial Water Depth	Ponded Area	Evaporation Loss	Constant Flow Rate	Max Exfiltration Rate	Min Exfiltration Rate
					(ft)	(ft)	(ft)	(ft)	(ft)	(ft^2)		(cfs)	(inches/hr)	(inches/hr)
1	BIOPOND_01	3926.93	4972.93		0.00	3.00	3.00	0.00	0.00	0.00	0.00			
2	PASSENGER	4032.98	4266.33		0.00	3.00	3.00	0.00	0.00	0.00	0.00			
3	TRUCK_NORTH	4693.17	4355.35		0.00	3.00	3.00	0.00	0.00	0.00	0.00			
4	TRUCK_SOUTH	3402.46	4244.08		0.00	3.00	3.00	0.00	0.00	0.00	0.00			

Decay Constant	Exfiltration Rate	Peak Inflow	Peak Lateral Inflow	Peak Outflow	Peak Exfiltration Flow Rate	Maximum HGL Elevation Attained	Maximum HGL Depth Attained	Average HGL Elevation Attained	Average HGL Depth Attained	Time of Maximum HGL Occurrence	Total Exfiltration Volume	Total Flooded Volume	Total Time Flooded	Total Retention Time
(1/hrs)	(inches/hr)	(cfs)	(cfs)	(cfs)	(cfm)	(ft)	(ft)	(ft)	(ft)	(days hh:mm)	(1000-ft³)	(ac-inches)	(minutes)	(seconds)
	1.5000	8.18	8.18	0.00	67.01	2.01	2.01	1.30	1.30	0 19:11	79.74	0.00	0.00	0.00
	4.5000	0.00	0.00	0.00	36.00	0.00	0.00	0.00	0.00	0 00:00	0.00	0.00	0.00	0.00
	4.5000	0.00	0.00	0.00	62.50	0.00	0.00	0.00	0.00	0 00:00	0.00	0.00	0.00	0.00
	4.5000	0.00	0.00	0.00	20.00	0.00	0.00	0.00	0.00	0 00:00	0.00	0.00	0.00	0.00

SN	Element ID	Description	From (Inlet) Node	To (Outlet) Node	From (Inlet) Node Invert Elevation (ft)	To (Outlet) Node Invert Elevation (ft)	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (inches)	Rectangular Orifice Height (ft)	Rectangular Orifice Width (ft)	Orifice Invert Elevation (ft)	Orifice Invert Offset (ft)	Orifice Coefficient	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)
1	North_Overflow	To_North_Gallery	BIOPOND_01	TRUCK_NORTH	0.00	0.00	BOTTOM	CIRCULAR	NO	24.00			2.01	2.01	0.6140	0.00	0 00:00
2	Passenger_Overflow	To_Passenger_Gallery	BIOPOND_01	PASSENGER	0.00	0.00	BOTTOM	CIRCULAR	NO	24.00			2.01	2.01	0.6140	0.00	0 00:00
3	South_Overflow	To_South_Gallery	BIOPOND_01	TRUCK_SOUTH	0.00	0.00	BOTTOM	CIRCULAR	NO	24.00			2.01	2.01	0.6140	0.00	0 00:00

Rain Gages

SN	Element ID	Description	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	Rain Gage-01		Time Series	WQ_6_MONTH	Cumulative	inches	Washington	Kittitas	2	2.84	SCS Type IA 24-hr

SN	Element ID	Description	Area	Drainage Node ID	Impervious Area Curve Number	Pervious Area Curve Number	Impervious Area	Rain Gage ID	Total Precipitation	Total Runoff	Peak Runoff	Time of Concentration
			(acres)				(%)		(inches)	(inches)	(cfs)	(days hh:mm:ss)
1	BASIN_01		17.14	BIOPOND_01	98.00	70.00	74.00	Rain Gage-01	2.84	2.08	8.18	0 00:10:00

SN	Element ID	Description	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Inlet Invert Offset	Outlet Invert Elevation	Outlet Invert Offset	Total Drop	Average Slope	Pipe Shape	Pipe Diameter or Height	Pipe Width
					(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(%)		(inches)	(inches)
1	Link_Placeholder_01		TRUCK_NORTH	Outfall_Placeholder_01	10.00	3.00	3.00	0.00	0.00	3.00	30.0000	CIRCULAR	18.000	18.00
2	Link_Placeholder_02		PASSENGER	Outfall_Placeholder_02	10.00	3.00	3.00	0.00	0.00	3.00	30.0000	CIRCULAR	18.000	18.00
3	Link_Placeholder_03		TRUCK_SOUTH	Outfall_Placeholder_03	10.00	3.00	3.00	0.00	0.00	3.00	30.0000	CIRCULAR	18.000	18.00

Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	Lengthening Factor	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Max Flow Velocity (ft/sec)	Travel Time (min)	Design Flow Capacity (cfs)	Max Flow / Design Flow Ratio	Max Flow Depth / Total Depth Ratio	Total Time Surcharged (min)	Max Flow Depth (ft)	Reported Condition
0.0150	0.5000	0.5000	0.0000	0.00	NO	1.00	0.00	0 00:00	0.00		49.86	0.00	0.00	0.00	0.00	Calculated
0.0150	0.5000	0.5000	0.0000	0.00	NO	1.00	0.00	0 00:00	0.00		49.86	0.00	0.00	0.00	0.00	Calculated
0.0150	0.5000	0.5000	0.0000	0.00	NO	1.00	0.00	0 00:00	0.00		49.86	0.00	0.00	0.00	0.00	Calculated

Outfalls

SN	Element ID	X Coordinate	Y Coordinate	Description	Invert Elevation	Boundary Type	Flap Gate	Fixed Water Elevation	Peak Inflow	Peak Lateral Inflow	Maximum HGL Depth Attained	Maximum HGL Elevation Attained
					(ft)			(ft)	(cfs)	(cfs)	(ft)	(ft)
1	Outfall_Placeholder_01	5338.52	3858.35		0.00	NORMAL	NO		0.00	0.00	0.00	0.00
2	Outfall_Placeholder_02	4225.84	3576.47		0.00	NORMAL	NO		0.00	0.00	0.00	0.00
3	Outfall_Placeholder_03	3246.69	3784.17		0.00	NORMAL	NO		0.00	0.00	0.00	0.00

SN	Element ID	X Coordinate	Y Coordinate	Description	Invert Elevation	Max (Rim) Elevation	Max (Rim) Offset	Initial Water Elevation	Initial Water Depth	Ponded Area	Evaporation Loss	Constant Flow Rate	Max Exfiltration Rate	Min Exfiltration Rate
					(ft)	(ft)	(ft)	(ft)	(ft)	(ft^2)		(cfs)	(inches/hr)	(inches/hr)
1	BIOPOND_01	3926.93	4972.93		0.00	3.00	3.00	0.00	0.00	0.00	0.00			
2	PASSENGER	4032.98	4266.33		0.00	3.00	3.00	0.00	0.00	0.00	0.00			
3	TRUCK_NORTH	4693.17	4355.35		0.00	3.00	3.00	0.00	0.00	0.00	0.00			
4	TRUCK_SOUTH	3402.46	4244.08		0.00	3.00	3.00	0.00	0.00	0.00	0.00			

Decay Constant	Exfiltration Rate	Peak Inflow	Peak Lateral Inflow	Peak Outflow	Peak Exfiltration Flow Rate	Maximum HGL Elevation Attained	Maximum HGL Depth Attained	Average HGL Elevation Attained	Average HGL Depth Attained	Time of Maximum HGL Occurrence	Total Exfiltration Volume	Total Flooded Volume	Total Time Flooded	Total Retention Time
(1/hrs)	(inches/hr)	(cfs)	(cfs)	(cfs)	(cfm)	(ft)	(ft)	(ft)	(ft)	(days hh:mm)	(1000-ft³)	(ac-inches)	(minutes)	(seconds)
	1.5000	18.93	18.93	15.08	74.10	2.47	2.47	1.80	1.80	0 13:30	91.51	0.00	0.00	0.00
	4.5000	5.03	0.00	0.00	36.90	2.35	2.35	1.46	1.46	0 13:39	35.86	0.00	0.00	0.00
	4.5000	5.03	0.00	0.00	64.37	2.31	2.31	1.38	1.38	0 13:42	62.45	0.00	0.00	0.00
	4.5000	5.03	0.00	0.00	21.20	2.38	2.38	1.50	1.50	0 13:37	20.34	0.00	0.00	0.00

SN	Element ID	Description	From (Inlet) Node	To (Outlet) Node	From (Inlet) Node Invert Elevation (ft)	To (Outlet) Node Invert Elevation (ft)	Orifice Type	Orifice Shape	Flap Gate	Circular Orifice Diameter (inches)	Rectangular Orifice Height (ft)	Rectangular Orifice Width (ft)	Orifice Invert Elevation (ft)	Orifice Invert Offset (ft)	Orifice Coefficient	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)
1	North_Overflow	To_North_Gallery	BIOPOND_01	TRUCK_NORTH	0.00	0.00	BOTTOM	CIRCULAR	NO	24.00			2.01	2.01	0.6140	5.03	0 08:08
2	Passenger_Overflow	To_Passenger_Gallery	BIOPOND_01	PASSENGER	0.00	0.00	BOTTOM	CIRCULAR	NO	24.00			2.01	2.01	0.6140	5.03	0 08:08
3	South_Overflow	To_South_Gallery	BIOPOND_01	TRUCK_SOUTH	0.00	0.00	BOTTOM	CIRCULAR	NO	24.00			2.01	2.01	0.6140	5.03	0 08:08

Rain Gages

SN	Element ID	Description	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	Rain Gage-01		Time Series	100_YEAR	Cumulative	inches	Washington	Kittitas	100	5.8	SCS Type IA 24-hr

Subbasins

SN	Element ID	Description	Area	Drainage Node ID	Impervious Area Curve Number	Pervious Area Curve Number	Impervious Area	Rain Gage ID	Total Precipitation	Total Runoff	Peak Runoff	Time of Concentration
			(acres)				(%)		(inches)	(inches)	(cfs)	(days hh:mm:ss)
1	BASIN_01		17.14	BIOPOND_01	98.00	70.00	74.00	Rain Gage-01	5.79	4.78	18.93	0 00:10:00

Storage Curves

General

Curve ID: BIOPOND_01

Description:

Underground storage calculator

Underground Pipes | Underground Arch Pipes | Storage Chambers

Barrels:	1		Stone base:	6.00	in
Diameter:	36	in	Additional width:	12.00	in
Length:	300	ft	Stone fill		
Depth increment:	0.10	ft	Stone cover:	0	in
Include headers			Stone voids:	40	%

Compute

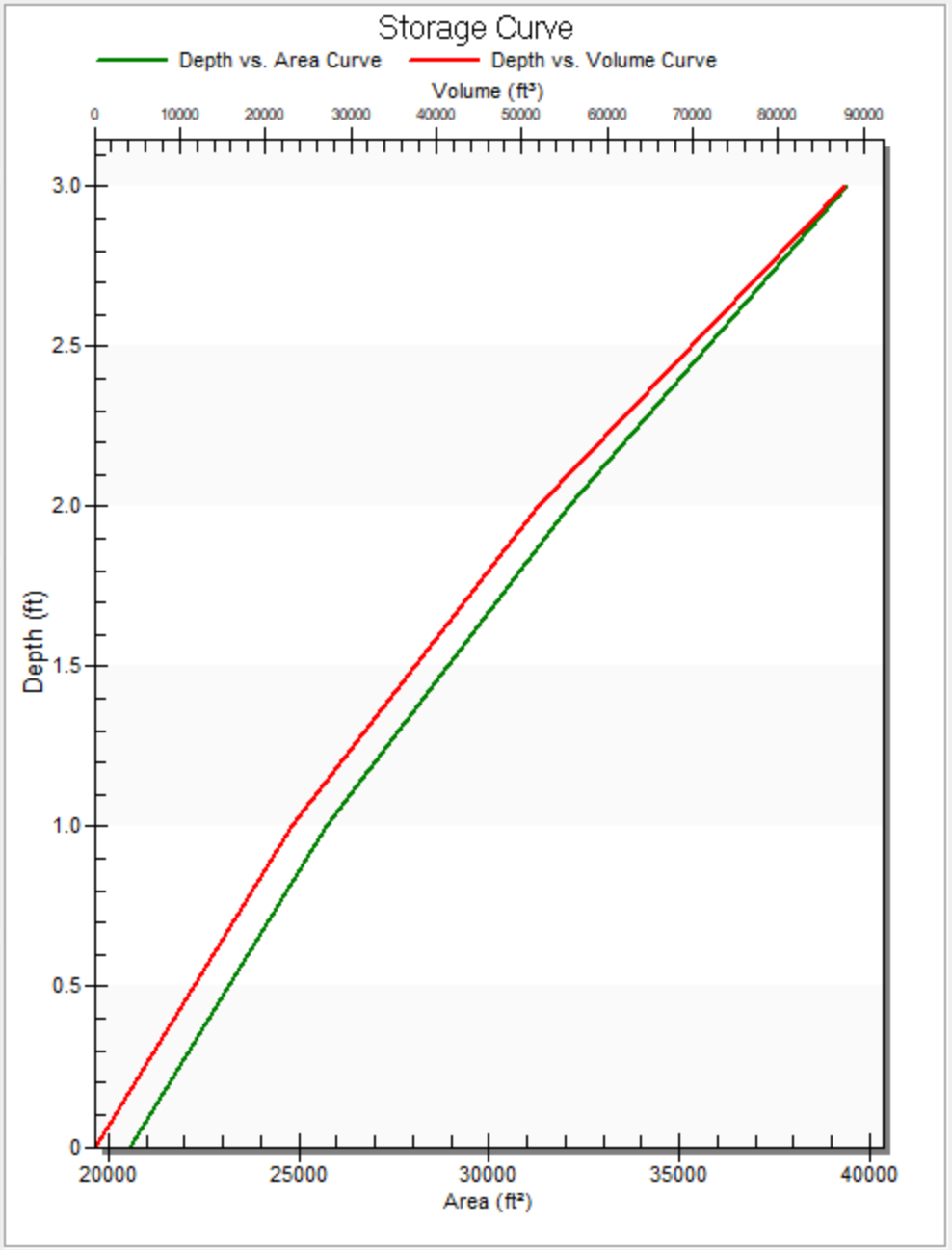
Storage curve data

Storage data type: Depth vs. Area

	Depth (ft)	Area (ft²)	Volume (ft³)
1	0	20566	0.000
2	1	25705	23135.50
3	2	32103	52039.50
4	3	39401	87791.50
5			
6			

Storage curves

	ID	Number of Points	Description
1	SOUTH	31	Underground pipe storage, 1 barrel, 24.00
2	PASSENGER	31	Underground pipe storage, 1 barrel, 24.00
3	NORTH	31	Underground pipe storage, 1 barrel, 24.00
4	BIOPOND_01	4	



Add
Delete
Load...
Save...
Close
Help

Storage Curves

General

Curve ID: NORTH

Description: Underground pipe storage, 1 barrel, 24.00 in diameter, 250 ft length, 6.00 in stone base, 1176.00 in additional width on both sides, with stone fill, 6.00 in stone cover, 40 % stone voids, without headers, with

Underground storage calculator

Underground Pipes | Underground Arch Pipes | Storage Chambers

Barrels:	1		Stone base:	6.00	in
Diameter:	24	in	Additional width:	1176.00	in
Length:	250	ft	☑ Stone fill		
Depth increment:	0.10	ft	Stone cover:	6.00	in
☐ Include headers			Stone voids:	40	%

Compute

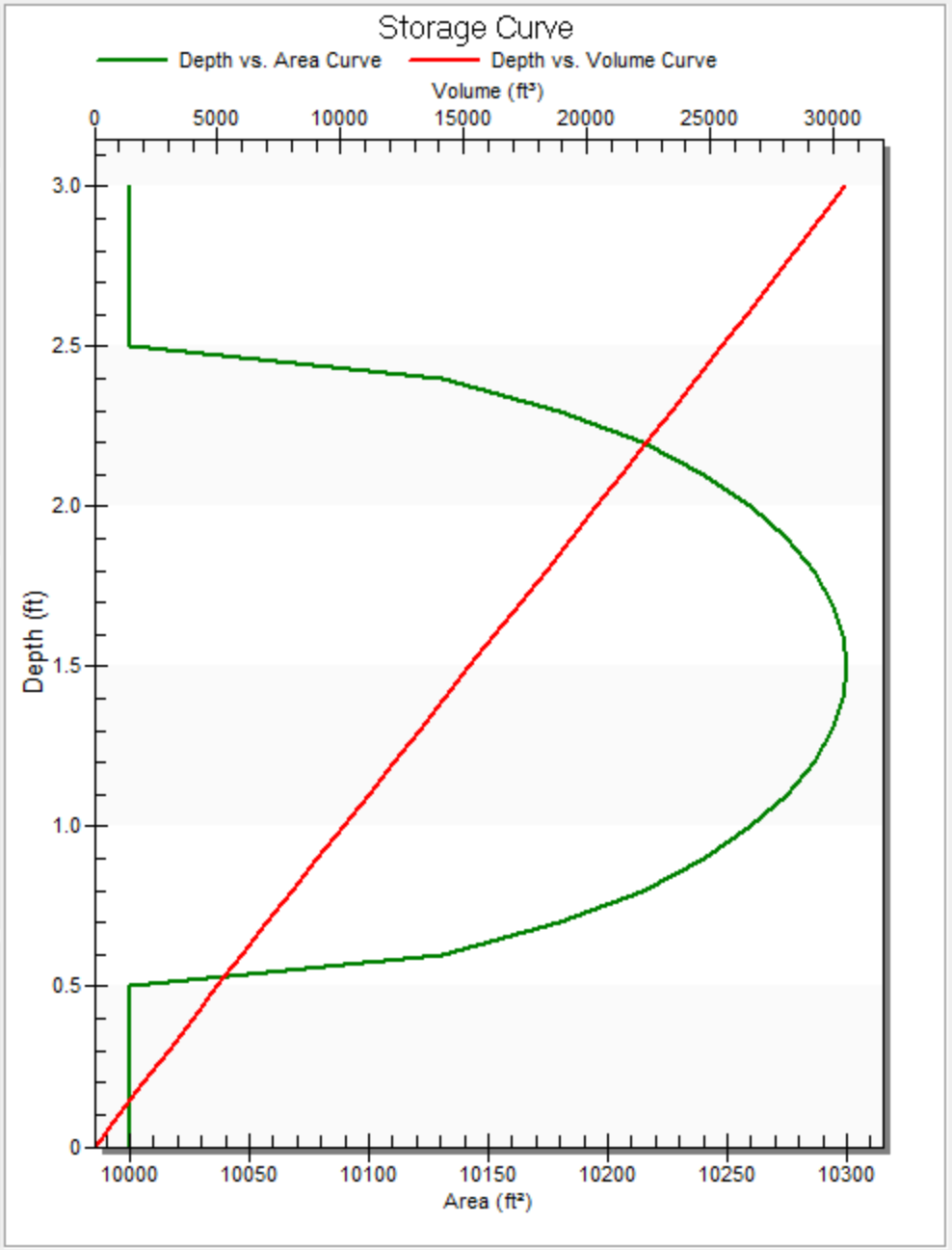
Storage curve data

Storage data type: Depth vs. Area

	Depth (ft)	Area (ft²)	Volume (ft³)
1	0	10000.0000	0.000
2	0.1	10000.0000	1000.00
3	0.2	10000.0000	2000.00
4	0.3	10000.0000	3000.00
5	0.4	10000.0000	4000.00
6	0.5	10000.0000	5000.00

Storage curves

	ID	Number of Points	Description
1	SOUTH	31	Underground pipe storage, 1 barrel, 24.00
2	PASSENGER	31	Underground pipe storage, 1 barrel, 24.00
3	NORTH	31	Underground pipe storage, 1 barrel, 24.00
4	BIOPOND_01	4	



Add
Delete
Load...
Save...
Close
Help

Storage Curves

General

Curve ID: PASSENGER

Description: Underground pipe storage, 1 barrel, 24.00 in diameter, 120 ft length, 6.00 in stone base, 1416.00 in additional width on both sides, with stone fill, 6.00 in stone cover, 40 % stone voids, without headers, with

Underground storage calculator

Underground Pipes | Underground Arch Pipes | Storage Chambers

Barrels:	1		Stone base:	6.00	in
Diameter:	24	in	Additional width:	1416.00	in
Length:	120	ft	☑ Stone fill		
Depth increment:	0.10	ft	Stone cover:	6.00	in
☐ Include headers			Stone voids:	40	%

Compute

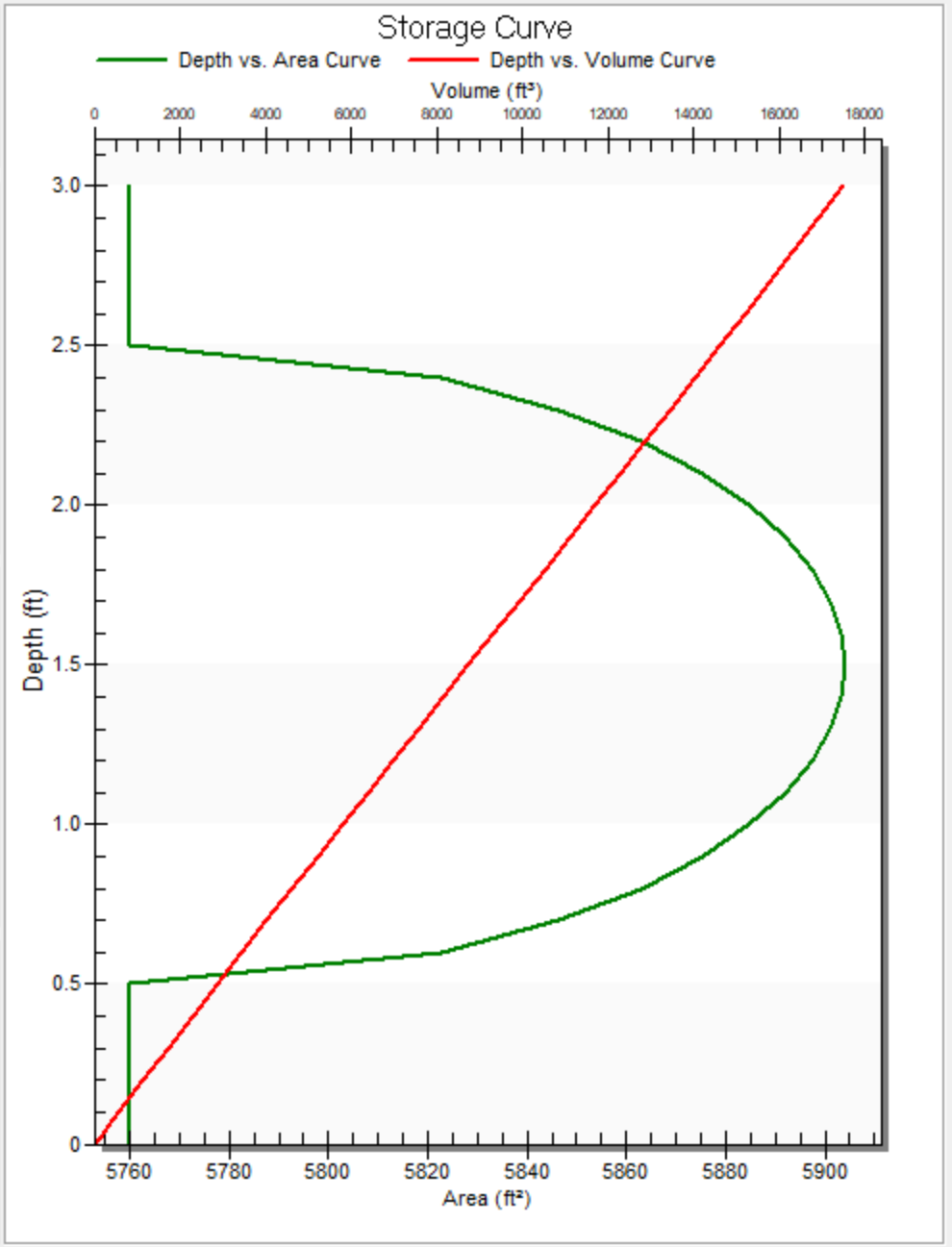
Storage curve data

Storage data type: Depth vs. Area

	Depth (ft)	Area (ft²)	Volume (ft³)
1	0	5760.0000	0.000
2	0.1	5760.0000	576.00
3	0.2	5760.0000	1152.00
4	0.3	5760.0000	1728.00
5	0.4	5760.0000	2304.00
6	0.5	5760.0000	2880.00

Storage curves

	ID	Number of Points	Description
1	SOUTH	31	Underground pipe storage, 1 barrel, 24.00
2	PASSENGER	31	Underground pipe storage, 1 barrel, 24.00
3	NORTH	31	Underground pipe storage, 1 barrel, 24.00
4	BIOPOND_01	4	



Add
Delete
Load...
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Close
Help

Storage Curves

General

Curve ID: SOUTH

Description: Underground pipe storage, 1 barrel, 24.00 in diameter, 160 ft length, 6.00 in stone base, 576.00 in additional width on both sides, with stone fill, 6.00 in stone cover, 40 % stone voids, without headers, with a total

Underground storage calculator

Underground Pipes | Underground Arch Pipes | Storage Chambers

Barrels:	1		Stone base:	6.00	in
Diameter:	24	in	Additional width:	576.00	in
Length:	160	ft	☑ Stone fill		
Depth increment:	0.10	ft	Stone cover:	6.00	in
☐ Include headers			Stone voids:	40	%

Compute

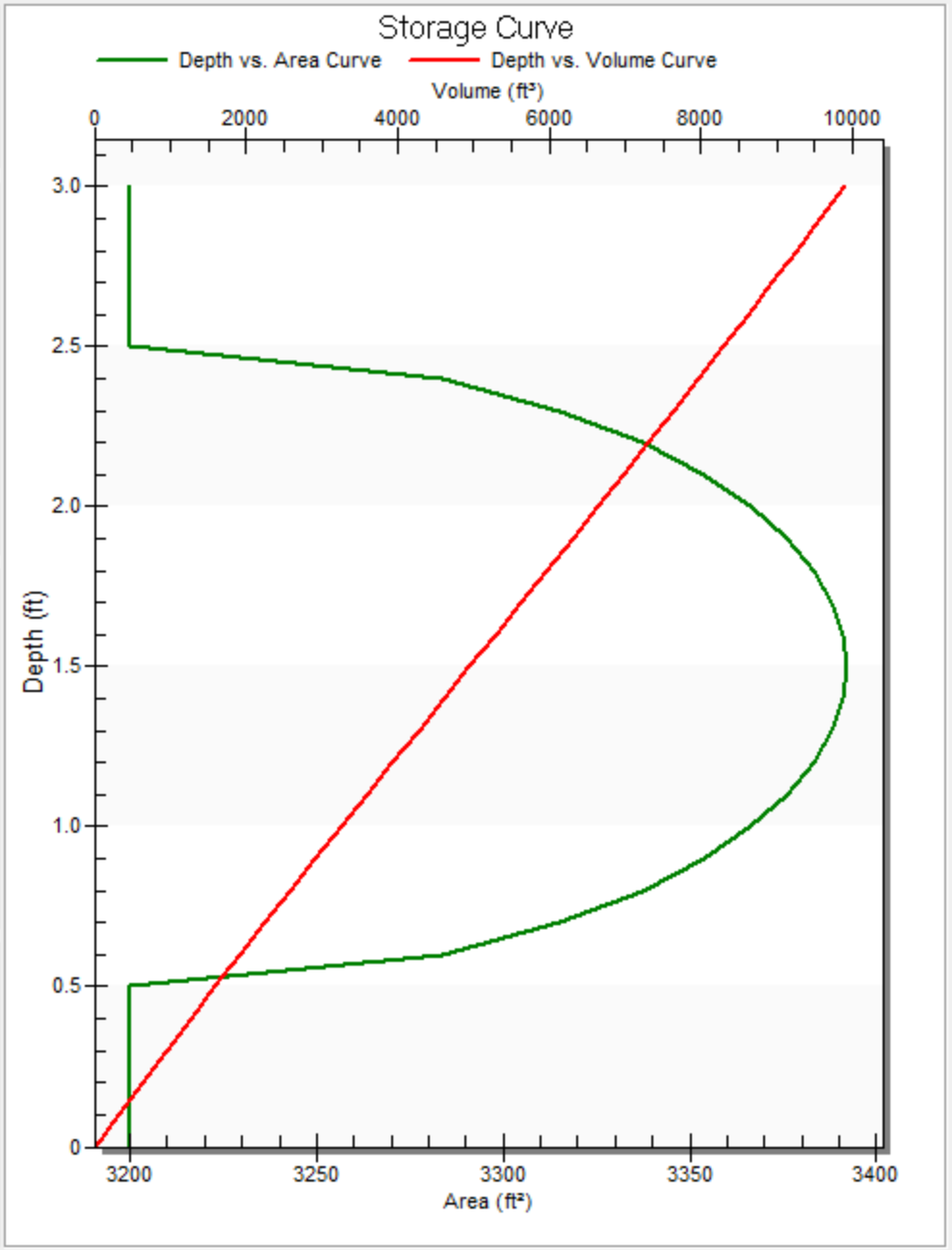
Storage curve data

Storage data type: Depth vs. Area

	Depth (ft)	Area (ft²)	Volume (ft³)
1	0	3200.0000	0.000
2	0.1	3200.0000	320.00
3	0.2	3200.0000	640.00
4	0.3	3200.0000	960.00
5	0.4	3200.0000	1280.00
6	0.5	3200.0000	1600.00

Storage curves

	ID	Number of Points	Description
1	SOUTH	31	Underground pipe storage, 1 barrel, 24.00
2	PASSENGER	31	Underground pipe storage, 1 barrel, 24.00
3	NORTH	31	Underground pipe storage, 1 barrel, 24.00
4	BIOPOND_01	4	



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APPENDIX 5

GEOTECHNICAL REPORT PREPARED BY TERRACON ON AUGUST 22, 2019

Geotechnical Engineering Report

Love's Travel Stop
Easton, Washington
August 22, 2019
Terracon Project No. 81195078

Prepared for:
Love's Travel Stops & Country Stores, Inc.
Oklahoma City, Oklahoma

Prepared by:
Terracon Consultants, Inc.
Mountlake Terrace, Washington

August 22, 2019

Love's Travel Stops & Country Stores, Inc.
McMullen, Chad T
Oklahoma City, Oklahoma 73120

Attn: Mr. Kowalczyk
P: (206) 470-9368
E: patryk.kowalczyk@loves.com

Re: Geotechnical Engineering Report
Love's Travel Stop
W Sparks Road and Interstate 90, Exit 70
Easton, Washington
Terracon Project No. 81195078

Dear Mr. Kowalczyk:

We have completed the Geotechnical Engineering services for the above referenced project. This study was performed in general accordance with Terracon Proposal No. P81195078 dated May 21, 2019. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork, pavements and foundations and floor slabs for the proposed structures.

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

Sincerely,
Terracon Consultants, Inc.

Kristen McFarland, E.I.T.
Geotechnical Field Engineer

Chad McMullen, P.E.
Geotechnical Project Engineer

David A. Baska, Ph.D., P.E.
Principal

REPORT TOPICS

Note: This report was originally delivered in a web-based format. For more interactive features, please view your project online at client.terracon.com.

ATTACHMENTS

Note: Refer to each individual Attachment for a listing of contents.

EXECUTIVE SUMMARY

Terracon conducted an exploration program at the proposed location of a new Tier 1 Love's Travel Stop in Easton, Washington. A total of nineteen (19) test pits were advanced to depths of approximately 8 to 15 feet below existing ground surface at the project site.

Based on our understanding of the development plans and the results of our geotechnical study, development of the site is feasible. Based on our field investigation and analyses, the following geotechnical considerations were identified:

- The site is generally underlain by a layer of silty sand with gravel; this layer is between 2 to 5 feet thick, generally becoming thicker to the northeast. Below the silty sand a layer of sandy gravel is present. The layer is predominantly sandy gravel, with gravelly sand, cobbles, and boulders.

- The site is currently vegetated and wooded. Clearing, grubbing, and removal of the forest litter (topsoil) and root systems should occur prior to other activities in portions of the site that will be developed.

- The native soil has numerous cobbles, plus occasional boulders up to 1½ feet in diameter. Cobbles larger than 6 inches and boulders encountered during grading or excavation will need to be removed from the subgrade beneath building foundations and floors; where cobbles and boulders are removed the subgrade elevation can be restored with compacted structural fill. We expect that earthwork activities including cobble and boulder removal may be accomplished with conventional construction equipment; however, in an area with alpine glacial deposits there remains some risk that larger boulders would require larger equipment or special techniques.

- Groundwater was not encountered during field exploration. We expect the regional groundwater table to reside at a depth of about 40 to 50 feet below the existing ground surface.

- Buildings, fueling canopies, the high-rise sign and other structures may be supported on spread footings bearing on medium dense to dense native soils with an allowable bearing pressure of 3,000 psf.

- Both flexible and rigid pavements are suitable for this site. Following preparation, the native subgrade is well-suited for pavement support.

- Underground storage tanks can be installed in open cut temporary excavations, which the proposed site layout appears to have room to accommodate. Excavations must comply with federal OSHA and Washington Department of Labor and Industry safety standards; these

standards include benching/sloping requirements dependent upon soils exposed at the time of construction.

- Based upon grain-size based correlations, the site soils can support a high infiltration rate. This rapid rate, however, likely cannot provide a treatment function for the low levels of contamination typically generated from surfaces that support vehicle traffic; an upstream treatment step is likely to be necessary.

- The proposed travel stop will include an on-site septic (OSS) disposal system. On-site soils are coarse and promote drainage that is too rapid for bacterial metabolization of septic waste. Trenching into the subgrade, placement of imported sand media, and timed dosing of septic effluent into the sand trenches (or a similar alternative) will be necessary to meet local and state health department OSS design standards.

Close monitoring of the construction operations discussed herein will be critical in achieving the design subgrade support. We therefore recommend that Terracon be retained to monitor this portion of the work. This summary should be used in conjunction with the entire report for design purposes. It should be recognized that details were not included or fully developed in this section, and the report must be read in its entirety for a comprehensive understanding of the items contained herein. The section titled **General Comments** should be read for an understanding of the report limitations.

Geotechnical Engineering Report

Love's Travel Stop
W Sparks Road and Interstate 90, Exit 70
Easton, Washington

Terracon Project No. 81195078
August 22, 2019

INTRODUCTION

This report presents the results of our subsurface exploration and geotechnical engineering services performed for the proposed Love's Travel Stop to be located at W Sparks Road and Interstate 90, Exit 70 in Easton, Washington. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- Subsurface Soil Conditions
- Groundwater Conditions
- Site Preparation and Earthwork
- Demolition Considerations
- Excavation Considerations
- Foundation Design and Construction
- Floor Slab Design and Construction
- Seismic Site Classification per IBC
- Lateral Earth Pressures
- Pavement Design and Construction
- Frost Considerations
- Stormwater Infiltration
- On-Site Septic Design

The geotechnical engineering Scope of Services for this project included the advancement of nineteen (19) test pits to depths ranging from approximately 8 to 15 feet below existing site grades.

Maps showing the site and exploration locations are shown in the **Site Location** and **Exploration Plan** sections, respectively. The results of the laboratory testing performed on soil samples obtained from the site during the field exploration are included on the test pit logs and as separate graphs in the **Exploration Results** section

SITE CONDITIONS

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
Parcel Information	The project is located east of the W Sparks Road and Interstate 90, Exit 70 interchange, approximately 1 mile northwest of Easton, Washington and approximately 8 miles west of Cle Elum, Washington. Approximately 17 acres. Latitude 47.250656 Longitude -121.186575 See **Site Location**
Existing Improvements	The site is relatively undisturbed and undeveloped. The site appears to have been logged sometime between 2006 and 2009. Some miscellaneous debris (piles of concrete, rusted metal) are strewn throughout the site.
Current Ground Cover	Approximately 70 percent of the site is vegetated with forest grasses and shrubs. The remaining 30 percent consists of wooded areas.
Existing Topography	W Sparks Road is on an embankment above the surrounding ground surface and connects with the elevated access ramps of westbound I-90, and the overpass to eastbound I-90. The onsite dirt trail adjacent to the W Sparks Road embankment is relatively level with an approximate elevation of 2,213 feet, and the site generally slopes up toward the northeast. The northeast corner has an approximate elevation of 2,223 feet.
Geology	Our experience near the vicinity of the proposed development and geologic maps indicates subsurface conditions consist of Pleistocene age alpine glacial outwash deposits above Jurassic-age bedrock. The presence of alpine glacial outwash was confirmed following our field exploration activities; this outwash extended to the bottom of each test pit we advanced at the site. Glacial outwash includes primarily sandy GRAVEL and gravelly SAND; the upper several feet of the glacial outwash includes an appreciable silt component, in addition to sand and gravel. Roots and other forest organics are also present near the ground surface. Based upon geologic mapping and publicly-available well logs in the project site vicinity, alpine glacial outwash likely extends to considerable depth above bedrock (likely greater than 80 feet). Groundwater was not encountered within the explored depth of any of our explorations. Based upon publicly available well records, we expect the regional groundwater table to reside at a depth of about 40 to 50 feet below the existing ground surface.

We collected photographs at the time of our field exploration program. Representative photos are provided in our **Photography Log**.

PROJECT DESCRIPTION

Our initial understanding of the project was provided in our proposal and was discussed during project planning. A period of collaboration has transpired since the project was initiated, and our final understanding of the project conditions is as follows:

Item	Description
Information Provided	Our understanding of the project is based on the Preliminary Site Plan prepared by Pascal Aughtry & Associates dated January 8, 2019.
Love's Facility Type	Tier 1
Project Description	The proposed Love's Travel Stop will include the following: ■ A single-story convenience store/restaurant building ■ A retail truck tire shop ■ Covered fuel-dispensing for trucks ■ Covered fuel-dispensing for passenger vehicles ■ Buried fuel storage tanks at two locations ■ Truck Scale ■ Passenger vehicle parking and truck parking ■ High rise sign ■ Infiltration of stormwater ■ An on-site septic system
Proposed Structure	The project includes single-story slab on grade buildings with no below grade structures.
Building Construction	■ We expect that the Country Store and Tire Shop will have isolated steel columns, load bearing masonry walls and a concrete slab-on-grade floor. ■ Fuel island canopies will be steel column and frame construction.

Item	Description
Maximum Loads (provided by Love's)	Country Store and Tire Shop: ■ Columns: 25 kips ■ Walls: 1 kip per linear foot (klf) ■ Floor Slab: assumed 150 pounds per square foot (psf) Auto Fuel Canopy (40' by 80' in plan dimensions) foundations: ■ Axial compression: 23.07 kips (dead and live loads) ■ Axial uplift: 14.99 kips ■ Moment: 22.58 kip-feet Truck Fuel Canopy (25' height) foundations: ■ Axial compression: 22.59 kips (dead and live loads) ■ Axial uplift: 113.73 kips ■ Moment: 54.61 kip-feet
Grading/Slopes	Finished floor elevation is currently unknown, but likely within 2 feet of existing grades. Site topography/grading plans not available at the time of this proposal.
Infiltration	Infiltration of stormwater is under consideration at either the southern or northwestern corners of the site (at whichever location is not selected for septic disposal)
On-Site Septic	Treatment and disposal of on-site septic (OSS) effluent will occur at the northwestern or southern corner of the project site (at whichever location is not selected for stormwater infiltration)
Below-Grade Structures	■ Two underground storage tank (USTs) installations ■ Truck scale pit ■ Septic holding tank ■ Possible stormwater infiltration gallery
Free-Standing Retaining Walls	Retaining walls are not currently expected to be constructed as part of site development to achieve final grades.
Pavements (provided by Love's)	The Love's Travel Stop will include light duty, medium duty, heavy duty, and extra heavy duty pavement areas. The pavement design criteria are noted below for Tier 1 facilities. ■ Light duty auto area: 1,000 cars per day ■ Medium duty truck parking area: 150 trucks per day ■ Heavy duty truck drives: 600 trucks per day ■ Extra heavy duty truck drives: 1,000 trucks per day ■ 20-year design life

Item	Description
High-Rise Sign Access Road	An unpaved access road extending to an advertising sign will support the weight of cranes used to erect and maintain the sign, as well as construction traffic. Cranes typically used very in size and weight depending on the height of the sign and monopole weight. Vehicles operating on this road include: ■ Crane, large (350-ton capacity): 140 kips load, 6 axles, 50 ft. long by 9 ft. wide; ■ Crane, medium: 72 kips load, 4 or 6 axles, 40 ft. long by 9 ft. wide; ■ Tractor trailers, 80 kip load, 5 axles, 18 wheels, 70 ft. long by 9 ft. wide; ■ Concrete trucks, 72 kip load, 10 wheels, 30 ft. long by 8 ft. wide. Based upon sight-lines and the I-90 view corridor, we expect that a sign of limited height would be permitted; loads associated with erecting this sign will likely not require the larger of the crane capacities described above.
Estimated Start of Construction	Unknown

GEOTECHNICAL CHARACTERIZATION

Subsurface Conditions – GeoModel

We developed a general characterization of the subsurface soil and groundwater conditions based upon our review of the subsurface exploration, laboratory data, geologic setting and our understanding of the project. This characterization, termed GeoModel, forms the basis of our geotechnical calculations and evaluation of site preparation and foundation options. As noted in **General Comments**, the characterization is based upon widely spaced exploration points across the site, and variations are likely.

As part of our analyses, we identified the following model layers within the subsurface profile. For a graphical summary of the model layer depths at each test pit location, refer to the GeoModel.

Model Layer	Approximate Depth to Bottom of Layer (feet)	Layer Name	General Description
0	0.5	TOPSOIL	Forest litter
1	2 to 5	SILTY SAND WITH GRAVEL	Silty Sand with Gravel, with scattered organics (tree roots and rootlets), trace cobbles
2	All test pits were terminated in this unit[1]	SANDY GRAVEL	Predominantly Sandy GRAVEL, plus Gravelly SAND, with cobbles and boulders

1. Test pit depths ranged from 8 to 15 feet. Mapped geology and nearby well logs indicate this unit extends to considerable depth above bedrock (likely greater than 80 feet).

A half foot of forest litter (Layer 0) was observed in the vegetated and wooded areas of the site, and overlies Layer 1. Layer 1 consists of 2 to 5 feet of silty sand with gravel and trace cobbles. This layer is fine grained with scattered tree roots and other vegetation roots, particularly within the upper portion of the layer. This layer contains gravel percentages of up to approximately 40 percent.

Below the silty sand, in Layer 2, we encountered sandy gravel, cobbles, and boulders. We identify these soils as alpine glaciofluvial deposits. Cobbles were typically 6 to 8 inches in diameter, and boulders were up to 1½ feet in diameter. Coarse grained sand lenses greater than 6 inches were embedded within the layer.

Representative photographs of these soils are included in the **Photography Log**.

At TP-06 we encountered 6- to 12-inch thick lenses of poorly graded sand or sandy silt with gravel within Layer 2, several feet below the top of Layer 2. At TP-12 we encountered 2-inch thick lenses

of silty sand with gravel within Layer 2, several feet below the top of Layer 2. Based upon the geology, these lenses likely represent localized lower stream energy depositional environments of limited areal extent. Although encountered only at these test pit locations during exploration, similar soils may be encountered in deeper excavations during project construction, even where such soils were not encountered in a nearby test pit.

Conditions encountered at each test pit location are indicated on the individual test pit logs shown in the **Exploration Results** section and the GeoModel can be found in the **Figures** section of this report. Stratification boundaries on the test pit logs represent the approximate location of changes in native soil types; in situ, the transition between materials may be gradual.

Groundwater Conditions

Groundwater was not observed in the test pits during excavation, nor for the short duration that the test pits remained open. We expect the regional groundwater table is at a depth of about 40 to 50 feet, based on well logs published by the Department of Ecology in the area.

Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff, agricultural and construction activities, as well as other factors. In addition, perched groundwater can develop above low permeability soil. Therefore, groundwater may be encountered, or groundwater levels may fluctuate during construction or at future times. While the possibility of groundwater fluctuations should be considered when developing the design and construction plans for the project, we do not anticipate the presence of groundwater to adversely affect the proposed design and construction.

Field Electrical Resistivity

Field measurements of soil resistivity were performed at the location of test pit TP-1. Field measurements of soil resistivity were performed in accordance with ASTM Test Method G 57 using the Wenner Four-Electrode Method. For "a"-spacings of between 2 and 40 feet, soil resistivity ranging from about 15,000 to 43,000 ohm-centimeters was measured. Additional discussion and presentation of the electrical resistance properties of the subsurface is presented in the **Exploration and Testing Procedures** section.

GEOTECHNICAL OVERVIEW

At this site, the proposed Love's Travel Stop is feasible from a geotechnical standpoint.

The site is generally underlain by a layer of silty sand with gravel; this layer is between 2 to 5 feet thick, generally becoming thicker to the northeast. Below the silty sand a layer of sandy gravel is present to considerable depth. The layer is predominantly sandy gravel, with gravelly sand, cobbles, and boulders. Based upon our field explorations, the native soil contains cobbles, plus boulders up to at least 1½ feet in diameter. Following moisture conditioning we expect that the native subgrade can perform adequately. When encountered during site grading or foundation excavation, boulders will need to be removed from the subgrade beneath building foundations and floors. We expect earthwork operations (including boulder removal) can be accomplished with conventional construction equipment. Site preparation recommendations including grading, fill placement, and other topics are provided in the **Earthwork** section.

Building columns and walls may be supported by isolated spread footings and continuous strip footings bearing on prepared native subgrade or compacted structural fill atop native subgrade. Fueling canopies, the high-rise sign, and other structures may be supported in a similar fashion. The **Shallow Foundations** section addresses support of the building, canopies, and other planned structures. The **Floor Slabs** section addresses slab-on-grade support of the building.

Both rigid and flexible pavements are appropriate at this site. The **Pavements** section addresses the design of pavement systems.

This Geotechnical Overview is a summary of the geotechnical aspects of the site as they relate to the **Project Description** and is not sufficient for thorough design of the project. The rest of this report must be read and understood. The **General Comments** section provides an understanding of the report limitations.

EARTHWORK

Earthwork is anticipated to include clearing, grubbing, removal of topsoil, and excavation for below grade structures. The following sections provide recommendations for use in the preparation of specifications for the work. Recommendations include critical quality criteria, as necessary, to render the site in the state considered in our geotechnical engineering evaluation for foundations, floor slabs, and pavements.

Site Preparation

Prior to other site activity, existing vegetation including tree stumps and root systems should be removed. Complete stripping of the topsoil should be performed in the proposed building and parking/driveway areas. We estimate the depth of this topsoil and root mat layer to be about 6 inches across the site based at observations at our exploration locations. Additional stripping will be necessary where tree root systems extend into Layer 1. Miscellaneous debris, such as concrete debris, should be removed. Following stripping, the entire subgrade area should be moisture conditioned and compacted with a large smooth-drum steel roller.

Subgrade Preparation and Stabilization

The subgrade should be proof-rolled with an adequately loaded vehicle such as a fully-loaded tandem-axle dump truck. The proof-rolling should be performed under the observation of the Geotechnical Engineer. Areas excessively deflecting under the proof-roll should be delineated and subsequently addressed by the Geotechnical Engineer. Excessively wet or dry material should either be removed or moisture conditioned and recompacted.

Existing Fill

We are not aware of existing fill at the site. If previously placed fill is encountered during construction, its suitability for retention on site should be evaluated by the Geotechnical Engineer.

Fill Material Types

Fill required to achieve design grade should be classified as Common Fill, or Structural Fill. Additional fill types necessary for utility installation are discussed in the Utility Trench Backfill section below. Fill materials should meet the following material property requirements:

Fill Type	Recommended Materials	Acceptable Location for Placement
Structural Fill[2]	9-03.9(3) Crushed Surfacing Base Course [1] 9-03.12(1)A Gravel Backfill for Foundations Class A[1] 9-03.14(1) Gravel Borrow[1]	Beneath and adjacent to structural slabs, foundations, building appurtenances, and pavement subgrades; gravel surfacing
Common Fill[2]	Section 9-03.14(3) Common Borrow[1,3]	Grade filling, utility trench backfill outside the building and other structure footprints and appurtenances

1. WSDOT Standard Specifications
2. Structural and common fill should consist of approved materials free of organic matter and debris. Frozen material should not be used, and fill should not be placed on a frozen subgrade. A sample of each material type should be submitted to the Geotechnical Engineer for evaluation prior to use on this site.
3. Soils generated during earthwork operations such as trenching *may* meet the criteria for *Common Borrow* and may be suitable for reuse – suitability of soils actually encountered would need to be evaluated during construction.

Soils derived from excavations made at the site may meet the criteria for Common Borrow. Some soils – particularly those from the GeoModel Layer 2 – may also meet gradation criteria for Gravel Borrow.

Fill Compaction Requirements

Structural and Common Fill should meet the following compaction requirements.

Item	Structural Fill	Common Fill[2]
Maximum Lift Thickness	8 inches or less in loose thickness when heavy, self-propelled compaction equipment is used 4 to 6 inches in loose thickness when hand-guided equipment (i.e. jumping jack or plate compactor) is used	Same as Crushed Surfacing
Minimum Compaction Requirements [1]	95% of maximum dry density below pavements and floor slabs	92% of maximum dry density, except 95% when within 2 feet of pavement or slab subgrade
Water Content Range [1]	Typically within 2% of optimum	As required to achieve min. compaction requirements

1. Maximum density and optimum water content as determined by the Modified Proctor test (ASTM D1557)
2. Refer to the following section for use of Common Fill as utility trench backfill

Utility Trench Backfill

All trenches should be wide enough to allow for compaction around the haunches of the pipe, or material such as pea gravel (provided this is allowed by the pipe manufacturer) should be used below the spring line of the pipes to eliminate the need for mechanical compaction in this portion

of the trenches. If water is encountered in the excavations, it should be removed prior to fill placement.

Placement and compaction of recommended materials for utility trench backfill should be in accordance with the recommendations presented herein for Earthwork. In our opinion, the initial lift thickness should not exceed one foot unless recommended by the manufacturer to protect utilities from damage by compacting equipment. Light, hand-operated compaction equipment in conjunction with thinner fill lift thicknesses may be utilized on backfill placed above utilities if damage resulting from heavier compaction equipment is of concern.

Grading and Drainage

All grades must provide effective drainage away from the building during and after construction and should be maintained throughout the life of the structure. Water retained next to the building can result in soil movements greater than those discussed in this report. Greater movements can result in unacceptable differential floor slab and/or foundation movements, cracked slabs and walls, and roof leaks. Gutters and downspouts should be routed into tight-line pipes that discharge either directly into a municipal storm drain or to an alternative drainage facility. Splash-blocks should also be considered below hose bibs and water spigots.

Site grades should be established such that surface water is directed away from foundation and pavement subgrades to prevent an increase in the water content of the soils. Adequate positive drainage diverting water from structures, open cuts, and slopes should be established to prevent erosion, ground loss, and instability. Locally, flatter grades may be necessary to transition ADA access requirements for flatwork. After building construction and landscaping, final grades should be verified to document effective drainage has been achieved. Where paving or flatwork abuts the structure, a maintenance program should be established to effectively seal and maintain joints, and prevent surface water infiltration.

Earthwork Construction Considerations

Shallow excavations for the proposed structure and excavations of cobbles and boulders up to 1½ feet in diameter are anticipated to be accomplished with conventional construction equipment. Where boulders are encountered that extend below the planned native subgrade elevation, boulders should be removed entirely, the over-excavated zone should be compacted as described above, and then Structural Fill should be placed and compacted as described in the previous sections.

Upon completion of filling and grading, care should be taken to maintain the subgrade water content prior to construction of floor slabs. Construction traffic over the completed subgrades should be avoided. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. Water collecting over or adjacent to construction areas should be removed. If the subgrade freezes, desiccates, saturates, or is disturbed, the affected material should be removed, or the materials should be scarified, moisture conditioned, and recompacted prior to floor slab construction.

As a minimum, excavations should be performed in accordance with OSHA 29 CFR, Part 1926, Subpart P, "Excavations" and its appendices, and in accordance with any applicable local, and/or state regulations.

Construction site safety is the sole responsibility of the contractor who controls the means, methods, and sequencing of construction operations. Under no circumstances shall the information provided herein be interpreted to mean Terracon is assuming responsibility for construction site safety, or the contractor's activities; such responsibility shall neither be implied nor inferred.

Construction Observation and Testing

The earthwork efforts should be monitored under the observation of the Geotechnical Engineer. Monitoring should include documentation of adequate removal of vegetation and topsoil, proof-rolling, and mitigation of areas delineated by the proof-roll to require mitigation.

Each lift of compacted fill should be tested, evaluated, and reworked, as necessary, until approved by the Geotechnical Engineer prior to placement of additional lifts. Each lift of fill should be tested for density and water content at a frequency of at least one test for every 2,500 square feet of compacted fill in the building areas and 10,000 square feet in pavement areas. One density and water content test should be performed for every 100 linear feet of compacted utility trench backfill.

In areas of foundation excavations, the bearing subgrade should be evaluated under the observation of the Geotechnical Engineer. If unanticipated conditions are encountered, the Geotechnical Engineer may prescribe mitigation options.

In addition to the documentation of the essential parameters necessary for construction, the continuation of the Geotechnical Engineer into the construction phase of the project provides the continuity to maintain the Geotechnical Engineer's evaluation of subsurface conditions, including assessing variations and associated design changes

SHALLOW FOUNDATIONS

If the site has been prepared in accordance with the requirements noted in **Earthwork**, the following design parameters are applicable for shallow foundations bearing on medium dense to dense native soils or structural fill placed directly over the medium dense to dense native soils.

Design Parameters – Compressive Loads

Item	Description
Maximum Net Allowable Bearing pressure [1, 2]	3,000 psf
Minimum Foundation Dimensions	30 inches
Allowable Passive Resistance [4]	400 pcf (equivalent fluid unit weight)
Allowable Coefficient of Sliding Friction [5]	0.30 (Layer 1- Silty Sand with Gravel) 0.35 (Layer 2- Sandy Gravel)
Minimum Embedment below Finished Grade [6]	24 inches
Estimated Total Settlement from Structural Loads [2]	1 inch
Estimated Differential Settlement [2, 7]	<2/3 inch over 50 feet

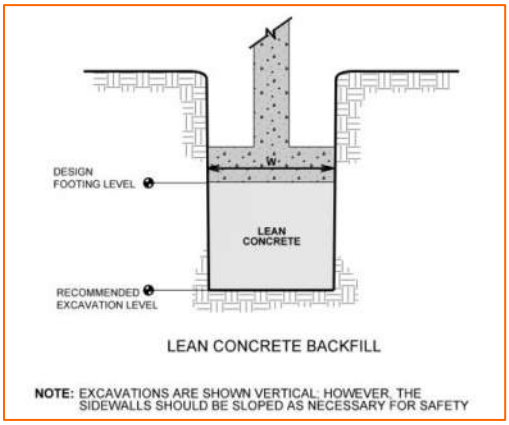
1. The maximum net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. An appropriate factor of safety has been applied. Values assume that exterior grades are no steeper than 10% within 10 feet of structures.
2. Values provided are for maximum loads noted in **Project Description**.
3. Unsuitable or soft soils should be over-excavated and replaced per the recommendations presented in the **Earthwork**.
4. Use of passive earth pressures require the sides of the excavation for the spread footing foundation to be nearly vertical and the concrete placed neat against these vertical faces or that the footing forms be removed and compacted structural fill be placed against the vertical footing face.
5. Can be used to compute sliding resistance where foundations are placed on suitable soil/materials. Should be neglected for foundations subject to net uplift conditions.
6. Embedment necessary to minimize the effects of frost and/or seasonal water content variations. For sloping ground, maintain depth below the lowest adjacent exterior grade within 5 horizontal feet of the structure. This depth corresponds with the minimum embedment requirement for Kittitas County, and is corresponds with the frost depth for the nearby town of Cle Elum.
7. Differential settlements are as measured over a span of 50 feet.

Foundation Construction Considerations

As noted in **Earthwork**, the footing excavations should be evaluated under the observation of the Geotechnical Engineer. The base of all foundation excavations should be free of water, loose soil, cobbles greater than 6 inches in any dimension, and boulders prior to placing concrete. Concrete

should be placed soon after excavating to reduce bearing soil disturbance. Care should be taken to prevent wetting or drying of the bearing materials during construction. Excessively wet or dry material or any loose/disturbed material in the bottom of the footing excavations should be removed/reconditioned before foundation concrete is placed.

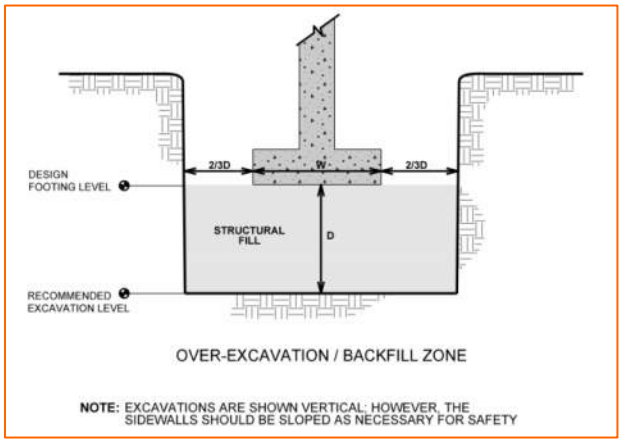
If unsuitable bearing soils are encountered at the base of the planned footing excavation, the excavation should be extended deeper to suitable soils, and the footings could bear directly on these soils at the lower level or on lean concrete backfill placed in the excavations. This is illustrated on the sketch below.



LEAN CONCRETE BACKFILL

NOTE: EXCAVATIONS ARE SHOWN VERTICAL; HOWEVER, THE SIDEWALLS SHOULD BE SLOPED AS NECESSARY FOR SAFETY

Over-excavation below footings – such as may necessary where boulders are encountered or soft, compressible soils are encountered -- should be conducted as shown below. The over-excavation should be restored to the footing elevation, with Structural Fill, which should be placed and compacted as recommended in the **Earthwork** section.



OVER-EXCAVATION / BACKFILL ZONE

NOTE: EXCAVATIONS ARE SHOWN VERTICAL; HOWEVER, THE SIDEWALLS SHOULD BE SLOPED AS NECESSARY FOR SAFETY

SEISMIC CONSIDERATIONS

The seismic design requirements for buildings and other structures are based on Seismic Design Category. Site Classification is required to determine the Seismic Design Category for a structure. The Site Classification is based on the upper 100 feet of the site profile defined by a weighted average value of either shear wave velocity, standard penetration resistance, or undrained shear strength in accordance with Section 20.4 of ASCE 7 and the International Building Code (IBC). Based on the soil properties encountered at the site and as described on the exploration logs and results, it is our professional opinion that the **Seismic Site Classification is D**. Subsurface explorations at this site were extended to a maximum depth of 15 feet. The site properties below the exploration depth to 100 feet were estimated based on our experience and knowledge of geologic conditions of the general area. Additional deeper explorations or geophysical testing may be performed to confirm the conditions below the current exploration depth.

Description	Value
2015 International Building Code (IBC) Site Classification[1,2]	D[3]
Site Latitude	47.250656
Site Longitude	-121.186575
S_S – Short Period Spectral Acceleration, Site Class B [4]	0.795 g
S_1 – 1-Second Period Spectral Acceleration, Site Class B [4]	0.304 g
F_a – Short Period Site Coefficient [4]	1.182
F_v –1-Second Period Site Coefficient[4]	1.791
PGA - ASCE 7-10, Peak Ground Acceleration	0.378
F_{PGA} – Peak Ground Acceleration Site Coefficient	1.179

1. Seismic site classification in general accordance with the 2015 IBC, which refers to ASCE 7-10.
2. 2015 IBC requires a site profile extending to a depth of 100 feet for seismic site classification. Explorations were extended to a maximum depth of 15 feet. The site properties below the exploration depth to 100 feet were estimated based on our experience and knowledge of geologic conditions of the general area.
3. Site Class D applies to stiff soil.
4. These values were obtained using online seismic design maps and tools provided by the Applied Technology Council (ATC), which references seismic data provided by the United States Geological Survey (http://earthquake.usgs.gov/hazards/designmaps/).

Surface-Fault Rupture

The hazard of damage from onsite fault rupture appears to be low based on review of the USGS Earthquake Hazards Program Quaternary Faults and Folds Database available online (https://usgs.maps.arcgis.com/apps/webappviewer/index.html?id=5a6038b3a1684561a9b0aadf88412fcf) accessed on July 17th, 2019. There are no mapped faults within a 20-mile radius of the project site.

LIQUEFACTION

Liquefaction is a phenomenon where saturated soils develop high pore water pressures during seismic shaking and lose their strength characteristics. This phenomenon generally occurs in areas of high seismicity, where groundwater is shallow and loose to medium dense granular soils or relatively non-plastic fine-grained soils are present. Based on the site geology and subsurface groundwater conditions, the risk of liquefaction of the site soils is low for this site during a design level earthquake.

FLOOR SLABS

Design parameters for floor slabs assume the requirements for **Earthwork** have been followed. Specific attention should be given to positive drainage away from the structure and positive drainage of the aggregate base beneath the floor slab.

Floor Slab Design Parameters

Item	Description
Floor Slab Support [1]	Minimum 6 inches of 9-03.9(3) Crushed Surfacing Base Course[3] Compacted to at least 95% of maximum dry density (ASTM D1557)
Estimated Modulus of Subgrade Reaction [2]	200 pounds per square inch per inch (psi/in) for point loads

1. Floor slabs should be structurally independent of building footings or walls to reduce the possibility of floor slab cracking caused by differential movements between the slab and foundation.
2. Modulus of subgrade reaction is an estimated value based upon our experience with the subgrade condition, the requirements noted in **Earthwork**, and the floor slab support as noted in this table. It is provided for point loads. For large area loads the modulus of subgrade reaction would be lower.
3. Free-draining granular material should have less than 5% fines (material passing the No. 200 sieve). Other design considerations such as cold temperatures and condensation development could warrant more extensive design provisions.

The use of a vapor retarder should be considered beneath concrete slabs on grade covered with wood, tile, carpet, or other moisture sensitive or impervious coverings, or when the slab will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder, the slab designer should refer to ACI 302 and/or ACI 360 for procedures and cautions regarding the use and placement of a vapor retarder.

Saw-cut control joints should be placed in the slab to help control the location and extent of cracking. For additional recommendations refer to the ACI Design Manual. Joints or cracks should be sealed with a water-proof, non-extruding compressible compound specifically recommended for heavy duty concrete pavement and wet environments.

Where floor slabs are tied to perimeter walls or turn-down slabs to meet structural or other construction objectives, our experience indicates differential movement between the walls and slabs will likely be observed in adjacent slab expansion joints or floor slab cracks beyond the length of the structural dowels. The Structural Engineer should account for potential differential settlement through use of sufficient control joints, appropriate reinforcing or other means.

Floor Slab Construction Considerations

Finished subgrade, within and for at least 10 feet beyond the floor slab, should be protected from traffic, rutting, or other disturbance and maintained in a relatively moist condition until floor slabs are constructed. If the subgrade should become damaged or desiccated prior to construction of floor slabs, the affected material should be removed and structural fill should be added to replace the resulting excavation. Final conditioning of the finished subgrade should be performed immediately prior to placement of the floor slab support course.

The Geotechnical Engineer should observe the condition of the floor slab subgrades immediately prior to placement of the floor slab support course, reinforcing steel, and concrete. Attention should be paid to high traffic areas that were rutted and disturbed earlier, and to areas where backfilled trenches are located.

BELOW-GRADE STRUCTURES

Below-grade structures at the site are expected to include underground fuel tanks, vaults related to stormwater treatment or handling, vaults related to septic disposal, and septic absorption chambers. Tanks, vaults, chambers, and other below-grade structures can be expected to experience vertical loads as a result of the soil mass (if any) above the structure, plus lateral (horizontal) soil loads on sides of buried structures.

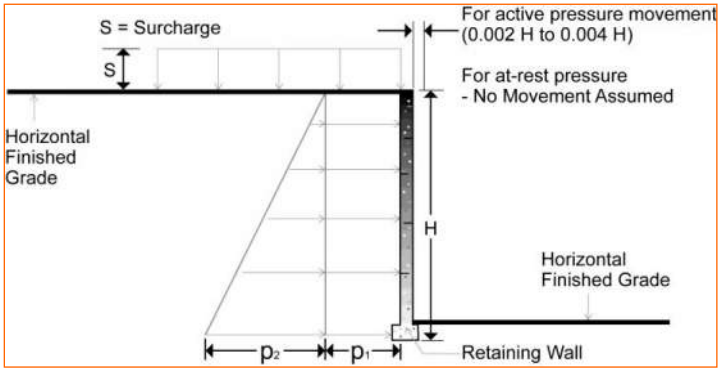
For the purpose of design, vertical load on structures due to soil weight may assume that in-place soil density of up to about 135 pcf may be experienced where compacted structural fill is placed above the structure. However, actual soil weight depends upon the fill type and fill source, degree of compaction, moisture level, and other factors. Appropriate factors of safety should be considered where structures will be loaded by soil, including cases where soil weight is necessary for structural resistance (such as buried footings resisting uplift loads or overturning moments).

Lateral loads on structures are discussed in the following section.

LATERAL EARTH PRESSURES

Design Parameters

Structures with unbalanced backfill levels on opposite sides should be designed for earth pressures at least equal to values indicated in the following table. Earth pressures will be influenced by structural design of the walls, conditions of wall restraint, methods of construction and/or compaction and the strength of the materials being restrained. Two wall restraint conditions are shown in the diagram below. Active earth pressure is commonly used for design of free-standing cantilever retaining walls and assumes wall movement. The "active" condition is also often assumed for relatively flexible steel- and fiberglass-walled tanks which are often used for fuel storage and for septic system components. The "at-rest" condition assumes no wall movement and is commonly used for basement walls, loading dock walls, or other walls restrained at the top. This condition is typically assumed for pre-cast concrete structures, which are often used for septic tanks and for oil-water separators and detention vaults in stormwater systems. The recommended design lateral earth pressures do not include a factor of safety and do not provide for hydrostatic pressure on the walls.



Lateral Earth Pressure Design Parameters			
Earth Pressure Condition [1]	**Coefficient for Backfill Type** [2]	**Surcharge Pressure** [3, 4, 5] **p_1 (psf)**	**Effective Lateral Fluid Pressures (psf)** [2, 4, 5, 6]
Active (Ka)	Structural Fill – 0.27	(0.27)S	(36)H
At-Rest (Ko)	Structural Fill – 0.43	0.43)S	(58)H
Passive (Kp)	Structural Fill – 3.7	---	(480)H

Lateral Earth Pressure Design Parameters			
Earth Pressure Condition [1]	**Coefficient for Backfill Type** [2]	**Surcharge Pressure** [3, 4, 5] **p_1 (psf)**	**Effective Lateral Fluid Pressures (psf)** [2, 4, 5, 6]

1. For active earth pressure, wall must rotate about base, with top lateral movements 0.001 H to 0.002 H, where H is wall height. For passive earth pressure, wall must move horizontally to mobilize resistance.
2. Uniform, horizontal backfill, compacted to at least 95% of the ASTM D1557 maximum dry density, rendering a maximum unit weight of 135 pcf.
3. Uniform surcharge, where S is surcharge pressure.
4. Loading from heavy compaction equipment is not included.
5. No safety factor is included in these values.
6. Effective lateral fluid pressures presented above require unsaturated conditions, which are expected at the site.

Additional Surcharges

Additional loads in proximity to below-grade vault and tank walls should be accommodated in design. At a minimum, we recommend that a uniform of 250 psf be considered to act vertically on the ground surface behind the wall. This load could be considered as a construction load during site development, and as a traffic surcharge during the life of the structure. A fraction of this load should be assumed to act on the below-grade wall laterally; the coefficient's Ka and Ko ("active" and "at-rest" coefficients, respectively) may be used to compute lateral load. "Active" or "at-rest" coefficients should be applied according to the conditions described in the sections above.

Backfill Against Walls

Backfill placed against structures should consist of Gravel Backfill for Foundations or Gravel Borrow, as described in the **Earthwork** section. Backfill should be placed and compacted as described in that section; however, compaction of backfill within four (4) horizontal feet of vault and tank walls should be accomplished with hand-operated tools only to avoid over-stressing from heavy equipment.

PAVEMENTS

General Pavement Comments

Both concrete and asphalt pavement design sections are requested for the proposed project. As noted in **Project Description**, pavement thickness design is dependent upon:

- the anticipated traffic conditions during the life of the pavement,
- subgrade and paving material characteristics, and
- climatic conditions of the region.

A critical aspect of pavement performance is site preparation. Pavement designs noted in this section must be applied to the site which has been prepared as recommended in the **Earthwork** section.

The pavement sections were designed using the American Association of State and Highway Transportation Officials (AASHTO) Guide for Design of Pavement Structures (1993). Development of layer thicknesses, including the asphalt thickness for the asphalt pavement alternatives, were determined using the layered elastic design methodology as outlined in the AASHTO 93 Design Guide, Part II, Section 3.1.5 Layered Design Analysis

Design Traffic Analysis

Traffic levels provided by the client were converted into flexible AASHTO pavement 18-kip equivalent single axle loads (ESALs) for use in Asphalt Concrete (AC) pavement thickness design, and into rigid AASHTO pavement 18-kip ESALs for Portland Cement Concrete (PCC) design, as noted in the following table. We understand that Love's Tier I traffic is experienced at this facility. Our office should be contacted if there are any changes in the reported traffic patterns or frequency to review the enclosed values.

Love's Tier 1 / Tier 2 Traffic Volumes	Light Duty	Medium Duty	Heavy Duty	Extra Heavy Duty
Traffic Level, vehicles per day [1]	1,000 cars	150 trucks	600 trucks	1,000 trucks
Flexible (AC) Pavement 18-Kip ESAL [2]	< 30,000	2.6 million	10.2 million	17 million
Rigid (PCC) Pavement 18 Kip ESAL [3]	< 30,000	4.2 million	17 million	29 million

1. Client provided values, based on Tier 1 and 2 sites in accordance with Love's Travel Stops.
2. Assumes 20-year design life, 100% of traffic consisting of fully loaded 80-kip semi-tractor trailers with two 34-kips tandem axles and one 12-kip single front axle.
3. ESAL's for PCC design are not equivalent to ESAL's used for AC sections.

Pavement Subgrade Parameters

Based on the proposed grading as previously discussed in this report, pavement subgrades are expected to consist of native on-site soils at elevations roughly equivalent to existing grades. Accordingly, bulk samples of near surface soils were collected near test pits TP-9, TP-11, TP-12, TP-14, TP-15, and TP-16 at depths of approximately 1 to 3 feet below existing grades for laboratory testing. Subgrade support was estimated from two laboratory-prepared remolded California Bearing Ratio (CBR) tests composited from the collected bulk samples. CBR values of 40 and 52 were obtained from these tests. A design CBR value of 38 was used as the basis for pavement design taking into consideration the effects of seasonal and other climatic conditions at this site. This value corresponds to a subgrade Resilient Modulus (Mr) of 26,000 psi (pounds per square inch) for use for flexible pavement design, and an effective Modulus of Subgrade Reaction (k) of 350 pci (pounds per cubic inch) for use in designing the rigid pavement sections.

Note that if actual subgrade conditions differ from the soil conditions and characteristics described here, we should be contacted to assess the construction conditions and review the pavement design recommendations.

Pavement Design Parameters

Analyses for the pavement design of the project have been based on the procedures of the AASHTO Guide for Design of Pavement Structures (1993). The following design parameters were utilized for pavement engineering analyses and the determination of design alternatives for the project:

Pavement Design Parameters		
Reliability	Level of Reliability	85%

Pavement Design Parameters		
	Flexible Overall Standard Deviation	0.45
	Rigid Overall Standard Deviation	0.35
Serviceability	Flexible Initial PSI	4.2
	Flexible Terminal PSI	2.0
	Rigid Terminal PSI	2.5
	Rigid Initial PSI	4.5
	Rigid Terminal PSI	2.3
Subgrade Conditions	CBR	38
	Correlated Resilient Modulus, M_r	26,000 psi
	Modulus of Subgrade Reaction, k	350 pci
Layer Properties	Asphalt Concrete (AC) Layer Coefficient	0.44
	Aggregate Base (ABC) Layer Coefficient	0.14
	Aggregate Base (ABC) Drainage Coefficient	1.0
	Aggregate Base (ABC) Resilient Modulus[1]	50,000 psi
	Load Transfer Coefficient J[2]	2.8
	Compressive Strength of Concrete f'_c	4,000 psi

1. AB Resilient Modulus values are limited to the smaller of 5x the subgrade Resilient Modulus or 50,000 psi for Geogrid reinforced pavements and 4x the subgrade Resilient modulus or 40,000 psi for non-geogrid reinforced pavements for the purposes of layered design analysis of flexible pavements.
2. Load transfer coefficient of 2.8 for dowel reinforced concrete joints.

The design period is considered the interval over which, with proper maintenance, the pavement will not require major repairs. We recommend a continuing regular maintenance program be implemented to maintain satisfactory serviceability over the design life. Please refer to **Pavement Maintenance** for additional information.

Asphalt Concrete Pavement Recommendations

Due to heavy truck traffic loading, Love's routinely uses geogrid reinforced flexible pavement designs in heavy traffic areas. Based on the site conditions and pavement subgrade, we believe that geogrids offer a cost-savings over unreinforced pavements in this case. Accordingly, we have designed the asphalt pavement sections to include BX2525 geogrid, using the LEpave Design Program. The following table provides our recommended pavement sections for this project:

LAYER	Materials[2,3] (WSDOT Grading)	Light Duty	Medium Duty	Heavy Duty	Extra Heavy Duty
		Thickness (in) [1]			
Surface[2]	½" HMA Cl. Low RAP/No RAS Mix, >10M ESAL[2], PG 64V-28 Binder	2	3	3	3
Base[2]	3/4" HMA Cl. Low RAP/No RAS Mix, >10M ESAL[2], PG 64H-28 Binder	2	2 ½	2 ½	3
Aggregate[3]	WSDOT 9-03.9(3) CSBC[3]	8	6	6	6
Geogrid[4]	**LeGeo** BX2525 or equivalent	No	Yes	Yes	Yes
Total Pavement Section (in.) [1]		**12**	**11 ½**	**11 ½**	**12**
Design Traffic (ESALs)		< 30,000	2.6 million	10.2 million	17 million

1. The individual and total material thickness values presented herein represent minimum thickness values, not averages.
2. Refer to Division 5-04 of the Washington State Department of Transportation (WSDOT) "Standard Specifications for Road, Bridge, and Municipal Construction" (WSDOT Standard Specs.), publication no. M41-10 for asphalt concrete pavement use and construction.
3. Refer to Division 9-02 and 9-03 of the WSDOT Standard Specs for material descriptions of asphalt binders (9-02) and aggregates for hot-mix asphalt and aggregate base material (9-03).
4. Aggregate base reinforced with 1 layer of LEGeo BX-2525 geogrid or equivalent located at the bottom of the aggregate base. Alternative grid materials are not acceptable unless documented with applicable design procedure and appropriate performance-based specification and/or post construction validation.

Asphalt Binder Selection

Terracon considered the weather conditions and traffic to determine the appropriate asphalt binder for this project. This was accomplished using the LTPPBind Version 3.1 Beta, dated September 15, 2015 software provided by the Federal Highway Administration (FHWA). This software utilizes historical temperature data from the 5 weather stations nearest the project and considers traffic speed and traffic loading to establish a recommended Performance Graded (PG) binder grade of asphalt concrete. Terracon then compared the software output to the binders that were indicated to be locally available, based on the Washington State DOT website, to determine the recommended binder selection for the project. The number of binders selected was limited to two for this recommendation to reduce the number of mix designs needed to construct the pavements.

Aggregate Base Requirements

Aggregate Base shall comply with Section 9-03.9(3) of the 2016 Washington Department of Transportation (WSDOT) Standard Specifications for Crushed Surfacing Base Course (CSBC). Surface drainage should be provided away from the edge of paved areas to minimize lateral moisture transmission into the subgrade.

Portland Cement Concrete Pavement Recommendations

It is our understanding that Love's prefers to use asphalt concrete for the majority of pavements at a Travel Stop site; however, Portland cement concrete (PCC) is occasionally selected as an alternate. Accordingly, we have included the following thickness recommendations for Jointed Plain Concrete Pavement (JPCP) with dowels:

LAYER	MATERIAL	LIGHT DUTY	MEDIUM DUTY	HEAVY DUTY	EXTRA HEAVY DUTY
		Thickness (in)[1]			
Surface	Portland Cement Concrete[2, 3]	5	8	10	11
Aggregate	Crushed Surfacing Base Course[4]	6	6	6	6
Subgrade	Subgrade to be prepared in accordance with Earthwork section of this report				
Total Pavement Section[1]		**11**	**14**	**16**	**17**

1. The individual and total material thickness values presented herein represent minimum thickness values, not averages.
2. Refer to Section 5-05.3 of the WSDOT Standard Specifications for PCC pavement construction. The concrete should be air entrained and have a minimum compressive strength of 4,000 psi after 28 days of laboratory curing per ASTM C-31.
3. Medium duty concrete pavements should include 1 ¼ inch diameter by 15-inch long dowel bars spaced at 12 inches center to center in all longitudinal and transverse contraction joints. Heavy and extra heavy-duty concrete pavements should include 1 ½ inch diameter by 18-inch long dowel bars spaced at 12 inches center to center in all longitudinal and transverse contraction joints.
4. Refer to Section 9-03.9(3) of the WSDOT Standard Specifications.

In general, PCC used in isolated areas such as dumpster pads and apron slabs does not require reinforcement. However, if Portland cement concrete is selected for use in general pavement areas proper design and detailing of longitudinal and transverse control joints, tie bars and joint

dowels will be required. In this situation, we should be contacted to provide more specific and detailed recommendations. In general, however, offer the following recommendations for doweled PCC pavements included in these recommendations:

- Contraction joints should be constructed in the rigid pavement in accordance with ACI 330.2R-17. Contraction joints should be ¼ of the depth of the concrete and should be cut as soon as the slab can support the weight of a man and the saw and can be cut without dislodging coarse aggregate particles from the surface.
- Expansion (isolation) joints must be full depth and should only be used to isolate fixed objects abutting or within the paved area. When they must be located in areas that encounter wheel loads, the pavement edges at the joint should be thickened by two inches wherever practical. The transition in thickness should occur over a minimum distance of five feet.
- Contraction joints should have a maximum spacing no greater than 15 feet, as described in ACI 330.2R-17.
- At construction joints an adequately designed keyed construction joint or a butt end construction joint is recommended. For a butt end construction joint, an adequate number of deformed tie bars or dowels should be provided.
- Tie bars made of deformed steel with a ½ inch diameter and 30-inch length are also recommended to tie the exterior curb and gutter to the outer concrete pavement edge to keep the outside slab from separating from the curb and gutter.
- Isolation joints are recommended for concrete pavement areas that abut fixed objects such as around light poles drainage inlet structures, etc.

Pavement Drainage

Pavements should be sloped to provide rapid drainage of surface water. Water allowed to pond on or adjacent to the pavements could saturate the subgrade and contribute to premature pavement deterioration. In addition, the pavement subgrade should be graded to provide positive drainage within the granular base section. Appropriate sub-drainage or connection to a suitable daylight outlet should be provided to remove water from the granular subbase.

Pavement Maintenance

The pavement sections represent minimum recommended thicknesses and, as such, periodic maintenance should be anticipated. Therefore, preventive maintenance should be planned and provided for through an on-going pavement management program. Maintenance activities are intended to slow the rate of pavement deterioration and to preserve the pavement investment. Maintenance consists of both localized maintenance (e.g., crack and joint sealing and patching) and global maintenance (e.g., surface sealing). Preventive maintenance is usually the priority when implementing a pavement maintenance program. Additional engineering observation is

recommended to determine the type and extent of a cost-effective program. Even with periodic maintenance, some movements and related cracking may still occur and repairs may be required.

Pavement performance is affected by its surroundings. In addition to providing preventive maintenance, the civil engineer should consider the following recommendations in the design and layout of pavements:

- Final grade adjacent to paved areas should slope down from the edges at a minimum 2%.
- Subgrade and pavement surfaces should have a minimum 2% slope to promote proper surface drainage.
- Install below pavement drainage systems surrounding areas anticipated for frequent wetting.
- Install joint sealant and seal cracks immediately.
- Seal all landscaped areas in or adjacent to pavements to reduce moisture migration to subgrade soils.
- Place compacted, low permeability backfill against the exterior side of curb and gutter.
- Place curb, gutter and/or sidewalk directly on clay subgrade soils rather than on unbound granular base course materials.

Cold Weather Paving

Concrete Pavement

Construction and quality of pavements, especially concrete pavements, can be negatively impacted when colder temperatures exist at the time of material placement. Placement of concrete pavement during cold weather should be conducted in accordance with Section 5-08.3(14) of the WSDOT Standard Specifications.

Asphalt Pavement

The primary concern for asphalt concrete is the ability to adequately densify the pavement layer before it cools below the minimum allowable temperature for compaction. We recommend that pavement construction be performed in accordance with WSDOT Standard Specifications Section 5-04.3(1) Table 5 which lists the following minimum surface temperature for paving:

Compacted Thickness (Feet)	Wearing Course	Other Courses
Less than 0.10	55º F	45º F
0.10 to 0.20	45º F	35º F
More than 0.20	35º F	35º F

When circumstances dictate, Love's and or the Contractor may choose to proceed with asphalt pavement construction during cold weather conditions. Placing asphalt in cold weather will increase the risk that adequate compaction is not achieved, resulting in a higher probability of premature cracking and increase rutting, stripping and raveling. If Love's or the Contractor is willing to accept these increased risks, we recommend that the following practices be observed:

- Additional and higher capacity rollers may be required, staged immediately behind the paver to provide immediate compaction.
- Compaction time should be calculated to determine the compaction equipment needed to complete compaction within the limited time. Tools are available for estimating the compaction. One example is the PaveCool application published by the Minnesota Department of Transportation: http://dot.state.mn.us/app/pavecool/index.html. Paving is not recommended if the calculated compaction time is less than required to adequately compact the pavement layer.
- Increase the mix temperature and/or maintain adequate control of the mix temperature to reduce variability.
- Asphalt concrete loads should be tightly tarped to maintain uniform temperatures throughout the load. Tarps should tightly cover the load and seal over the sides of the truck bed.
- Warm mix asphalt additives can be used as a compaction aide. Any Warm Mix additives should be utilized in accordance with Section 5-04.2(2)B Using Warm Mix Asphalt Processes of the WSDOT Standard Specifications.
- Compaction of the asphalt should be avoided when the mixture temperature is less than 185 ºF unless warm mix additives are used.
- Layer lift thicknesses less than 2 inches should not be attempted.
- Minimize the time/length of haul to the jobsite.
- Haul trucks should be staged to unload immediately upon arrive at the job site.
- If the asphalt concrete is to be placed on an aggregate base, the aggregate base materials must not be excessively wet or below minimum allowable temperatures.
- Do not place asphalt concrete on frozen aggregate base or subgrade.
- Hand-worked areas should be avoided during cold weather conditions. If hand-work is necessary, these areas should be considered temporary and subject to replacement when favorable weather conditions permit.

Gravel (Aggregate) Surfaced Road

We understand that a gravel (aggregate) surfaced road will be constructed extending to the high-rise sign that can support the weight of cranes used to erect and maintain the sign and concrete trucks during construction. Based on the relative strength characteristics of the subgrade soils and expected traffic loading, we recommend an aggregate base thickness of 8 inches be used for this

road. The aggregate material should consist of crushed stone as noted in the asphalt pavement section aggregate base course material (Crushed Surfacing Base Course).

STORMWATER INFILTRATION

The design team proposes to construct one or more stormwater infiltration facilities to accommodate site-generated stormwater runoff. Infiltration "facilities" may include ponds or vaults. The site subgrade soils are suitable for infiltration and have a rapid infiltration rate, as discussed in the next paragraphs. However, it should be noted and accommodated in site design that the native soils have limited capacity to promote in-situ treatment of stormwater runoff. Stormwater generated from many impermeable surfaces, including pavements carrying vehicle traffic and roof surfaces with a leachable finish typically require pre-treatment to remove low levels of petroleum, metals, and other environmental contaminants.

The Washington Department of Ecology's *2019 Stormwater Management Manual for Eastern Washington* (2019 SWMMEW) provides design guidance and design requirements for stormwater infiltration facilities for counties and cities in eastern Washington operating under NPDES requirements for stormwater control.

Appendix B of Chapter 6 of the 2019 SWMMEW allows for estimation of saturated hydraulic conductivity of soils that have not been glacially compacted using the grain size characteristics of soils beneath the bottom of infiltration facilities and published correlations; this method is appropriate for the soils at the project site. This grain-size based approach is described on pages 744 through 746 of the 2019 SWMMEW. Using equations 6.16 and 6.17 and the grain size distribution results obtained from laboratory testing of samples recovered from test pits TP-18 and TP-19 at depths of 4 and 8 feet, the soils at these depths and locations may be assumed to have a **short-term infiltrative capacity** that **exceeds 100 inches per hour**; however the maximum rate that may be considered for design may be limited elsewhere in the 2019 SWMMEW. This high infiltration rate was also estimated for other samples **within GeoModel Layer 2**. If stormwater dispersion or shallow infiltration is being considered at the site in a way such that infiltration will occur within soils in the shallow subsurface – in **GeoModel Layer 1** -- **a short-term infiltration rate of 9 inches per hour should be assumed**.

Based upon the grain-size based correlation used to determine these rates we recommend that a **test method correction factor of 0.5** be applied to this short-term infiltration rate**. A correction factor of 1.0 may be used for site variability** (site variability is low). **Additional correction factors** -- such as for pond or vault geometry and for the level of planned maintenance – **should be determined by other members of the design team**.

A high long-term infiltration rate is too rapid to allow for a pollution treatment function for flows generated from pavements and other pollution-generating surfaces; this should be evaluated by other members of the design team. An upstream pre-treatment step will likely be necessary prior to discharge of stormwater into infiltration ponds or galleries.

ON-SITE SEPTIC DISPOSAL

The proposed travel stop will include an on-site septic (OSS) disposal system. The proposed location of OSS disposal would be either in the northwest corner of the site or at the southernmost end of the site, at a location distant from stormwater infiltration. Site selection would need to consider required setbacks from neighboring wells and property lines. Based upon the USDA Classification System, soils with the upper few feet of the subsurface consist primarily of "extremely gravelly sand" and "extremely gravelly loamy sand". These soils are overly coarse and thus have limited surface area for growth of a biological mat and drain too rapidly to provide the residence time necessary for effective biologic metabolization of septic waste. These soils fall into the "Type 1" soil designation according to the Washington Department of Health, and a gravity septic system discharging non-residential effluent directly into native soils will not be permitted by Kittitas County. Other OSS disposal methods, such as a pressure system with timed dosage into an imported sand media, will be necessary to meet local and state health department design standards.

Design of the OSS system – including estimation of flow volume, selection of system type and components, and sizing and specification of the sand media trenches -- will need to be completed by an on-site wastewater designer licensed in the State of Washington.

FROST CONSIDERATIONS

The soils in the shallow subsurface of this site can be considered to have low to moderate frost susceptibility. However, the absence of shallow groundwater will generally prevent the formation of ice lensing, interstitial ice formation, and frost heave. With proper grading and drainage of the subgrade and paving of the site, additions of water into the subsurface that would promote frost heave will be largely circumvented. The following drainage recommendations will further reduce the potential frost heave:

- Provide surface drainage away from the building, slabs, and pavements, and towards the site storm drainage system.
- Install drains around the perimeter of the building, stoops, below exterior slabs and pavements, and connect them to the storm drainage system.
-

CORROSIVITY

We submitted two soil samples from test pits TP-01 and TP-02 at depths 8 and 10 feet, respectively, to a local analytical laboratory to determine soluble salt content, pH, minimum resistivity, redox potential and sulfide of the soils. These samples depths and locations were selected to reflect the possible location of underground fuel storage tanks. The results of these tests are summarized in the table below and included in the **Exploration Results** section. Field-based electrical resistivity measurements are also included in that section.

Corrosivity Test Results Summary								
Test Pit	**Sample Depth (feet)**	**Soil Description**	**Soluble Sulfate (ppm)**	**Soluble Chloride (ppm)**	**Electrical Resistivity (Ω-cm)**	**pH**	**Re-Dox Potential (mV)**	**Sulfide (ppm)**
TP-01	8	SANDY GRAVEL	12	<10	180,000	4.7	373	<10
TP-02	10	SANDY GRAVEL	<10	<10	120,000	4.4	388	<10

We scored these analytic test results with the Ductile Iron Pipe Research Association's (DIPRA) 10-point ranking system for assessing the site's potential to promote accelerated corrosion of buried steel and iron, which considers the moisture condition of the soils, pH, redox potential, and sulfide content. We evaluated sulfate and chloride results with respect to guidance provided by the American Concrete Institute in Tables 4.2.1 and 4.3.1 of the ACI 318 Design Manual.

The analytical test results above indicate that soils at the project site do not present a significant risk for accelerated corrosion of steel nor sulfate or chloride attack of concrete. However, the project site is in a mountain corridor that receives heavy winter-time use and the use of de-icing salts is extensive along I-90 and (presumably) local roads; designers should anticipate the use of de-icing salts with respect to cement selection and cathodic protection of buried ferrous components.

GENERAL COMMENTS

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Natural variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence or collaboration through this system are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly impact excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety, and cost estimating including, excavation support, and dewatering requirements/design are the responsibility of others. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES

Field Exploration

Test Pit Number	Test Pit Depth (feet)	Planned Location
TP-1 and TP-2	11, 15	Underground Storage Tank areas
TP-3	12	Automobile Fuel Canopy
TP-4	12	Truck Fuel Canopy and Scale
TP-5	12	Country Store
TP-6	14	Tire Shop
TP-7	8	Advertising Sign
TP-8, TP-9, TP-10	8, 8, 8½	Truck and Vehicle Parking Areas
TP-11, TP-12, TP-13, TP-14, TP-16	8	Site Entrance/Exit
TP-15	9½	Site Entrance/Exit
TP-17	8½	Vehicle Parking Area
TP-18, TP-19	8, 8	Stormwater/Septic Infiltration Areas

Exploration Layout and Elevations: Unless otherwise noted, Terracon personnel provided the exploration layout. Coordinates were obtained with a handheld GPS unit (estimated horizontal accuracy of about ±10 feet). If a more precise exploration layout is desired, we recommend exploration be surveyed. Elevations stated on the test pit logs are based upon interpolation from topographic mapping provided by Love's civil designer.

Subsurface Exploration Procedures: We advanced the test pits with a Yanmar SV100 Excavator. Bag and bulk samples were collected from the bucket of the excavator. Representative samples were collected for soil Layers 1 and 2 noted in the GeoModel for each test pit. We did not encounter groundwater during excavating and sampling. All test pits were backfilled with soil cuttings after their completion. Soil cuttings were periodically tamped with the excavator bucket during backfilling; a greater degree of compaction is not implied. During site grading, the locations of test pits will likely require additional effort during subgrade preparation, including possibly overexcavation and replacement with Structural Fill.

The sampling depths, penetration distances, and other sampling information was recorded on the field test pit logs. The samples were placed in appropriate containers and taken to our soil laboratory for testing and classification by an engineer. Our exploration team prepared field test pit logs as part of the excavating operations. These field logs included visual classifications of the materials encountered during excavation and our interpretation of the subsurface conditions between samples. Test pit logs were prepared from the field logs. The test pit logs represent the engineer's

interpretation of the field logs and include modifications based on observations and tests of the samples in our laboratory.

Electrical Resistivity Testing: Field measurements of soil resistivity were performed at the location of test pit TP-1. Field measurements of soil resistivity were performed in accordance with ASTM Test Method G 57 using the Wenner Four-Electrode Method. The soil resistivity measurements were made using a Megger DET5/4D resistivity meter. The Wenner arrangement (equal electrode spacing) was used with the "a" spacing incrementally increasing from 2 to 40 feet. The "a" spacing is generally considered to be the depth of influence of the test. Two test arrays oriented at right angles to each other were performed at the test location. Results of the soil resistivity measurements performed are presented in the following table. It should be noted that electrical resistivity will vary somewhat throughout the year due to seasonal changes in soil moisture, particularly in the shallow subsurface.

Array Location and Orientation	"a" spacing (feet)	Measured Resistance (ohms)	Average Resistivity (ohm-cm)
B-1 (east-west)	2	3,995	15,300
	5	3,220	30,830
	10	2,070	39,640
	20	797	30,530
B-1 (north-south)	2	5,620	21,530
	5	3,650	34,950
	10	2,250	43,090
	20	1,093	41,860
	40	344	26,350

Laboratory Testing

The project engineer reviewed the field data and assigned laboratory tests to understand the engineering properties of the various soil strata, as necessary, for this project. Procedural standards noted below are for reference to methodology in general. In some cases, variations to methods were applied because of local practice or professional judgment. Standards noted below include reference to other, related standards. Such references are not necessarily applicable to describe the specific test performed.

- ASTM D2216 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

- ASTM D422 Standard Test Method for Particle-Size Analysis of Soils
- ASTM D1140 Standard Test Method for Determining the Amount of Material Finer than No. 200 Sieve in Soils by Washing
- ASTM D1883 Standard Test Method for California Bearing Ratio (CBR) of Laboratory-Compacted Soils

The laboratory testing program often included examination of soil samples by an engineer. Based on the material's texture and plasticity, we described and classified the soil samples in accordance with the Unified Soil Classification System. For the purpose of septic design, soil samples at TP-18 and TP-19 are also classified according to the USDA soil textural classification triangle.

PHOTOGRAPHY LOG

View of TP-8 Location

Forest Grasses, Shrubs, and Trees

Cobbles (TP-5)

Cobbles in Spoils Pile (TP-1)

	
Cobbles and Boulders (TP-4)	Cobbles and Boulders (TP-5)
	
Cobbles and Boulders (TP-18)	

SITE LOCATION AND EXPLORATION PLANS

Contents:

Site Location Plan
Exploration Plan

Note: All attachments are one page unless noted above.

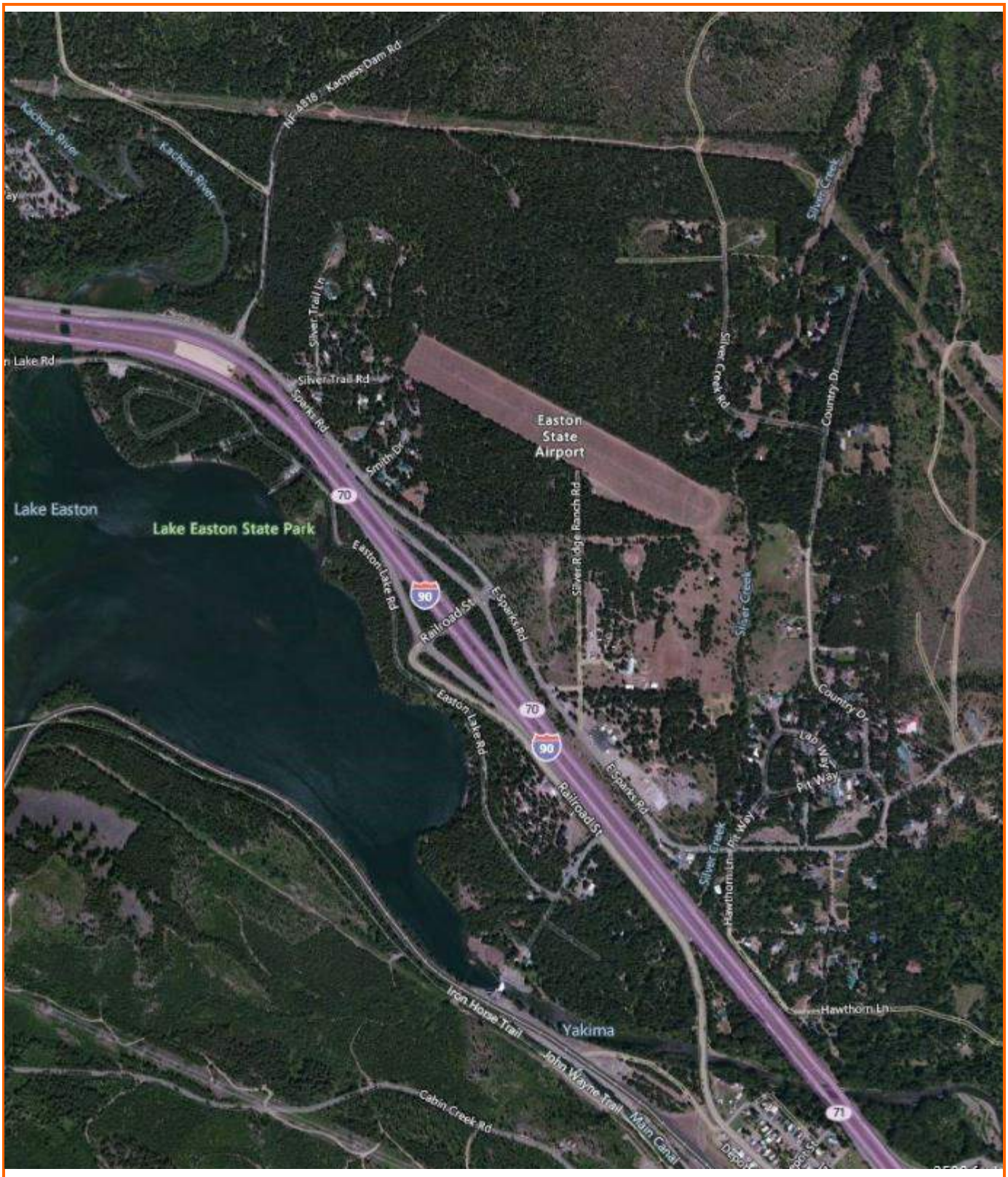


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

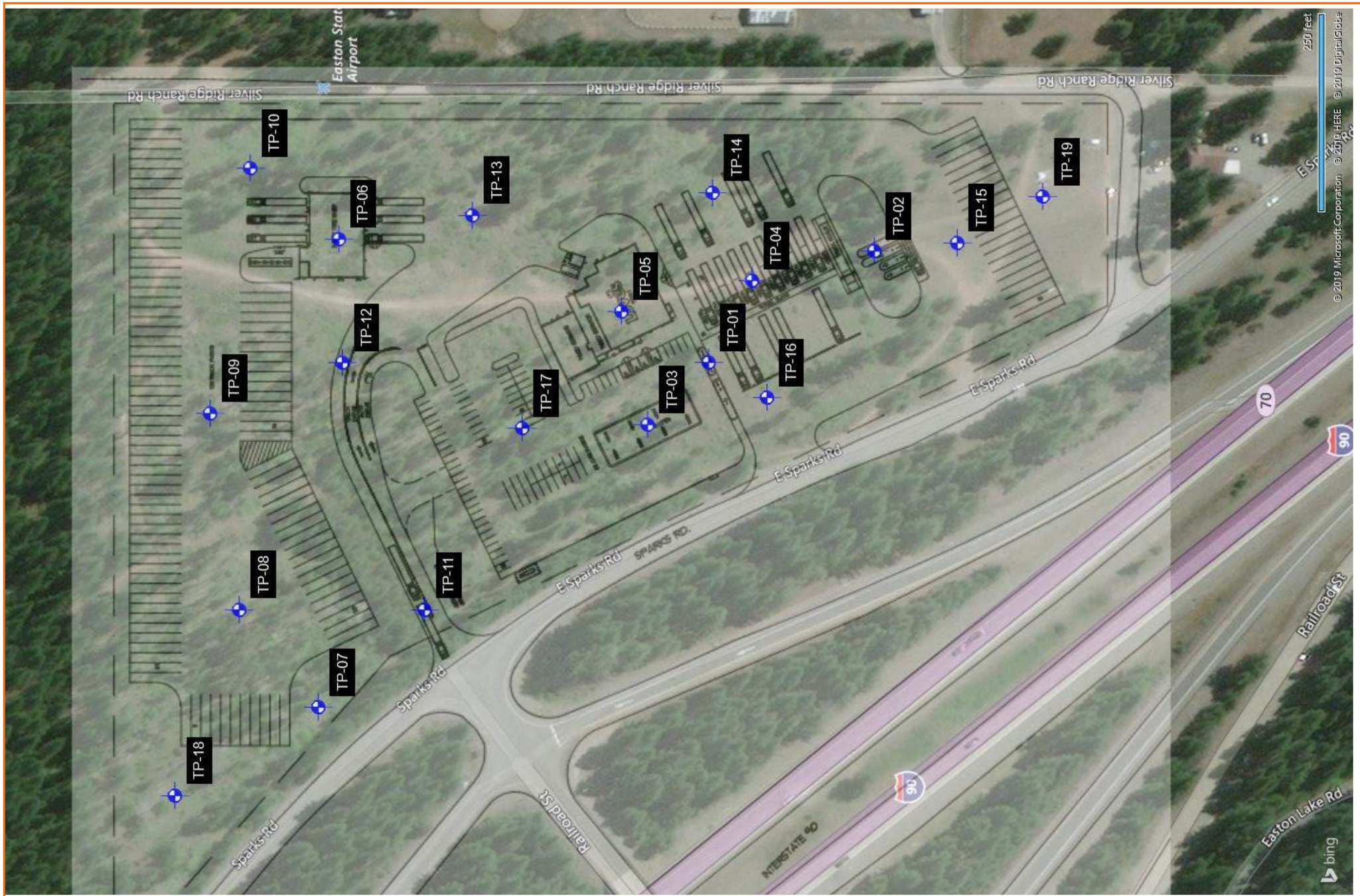


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

EXPLORATION RESULTS

Contents:

Note: All attachments are one page unless noted above.

TEST PIT LOG NO. TP-01

PROJECT: Love's - Easton

CLIENT: Love's Travel Stops & Country Stores Inc
Oklahoma City, OK

SITE: W Sparks Road and I-90
Easton, WA

LOCATION See Exploration Plan

Latitude: 47.2499° Longitude: -121.1868°

Approximate Surface Elev.: 2219 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	Sample No.	WATER CONTENT (%)	PERCENT FINES
		0.5	2218.5+/-						
		TOPSOIL, forest litter							
1		**SILTY GRAVELLY SAND (SM)**, with organics (tree roots), fine grained, reddish brown to dark orange, moist, medium dense, trace cobbles					S-1		
		2.0	2217+/-						
2		**SANDY GRAVEL**, with cobbles and boulders, coarse grained, brown to dark gray, moist, dense to very dense		5			S-2		
							S-3		
				10					
		11.0	2208+/-						
		Test Pit Terminated at 11 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Excavator

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations measured in the field

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
21905 64th Ave W, Ste 100
Mountlake Terrace, WA

Test Pit Started: 06-19-2019
Test Pit Completed: 06-19-2019
Excavator: Yanmar SV100
Operator: NW Excavating
Project No.: 81195078

TEST PIT LOG NO. TP-02

PROJECT: Love's - Easton

CLIENT: Love's Travel Stops & Country Stores Inc
Oklahoma City, OK

SITE: W Sparks Road and I-90
Easton, WA

LOCATION See Exploration Plan

Latitude: 47.2493° Longitude: -121.1862°

Approximate Surface Elev.: 2216 (Ft.) +/-

MODEL LAYER	DEPTH	ELEVATION (Ft.)	
	0.5	2215.5+/-	**TOPSOIL**, forest litter
1	2.0	2214+/-	**SILTY GRAVELLY SAND (SM)**, with organics (tree roots), fine grained, reddish brown to dark orange, moist, medium dense, trace cobbles
2	15.0	2201+/-	**SANDY GRAVEL**, with cobbles and boulders, coarse grained, brown to dark gray, moist, dense to very dense, course to medium grained sand lenses >6"
			Test Pit Terminated at 15 Feet

DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	Sample No.	WATER CONTENT (%)	PERCENT FINES
			S-1		
			S-2		
5					
			S-3		
10			S-4		
15			S-5		

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Excavator

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations measured in the field

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
21905 64th Ave W, Ste 100
Mountlake Terrace, WA

Test Pit Started: 06-19-2019
Test Pit Completed: 06-19-2019
Excavator: Yanmar SV100
Operator: NW Excavating
Project No.: 81195078

TEST PIT LOG NO. TP-03

PROJECT: Love's - Easton

CLIENT: Love's Travel Stops & Country Stores Inc
Oklahoma City, OK

SITE: W Sparks Road and I-90
Easton, WA

LOCATION See Exploration Plan

Latitude: 47.2501° Longitude: -121.1871°

Approximate Surface Elev.: 2215 (Ft.) +/-

MODEL LAYER	DEPTH	ELEVATION (Ft.)		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	Sample No.	WATER CONTENT (%)	PERCENT FINES
	0.5	2214.5+/-	**TOPSOIL**, forest litter						
1	3.0	2212+/-	**SILTY GRAVELLY SAND (SM)**, with organics (tree roots), fine grained, reddish brown to dark orange, moist, medium dense, trace cobbles				S-1		
2	12.0	2203+/-	**SANDY GRAVEL**, with cobbles and boulders, coarse grained, brown to dark gray, moist, dense to very dense	5			S-2	4	1
				10			S-3		
			Test Pit Terminated at 12 Feet						

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Excavator

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations measured in the field

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
21905 64th Ave W, Ste 100
Mountlake Terrace, WA

Test Pit Started: 06-19-2019
Test Pit Completed: 06-19-2019
Excavator: Yanmar SV100
Operator: NW Excavating
Project No.: 81195078

TEST PIT LOG NO. TP-04

PROJECT: Love's - Easton

CLIENT: Love's Travel Stops & Country Stores Inc
Oklahoma City, OK

SITE: W Sparks Road and I-90
Easton, WA

LOCATION See Exploration Plan

Latitude: 47.2498° Longitude: -121.1864°

Approximate Surface Elev.: 2218 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	Sample No.	WATER CONTENT (%)	PERCENT FINES
		0.5	2217.5+/-						
1		**TOPSOIL**, forest litter **SILTY SANDY GRAVEL (GM)**, with organics (tree roots), fine grained, reddish brown to dark orange, moist, medium dense, trace cobbles					S-1	10	16
		2.0	2216+/-						
2		**SANDY GRAVEL**, with cobbles and boulders, coarse grained, brown to dark gray, moist, dense to very dense, course to medium grained sand lenses >6"		5			S-2	4	1
				10			S-3		
		12.0	2206+/-						
		Test Pit Terminated at 12 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Excavator

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations measured in the field

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
21905 64th Ave W, Ste 100
Mountlake Terrace, WA

Test Pit Started: 06-19-2019
Test Pit Completed: 06-19-2019
Excavator: Yanmar SV100
Operator: NW Excavating
Project No.: 81195078

TEST PIT LOG NO. TP-05

PROJECT: Love's - Easton

CLIENT: Love's Travel Stops & Country Stores Inc
Oklahoma City, OK

SITE: W Sparks Road and I-90
Easton, WA

LOCATION See Exploration Plan

Latitude: 47.2502° Longitude: -121.1866°

Approximate Surface Elev.: 2220 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH		ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	Sample No.	WATER CONTENT (%)	PERCENT FINES
		0.5	**TOPSOIL**, forest litter	2219.5+/-						
1		2.0	**SILTY GRAVELLY SAND (SM)**, with organics (tree roots), fine grained, reddish brown to dark orange, moist, medium dense, trace cobbles	2218+/-				S-1	3	2
2			**SANDY GRAVEL**, with cobbles and boulders, coarse grained, brown to dark gray, moist, dense to very dense		5			S-2		
					10			S-3		
		12.0		2208+/-						
			Test Pit Terminated at 12 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Excavator

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations measured in the field

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
21905 64th Ave W, Ste 100
Mountlake Terrace, WA

Test Pit Started: 06-19-2019
Test Pit Completed: 06-19-2019
Excavator: Yanmar SV100
Operator: NW Excavating
Project No.: 81195078

TEST PIT LOG NO. TP-06

PROJECT: Love's - Easton

CLIENT: Love's Travel Stops & Country Stores Inc
Oklahoma City, OK

SITE: W Sparks Road and I-90
Easton, WA

LOCATION See Exploration Plan

Latitude: 47.2512° Longitude: -121.1862°

Approximate Surface Elev.: 2219 (Ft.) +/-

MODEL LAYER	DEPTH		ELEVATION (Ft.)
	0.5	**TOPSOIL**, forest litter	2218.5+/-
1		**SILTY GRAVELLY SAND (SM)**, with organics (tree roots), fine grained, reddish brown to dark orange, moist, medium dense, trace cobbles	
	3.0		2216+/-
2		**SANDY GRAVEL**, with cobbles and boulders, coarse grained, brown to dark gray, moist, dense to very dense, course to medium grained sand lenses >6"	
	4.5		2214.5+/-
	5.5	**POORLY GRADED SAND WITH GRAVEL (SP)**, coarse grained, brown to dark gray, moist, dense to very dense	2213.5+/-
		SANDY GRAVEL, with cobbles and boulders, coarse grained, brown to dark gray, moist, dense to very dense, course to medium grained sand lenses >6"	
	11.0		2208+/-
	12.0	**SANDY SILT WITH GRAVEL (ML)**, fine grained, light gray to brown gray, moist, medium dense	2207+/-
		SANDY GRAVEL, with cobbles and boulders, coarse grained, brown to dark gray, moist, dense to very dense	
	14.0		2205+/-
		Test Pit Terminated at 14 Feet	

DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	Sample No.	WATER CONTENT (%)	PERCENT FINES
5			S-1		
			S-2	5	1
10			S-3		
			S-4		

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Excavator

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations measured in the field

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
21905 64th Ave W, Ste 100
Mountlake Terrace, WA

Test Pit Started: 06-19-2019
Test Pit Completed: 06-19-2019
Excavator: Yanmar SV100
Operator: NW Excavating
Project No.: 81195078

TEST PIT LOG NO. TP-07

PROJECT: Love's - Easton

CLIENT: Love's Travel Stops & Country Stores Inc
Oklahoma City, OK

SITE: W Sparks Road and I-90
Easton, WA

LOCATION See Exploration Plan

Latitude: 47.2513° Longitude: -121.1886°

Approximate Surface Elev.: 2213 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	Sample No.	WATER CONTENT (%)	PERCENT FINES
		0.5	2212.5+/-						
1			**TOPSOIL**, forest litter **SILTY GRAVELLY SAND (SM)**, with organics (tree roots), fine grained, reddish brown to dark orange, moist, medium dense, trace cobbles				S-1	16	23
		3.0	2210+/-						
2			**SANDY GRAVEL**, with cobbles and boulders, coarse grained, brown to dark gray, moist, dense to very dense	5					
		8.0	2205+/-				S-2	6	2
			Test Pit Terminated at 8 Feet						

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Excavator

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
21905 64th Ave W, Ste 100
Mountlake Terrace, WA

Test Pit Started: 06-19-2019	Test Pit Completed: 06-19-2019
Excavator: Yanmar SV100	Operator: NW Excavating
Project No.: 81195078	

TEST PIT LOG NO. TP-08

PROJECT: Love's - Easton

CLIENT: Love's Travel Stops & Country Stores Inc
Oklahoma City, OK

SITE: W Sparks Road and I-90
Easton, WA

LOCATION See Exploration Plan

Latitude: 47.2515° Longitude: -121.1881°

Approximate Surface Elev.: 2215 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	Sample No.	WATER CONTENT (%)	PERCENT FINES
		0.5	2214.5+/-						
1			**TOPSOIL**, forest litter **SILTY GRAVELLY SAND (SM)**, with organics (tree roots), fine grained, reddish brown to dark orange, moist, medium dense, trace cobbles				S-1		
		3.0	2212+/-						
2			**SANDY GRAVEL**, with cobbles and boulders, coarse grained, brown to dark gray, moist, dense to very dense	5			S-2		
		8.0	2207+/-						
			Test Pit Terminated at 8 Feet						

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Excavator

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
21905 64th Ave W, Ste 100
Mountlake Terrace, WA

Test Pit Started: 06-19-2019
Test Pit Completed: 06-19-2019
Excavator: Yanmar SV100
Operator: NW Excavating
Project No.: 81195078

TEST PIT LOG NO. TP-09

PROJECT: Love's - Easton

CLIENT: Love's Travel Stops & Country Stores Inc
Oklahoma City, OK

SITE: W Sparks Road and I-90
Easton, WA

LOCATION See Exploration Plan

Latitude: 47.2516° Longitude: -121.1871°

Approximate Surface Elev.: 2215 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	Sample No.	WATER CONTENT (%)	PERCENT FINES
		0.5	2214.5+/-	**TOPSOIL**, forest litter						
1		3.0	2212+/-	**SILTY GRAVELLY SAND (SM)**, with organics (tree roots), fine grained, reddish brown to dark orange, moist, medium dense, trace cobbles				S-1		
2		8.0	2207+/-	**SANDY GRAVEL**, with cobbles and boulders, coarse grained, brown to dark gray, moist, dense to very dense	5			S-2		
				Test Pit Terminated at 8 Feet						

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Excavator

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
21905 64th Ave W, Ste 100
Mountlake Terrace, WA

Test Pit Started: 06-19-2019
Test Pit Completed: 06-19-2019
Excavator: Yanmar SV100
Operator: NW Excavating
Project No.: 81195078

TEST PIT LOG NO. TP-10

PROJECT: Love's - Easton

CLIENT: Love's Travel Stops & Country Stores Inc
Oklahoma City, OK

SITE: W Sparks Road and I-90
Easton, WA

LOCATION See Exploration Plan

Latitude: 47.2515° Longitude: -121.1858°

Approximate Surface Elev.: 2220 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	Sample No.	WATER CONTENT (%)	PERCENT FINES
		0.5	2219.5+/-						
1			**TOPSOIL**, forest litter **SILTY GRAVELLY SAND (SM)**, with organics (tree roots), fine grained, reddish brown to dark orange, moist, medium dense, trace cobbles				S-1		
		3.0	2217+/-						
2			**SANDY GRAVEL**, with cobbles and boulders, coarse grained, brown to dark gray, moist, dense to very dense	5			S-2		
		8.5	2211.5+/-						
			Test Pit Terminated at 8.5 Feet						

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Excavator

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations measured in the field

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
21905 64th Ave W, Ste 100
Mountlake Terrace, WA

Test Pit Started: 06-19-2019
Test Pit Completed: 06-19-2019
Excavator: Yanmar SV100
Operator: NW Excavating
Project No.: 81195078

TEST PIT LOG NO. TP-11

PROJECT: Love's - Easton

CLIENT: Love's Travel Stops & Country Stores Inc
Oklahoma City, OK

SITE: W Sparks Road and I-90
Easton, WA

LOCATION See Exploration Plan

Latitude: 47.2509° Longitude: -121.1881°

Approximate Surface Elev.: 2212 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	Sample No.	WATER CONTENT (%)	PERCENT FINES
		0.5	2211.5+/-	**TOPSOIL**, forest litter						
1		3.0	2209+/-	**SILTY GRAVELLY SAND (SM)**, with organics (tree roots), fine grained, reddish brown to dark orange, moist, medium dense, trace cobbles				S-1		
2		8.0	2204+/-	**SANDY GRAVEL**, with cobbles and boulders, coarse grained, brown to dark gray, moist, dense to very dense	5			S-2		
								S-3		
				Test Pit Terminated at 8 Feet						

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Excavator

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
21905 64th Ave W, Ste 100
Mountlake Terrace, WA

Test Pit Started: 06-19-2019
Test Pit Completed: 06-19-2019
Excavator: Yanmar SV100
Operator: NW Excavating
Project No.: 81195078

TEST PIT LOG NO. TP-12

PROJECT: Love's - Easton

CLIENT: Love's Travel Stops & Country Stores Inc
Oklahoma City, OK

SITE: W Sparks Road and I-90
Easton, WA

LOCATION See Exploration Plan

Latitude: 47.2512° Longitude: -121.1868°

Approximate Surface Elev.: 2214 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH		ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	Sample No.	WATER CONTENT (%)	PERCENT FINES
		0.5	**TOPSOIL**, forest litter	2213.5+/-						
1			**SILTY GRAVELLY SAND (SM)**, with organics (tree roots), fine grained, reddish brown to dark orange, moist, medium dense, trace cobbles					S-1		
		5.0		2209+/-	5					
2			**SANDY GRAVEL**, with cobbles and boulders, coarse grained, brown to dark gray, moist, dense to very dense, lensed					S-2		
		8.0	interbedded 2" lenses of silty sand with gravel poorly graded coarse grained sands	2206+/-				S-3A S-3B		
			Test Pit Terminated at 8 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Excavator

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations measured in the field

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
21905 64th Ave W, Ste 100
Mountlake Terrace, WA

Test Pit Started: 06-19-2019
Test Pit Completed: 06-19-2019
Excavator: Yanmar SV100
Operator: NW Excavating
Project No.: 81195078

TEST PIT LOG NO. TP-13

PROJECT: Love's - Easton

CLIENT: Love's Travel Stops & Country Stores Inc
Oklahoma City, OK

SITE: W Sparks Road and I-90
Easton, WA

LOCATION See Exploration Plan

Latitude: 47.2507° Longitude: -121.1861°

Approximate Surface Elev.: 2221 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	Sample No.	WATER CONTENT (%)	PERCENT FINES
		0.5	2220.5+/-						
		TOPSOIL, forest litter							
1		**SILTY GRAVELLY SAND (SM)**, with organics (tree roots), fine grained, reddish brown to dark orange, moist, medium dense, trace cobbles					S-1		
		3.0	2218+/-						
2		**SANDY GRAVEL**, with cobbles and boulders, coarse grained, brown to dark gray, moist, dense to very dense		5			S-2		
		8.0	2213+/-						
		Test Pit Terminated at 8 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Excavator

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations measured in the field

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
21905 64th Ave W, Ste 100
Mountlake Terrace, WA

Test Pit Started: 06-19-2019
Test Pit Completed: 06-19-2019
Excavator: Yanmar SV100
Operator: NW Excavating
Project No.: 81195078

TEST PIT LOG NO. TP-14

PROJECT: Love's - Easton

CLIENT: Love's Travel Stops & Country Stores Inc
Oklahoma City, OK

SITE: W Sparks Road and I-90
Easton, WA

LOCATION See Exploration Plan

Latitude: 47.2499° Longitude: -121.1859°

Approximate Surface Elev.: 2219 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	Sample No.	WATER CONTENT (%)	PERCENT FINES
		0.5	2218.5+/-	**TOPSOIL**, forest litter						
1				**SILTY GRAVELLY SAND (SM)**, with organics (tree roots), fine grained, reddish brown to dark orange, moist, medium dense, trace cobbles				S-1		
		3.5	2215.5+/-							
2				**SANDY GRAVEL**, with cobbles and boulders, coarse grained, brown to dark gray, moist, dense to very dense, course grained sand lenses >6"	5			S-2		
		8.0	2211+/-							
				Test Pit Terminated at 8 Feet						

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Excavator

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations measured in the field

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
21905 64th Ave W, Ste 100
Mountlake Terrace, WA

Test Pit Started: 06-19-2019
Test Pit Completed: 06-19-2019
Excavator: Yanmar SV100
Operator: NW Excavating
Project No.: 81195078

TEST PIT LOG NO. TP-15

PROJECT: Love's - Easton

CLIENT: Love's Travel Stops & Country Stores Inc
Oklahoma City, OK

SITE: W Sparks Road and I-90
Easton, WA

LOCATION See Exploration Plan

Latitude: 47.2491° Longitude: -121.1862°

Approximate Surface Elev.: 2215 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	Sample No.	WATER CONTENT (%)	PERCENT FINES
1		**SILTY GRAVELLY SAND (SM)**, with organics (tree roots), fine grained, reddish brown to dark orange, moist, medium dense, trace cobbles					S-1		
		3.0	2212+/-						
2		**SANDY GRAVEL**, with cobbles and boulders, coarse grained, brown to dark gray, moist, dense to very dense		5			S-2		
							S-3		
		9.5	2205.5+/-						
		Test Pit Terminated at 9.5 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Excavator

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
21905 64th Ave W, Ste 100
Mountlake Terrace, WA

Test Pit Started: 06-19-2019
Test Pit Completed: 06-19-2019
Excavator: Yanmar SV100
Operator: NW Excavating
Project No.: 81195078

TEST PIT LOG NO. TP-16

PROJECT: Love's - Easton

CLIENT: Love's Travel Stops & Country Stores Inc
Oklahoma City, OK

SITE: W Sparks Road and I-90
Easton, WA

LOCATION See Exploration Plan

Latitude: 47.2497° Longitude: -121.187°

Approximate Surface Elev.: 2217 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DESCRIPTION
		0.5	2216.5+/-	**TOPSOIL**, forest litter
1				**SILTY GRAVELLY SAND (SM)**, with organics (tree roots), fine grained, reddish brown to dark orange, moist, medium dense, trace cobbles
		3.5	2213.5+/-	
2				**SANDY GRAVEL**, with cobbles and boulders, coarse grained, brown to dark gray, moist, dense to very dense
		8.0	2209+/-	***Test Pit Terminated at 8 Feet***

DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	Sample No.	WATER CONTENT (%)	PERCENT FINES
5			S-1		
			S-2		

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Excavator

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations measured in the field

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
21905 64th Ave W, Ste 100
Mountlake Terrace, WA

Test Pit Started: 06-19-2019
Test Pit Completed: 06-19-2019
Excavator: Yanmar SV100
Operator: NW Excavating
Project No.: 81195078

TEST PIT LOG NO. TP-17

PROJECT: Love's - Easton

CLIENT: Love's Travel Stops & Country Stores Inc
Oklahoma City, OK

SITE: W Sparks Road and I-90
Easton, WA

LOCATION See Exploration Plan

Latitude: 47.2506° Longitude: -121.1871°

Approximate Surface Elev.: 2212 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DESCRIPTION
		0.5	2211.5+/-	**TOPSOIL**, forest litter
1				**SILTY GRAVELLY SAND (SM)**, with organics (tree roots), fine grained, reddish brown to dark orange, moist, medium dense, trace cobbles
		4.0	2208+/-	
2				**SANDY GRAVEL**, with cobbles and boulders, coarse grained, brown to dark gray, moist, dense to very dense
		8.5	2203.5+/-	
				Test Pit Terminated at 8.5 Feet

DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	Sample No.	WATER CONTENT (%)	PERCENT FINES
5			S-1		
			S-2		

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Excavator

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

Terracon
21905 64th Ave W, Ste 100
Mountlake Terrace, WA

Test Pit Started: 06-19-2019	Test Pit Completed: 06-19-2019
Excavator: Yanmar SV100	Operator: NW Excavating
Project No.: 81195078	

TEST PIT LOG NO. TP-18

PROJECT: Love's - Easton

CLIENT: Love's Travel Stops & Country Stores Inc
Oklahoma City, OK

SITE: W Sparks Road and I-90
Easton, WA

LOCATION See Exploration Plan

Latitude: 47.2518° Longitude: -121.189°

Approximate Surface Elev.: 2214 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	Sample No.	WATER CONTENT (%)	PERCENT FINES
		0.5	2213.5+/-						
1			**TOPSOIL**, forest litter **SILTY GRAVELLY SAND (SM)**, with organics (tree roots), fine grained, reddish brown to dark orange, moist, medium dense, trace cobbles						
		4.0	2210+/-						
2			**SANDY GRAVEL**, with cobbles and boulders, coarse grained, brown to dark gray, moist, dense to very dense	5			S-1	4	4
		8.0	2206+/-				S-2	7	5
			Test Pit Terminated at 8 Feet						

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Excavator

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
21905 64th Ave W, Ste 100
Mountlake Terrace, WA

Test Pit Started: 06-19-2019
Test Pit Completed: 06-19-2019
Excavator: Yanmar SV100
Operator: NW Excavating
Project No.: 81195078

TEST PIT LOG NO. TP-19

PROJECT: Love's - Easton

CLIENT: Love's Travel Stops & Country Stores Inc
Oklahoma City, OK

SITE: W Sparks Road and I-90
Easton, WA

LOCATION See Exploration Plan

Latitude: 47.2488° Longitude: -121.186°

Approximate Surface Elev.: 2213 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	Sample No.	WATER CONTENT (%)	PERCENT FINES
		0.5	2212.5+/-						
		TOPSOIL, forest litter							
1		**SILTY GRAVELLY SAND (SM)**, with organics (tree roots), fine grained, reddish brown to dark orange, moist, medium dense, trace cobbles					S-1		
		2.0	2211+/-						
2		**SANDY GRAVEL**, with cobbles and boulders, coarse grained, brown to dark gray, moist, dense to very dense, course grained sand lenses >6"		5			S-2	4	3
							S-3		
		8.0	2205+/-				S-4	5	2
		Test Pit Terminated at 8 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Excavator

Abandonment Method:
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

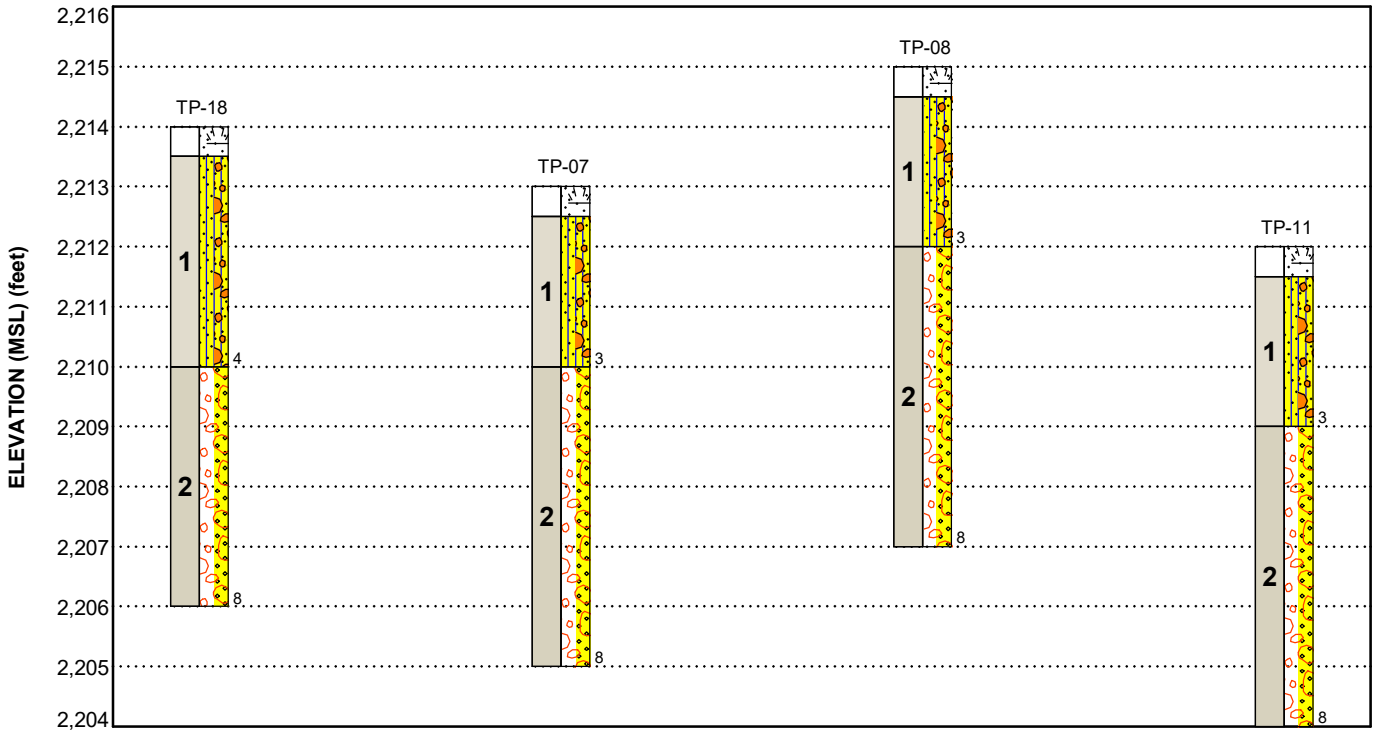
Groundwater not encountered

Terracon
21905 64th Ave W, Ste 100
Mountlake Terrace, WA

Test Pit Started: 06-19-2019
Test Pit Completed: 06-19-2019
Excavator: Yanmar SV100
Operator: NW Excavating
Project No.: 81195078

GEOMODEL

Love's - Easton ■ Easton, WA
7/9/2019 ■ Terracon Project No. 81195078



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	SILTY SAND WITH GRAVEL	Silty Sand with Gravel, with organics (tree roots), trace cobbles
2	WELL GRADED SAND WITH GRAVEL	Well Graded Sand with Gravel, with cobbles

LEGEND

- Topsoil
- Silty Sand with Gravel
- Well-graded Gravel with Sand

- First Water Observation
- Second Water Observation
- Third Water Observation

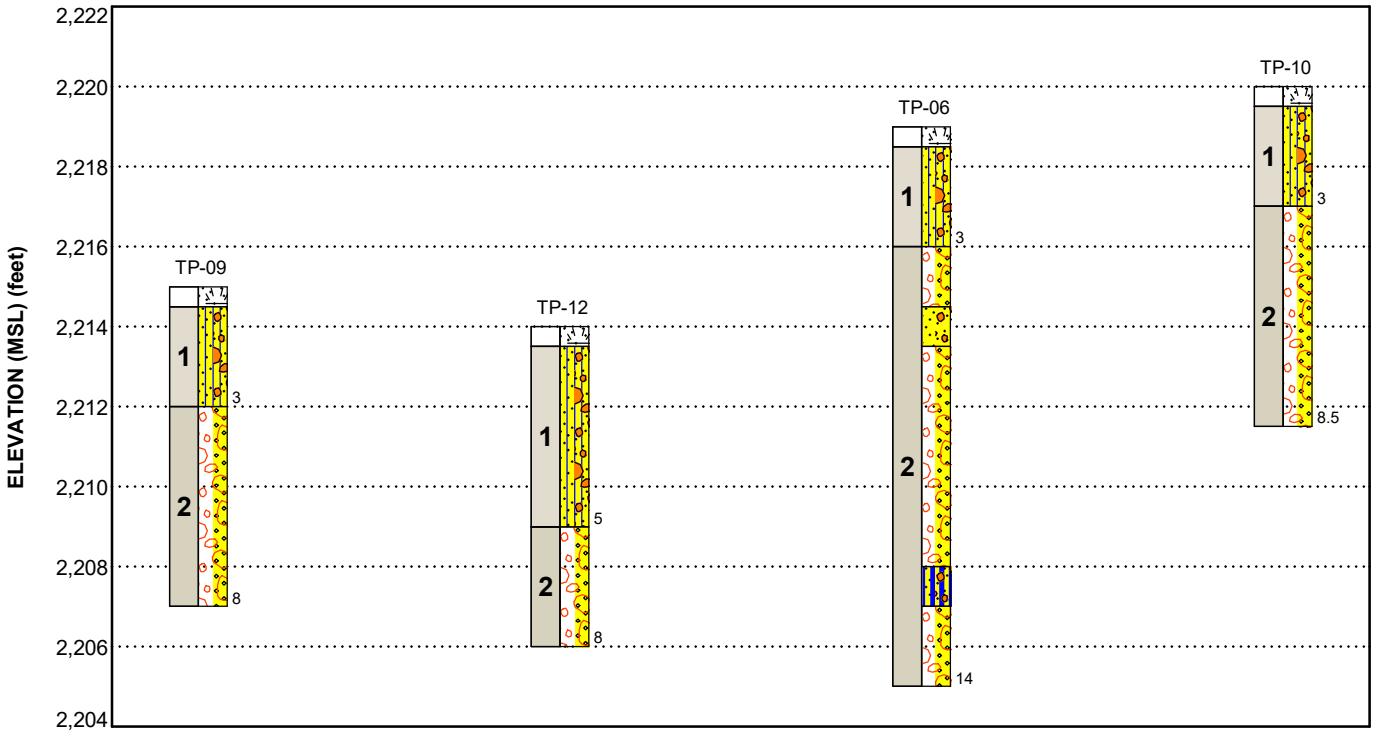
Groundwater levels are temporal. The levels shown are representative of the date and time of our exploration. Significant changes are possible over time.
Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project.
Numbers adjacent to soil column indicate depth below ground surface.

GEOMODEL

Love's - Easton ■ Easton, WA
7/9/2019 ■ Terracon Project No. 81195078

Terracon GeoReport



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	SILTY SAND WITH GRAVEL	Silty Sand with Gravel, with organics (tree roots), trace cobbles
2	WELL GRADED SAND WITH GRAVEL	Well Graded Sand with Gravel, with cobbles

LEGEND

- Topsoil
- Silty Sand with Gravel
- Well-graded Gravel with Sand
- Poorly-graded Sand with Gravel
- Sandy Silt with Gravel

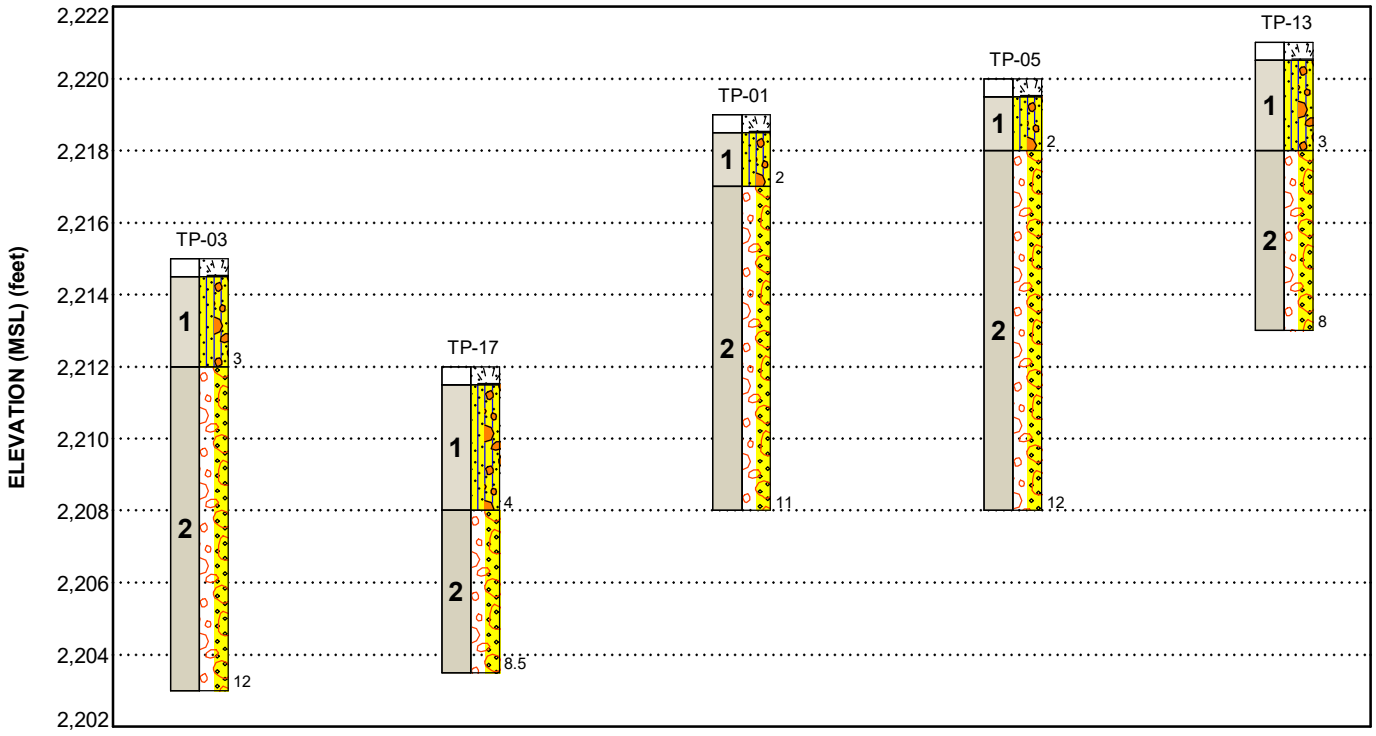
- First Water Observation
- Second Water Observation
- Third Water Observation

Groundwater levels are temporal. The levels shown are representative of the date and time of our exploration. Significant changes are possible over time.
Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project.
Numbers adjacent to soil column indicate depth below ground surface.

GEOMODEL

Love's - Easton ■ Easton, WA
7/9/2019 ■ Terracon Project No. 81195078



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	SILTY SAND WITH GRAVEL	Silty Sand with Gravel, with organics (tree roots), trace cobbles
2	WELL GRADED SAND WITH GRAVEL	Well Graded Sand with Gravel, with cobbles

LEGEND

- Topsoil
- Silty Sand with Gravel
- Well-graded Gravel w/sand
- Well-graded Gravel with Sand

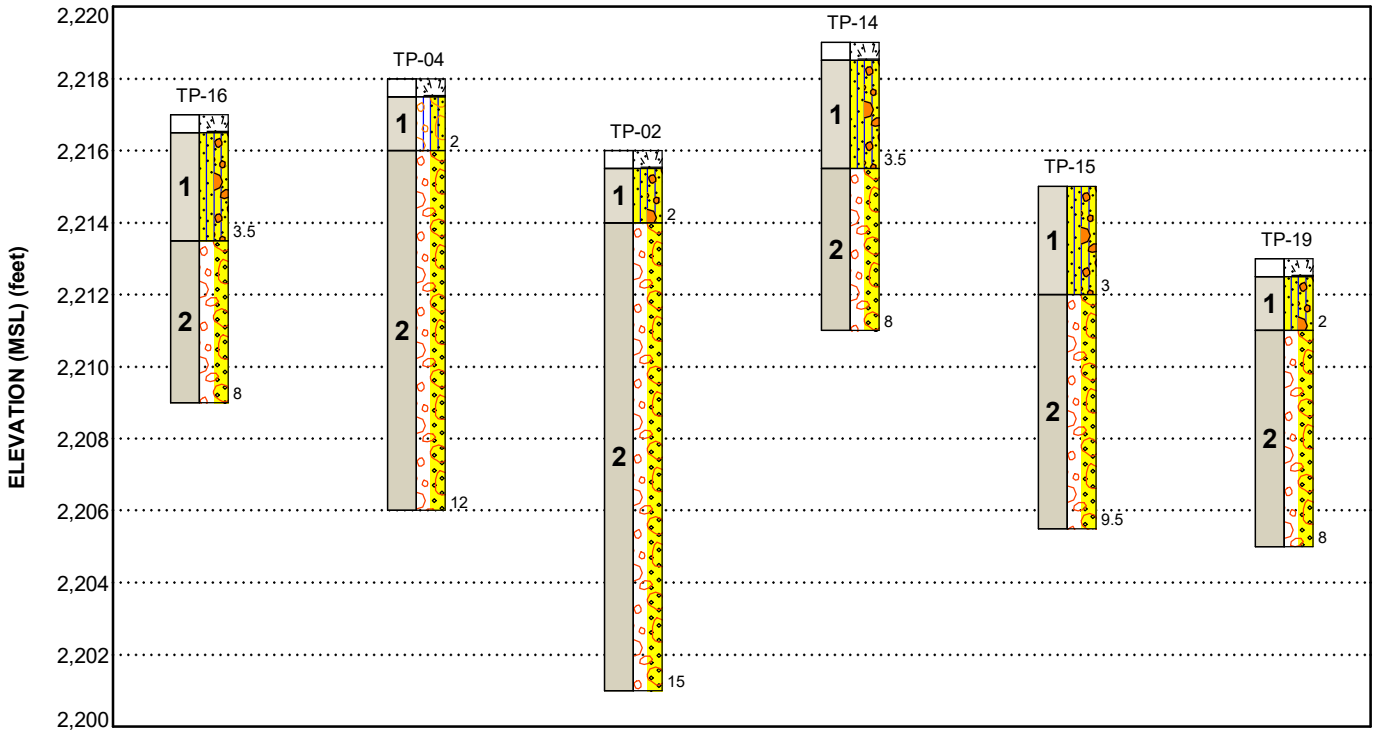
- First Water Observation
- Second Water Observation
- Third Water Observation

Groundwater levels are temporal. The levels shown are representative of the date and time of our exploration. Significant changes are possible over time.
Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project.
Numbers adjacent to soil column indicate depth below ground surface.

GEOMODEL

Love's - Easton ■ Easton, WA
7/9/2019 ■ Terracon Project No. 81195078



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	SILTY SAND WITH GRAVEL	Silty Sand with Gravel, with organics (tree roots), trace cobbles
2	WELL GRADED SAND WITH GRAVEL	Well Graded Sand with Gravel, with cobbles

LEGEND

- Topsoil
- Silty Gravel with Sand
- Silty Sand with Gravel
- Well-graded Gravel with Sand

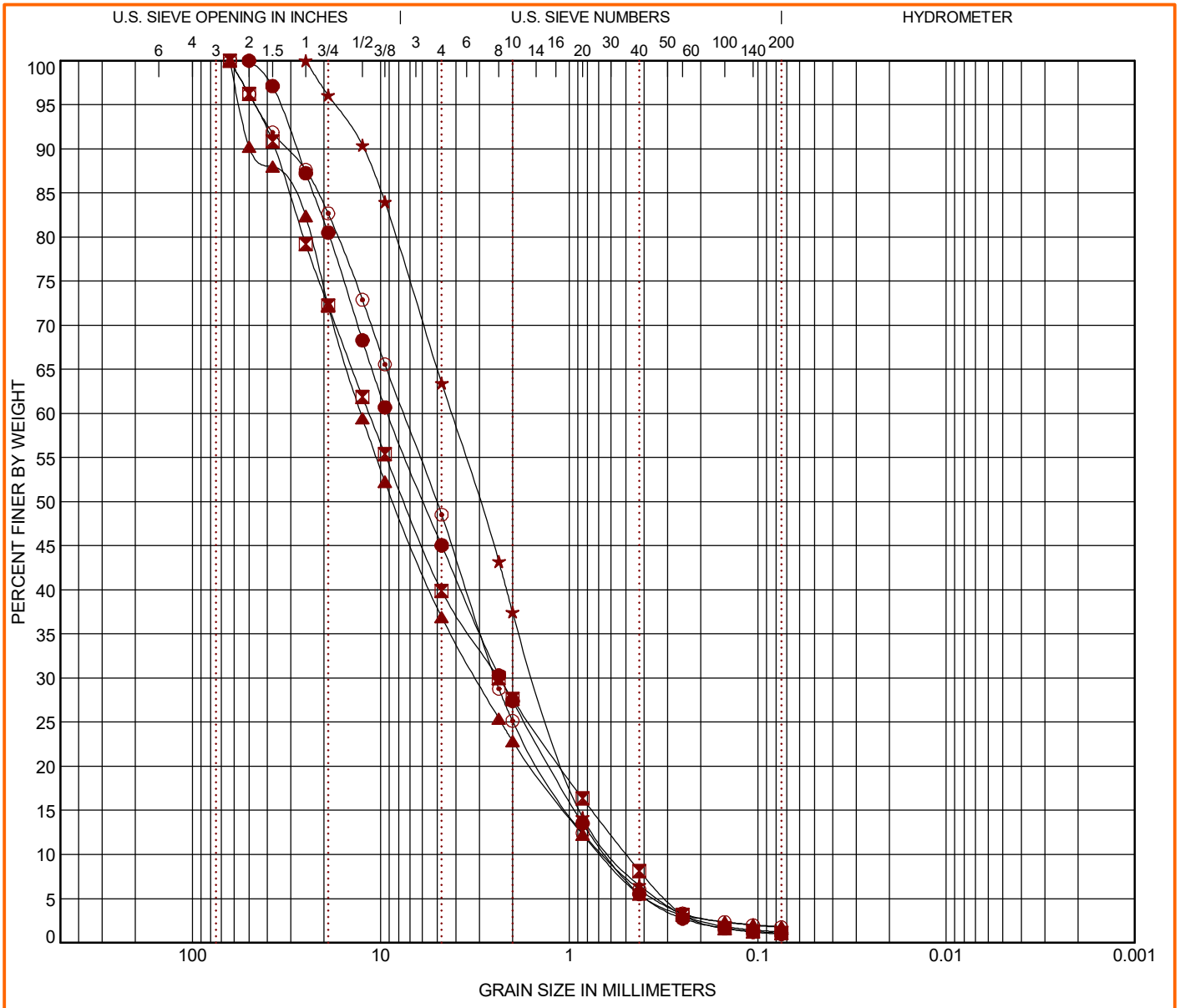
- First Water Observation
- Second Water Observation
- Third Water Observation

Groundwater levels are temporal. The levels shown are representative of the date and time of our exploration. Significant changes are possible over time.
Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project.
Numbers adjacent to soil column indicate depth below ground surface.

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID		Depth	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	TP-03	8	SANDY GRAVEL	4				0.93	14.71
⊠	TP-04	4.5	SANDY GRAVEL	4				0.97	23.24
▲	TP-05	2	SANDY GRAVEL	3				1.14	18.87
★	TP-06	5	POORLY GRADED SAND with GRAVEL	5				0.94	7.23
⊙	TP-07	8	SANDY GRAVEL	6				1.22	11.59

Boring ID		Depth	D_{100}	D_{60}	D_{30}	D_{10}		%Gravel	%Sand	%Silt	%Fines	%Clay
●	TP-03	8	50	9.211	2.319	0.626		55.0	44.1		1.0	
⊠	TP-04	4.5	63	11.548	2.362	0.497		60.1	38.8		1.1	
▲	TP-05	2	63	12.724	3.121	0.674		63.1	35.1		1.8	
★	TP-06	5	25	4.216	1.519	0.583		36.6	62.2		1.2	
⊙	TP-07	8	63	7.575	2.463	0.654		51.5	46.8		1.7	

PROJECT: Love's - Easton

SITE: W Sparks Road and I-90
Easton, WA

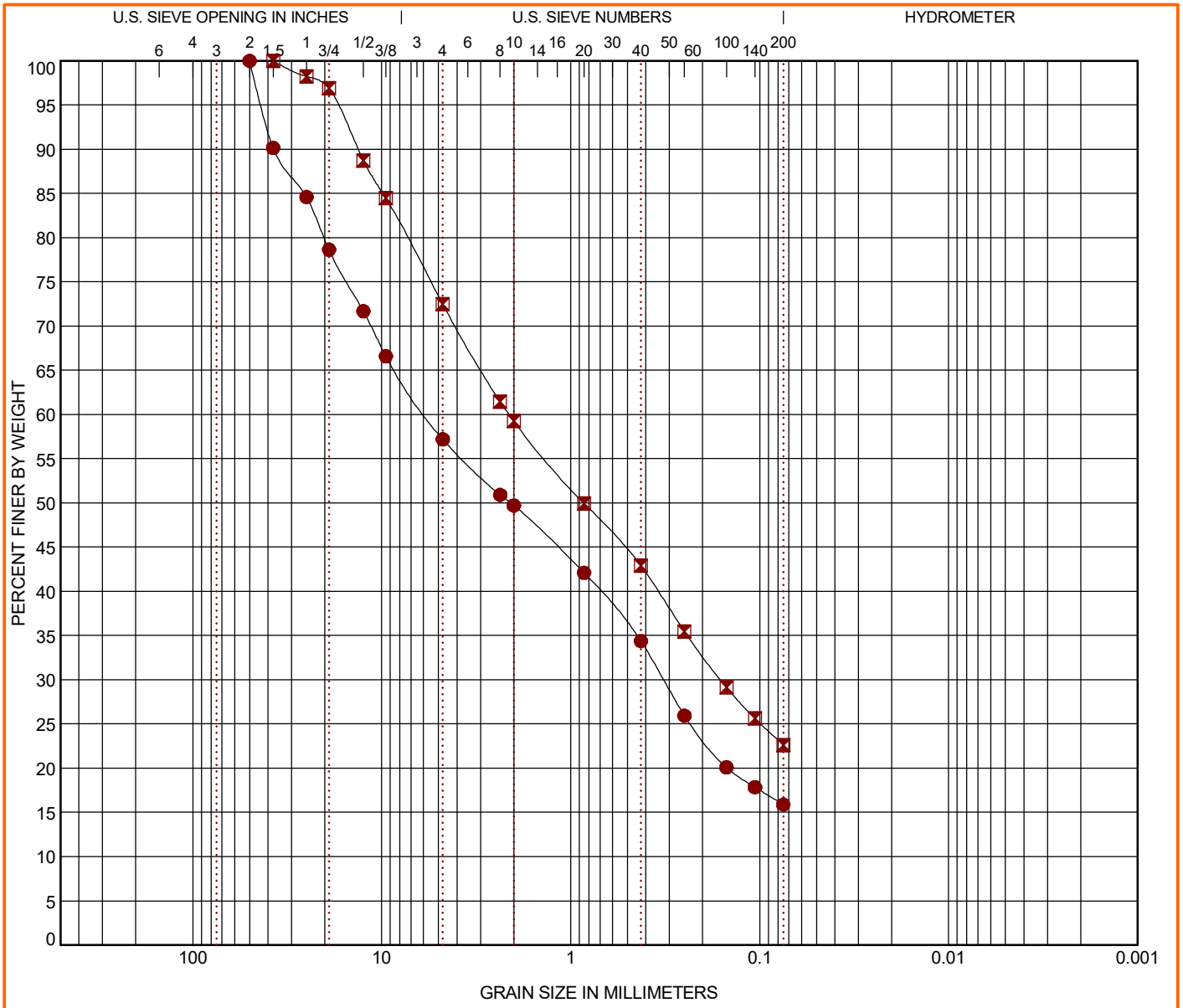
Terracon
21905 64th Ave W, Ste 100
Mountlake Terrace, WA

PROJECT NUMBER: 81195078

CLIENT: Love's Travel Stops & Country Stores Inc
Oklahoma City, OK

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID		Depth	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	TP-04	1	SILTY SANDY GRAVEL	10					
⊠	TP-07	1.5	SILTY GRAVELLY SAND	16					

Boring ID		Depth	D_{100}	D_{60}	D_{30}	D_{10}		%Gravel	%Sand	%Silt	%Fines	%Clay
●	TP-04	1	50	5.842	0.323			42.8	41.3		15.9	
⊠	TP-07	1.5	37.5	2.116	0.161			27.5	49.8		22.6	

PROJECT: Love's - Easton

SITE: W Sparks Road and I-90
Easton, WA

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21905 64th Ave W, Ste 100
Mountlake Terrace, WA

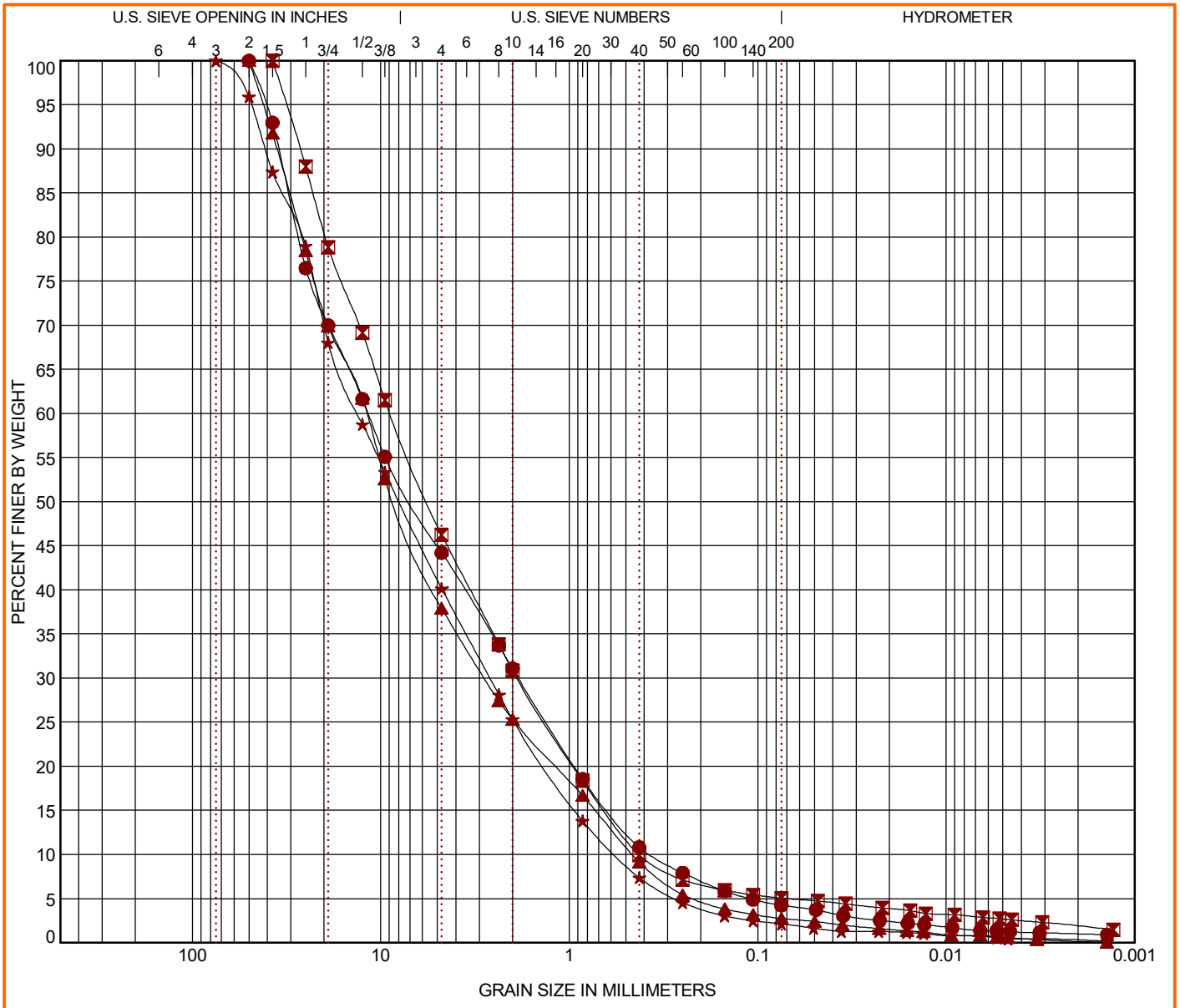
PROJECT NUMBER: 81195078

CLIENT: Love's Travel Stops & Country Stores Inc
Oklahoma City, OK

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 81195078 LOVES - EASTON.GPJ TERRACON_DATATEMPLATE.GDT 7/9/19

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID		Depth	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	TP-18	4	SANDY GRAVEL	4				0.81	31.85
⊠	TP-18	8	SANDY GRAVEL	7				0.94	20.81
▲	TP-19	4	SANDY GRAVEL	4				1.44	25.79
★	TP-19	8	SANDY GRAVEL	5				0.93	23.41

Boring ID		Depth	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	TP-18	4	50	11.676	1.858	0.367	0.0	55.8	40.0	2.9		1.3
⊠	TP-18	8	37.5	8.873	1.886	0.426	0.0	53.8	41.2	2.4		2.7
▲	TP-19	4	50	11.871	2.804	0.46	0.0	62.1	35.1	2.1		0.6
★	TP-19	8	75	13.214	2.633	0.564	0.0	59.8	38.0	1.6		0.5

PROJECT: Love's - Easton

SITE: W Sparks Road and I-90
Easton, WA

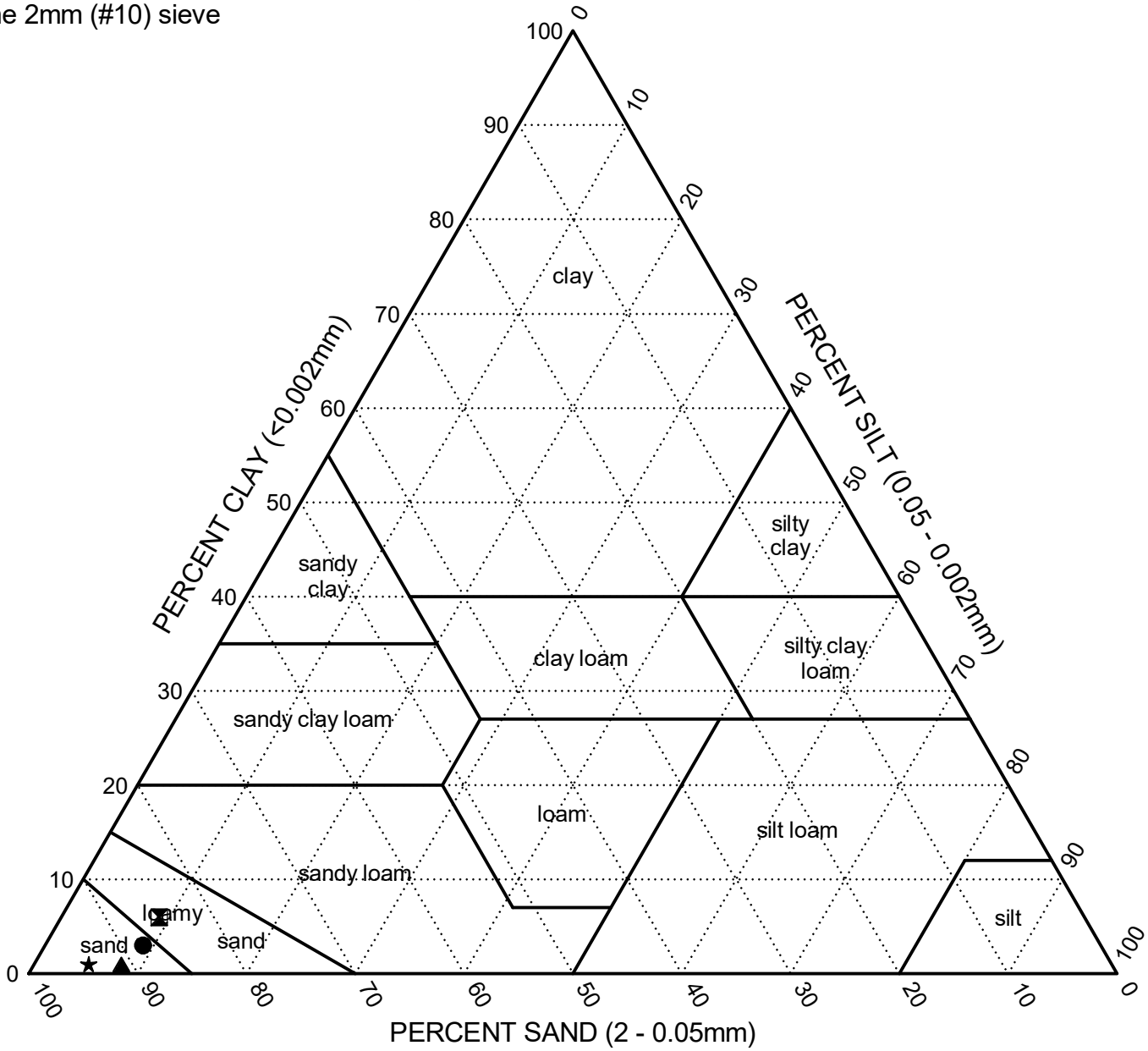
Terracon
21905 64th Ave W, Ste 100
Mountlake Terrace, WA

PROJECT NUMBER: 81195078

CLIENT: Love's Travel Stops & Country Stores Inc
Oklahoma City, OK

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 81195078 LOVES - EASTON.GPJ TERRACON_DATATEMPLATE.GDT 7/9/19

Fractions normalized to 100% passing the 2mm (#10) sieve



	Borehole	Depth (ft)	USDA Classification	Sand (%)	Silt (%)	Clay (%)
●	**TP-18**	**4**	**SAND**	**88.0**	**8.8**	**3.2**
⊠	**TP-18**	**8**	**LOAMY SAND**	**84.6**	**9.3**	**6.1**
▲	**TP-19**	**4**	**SAND**	**90.5**	**8.8**	**0.6**
★	**TP-19**	**8**	**SAND**	**93.6**	**5.4**	**1.1**

PROJECT: Love's - Easton

SITE: W Sparks Road and I-90
Easton, WA

Terracon
21905 64th Ave W, Ste 100
Mountlake Terrace, WA

PROJECT NUMBER: 81195078

CLIENT: Love's Travel Stops & Country Stores Inc
Oklahoma City, OK

HWA GeoSciences Inc.
Geotechnical & Pavement Engineering • Hydrogeology • Geoenvironmental • Inspection & Testing

July 17, 2019
HWA Project No. 2012-045-23 Task 10

Terracon Consultants, Inc.
21905 64th Avenue West, Suite 100
Mountlake Terrace, WA 98043

Attention: Ms. Kristen McFarland

Subject: **Materials Laboratory Report**
Soil Index, Compaction and CBR Testing
Love's Easton
Client Project No. 81195078

Dear Ms. McFarland;

In accordance with your request, HWA GeoSciences Inc. (HWA) performed laboratory testing for the above referenced project. Herein we present the results of our laboratory analyses, which are summarized on the attached Figures. The laboratory testing program was performed in general accordance with your instructions and appropriate ASTM Standards as outlined below.

SAMPLE DESCRIPTION: Six bulk samples were delivered to our laboratory on June 26, 2019 by Terracon personnel. TP-9, TP-11, and TP-12 were combined to create a composite sample which the laboratory designated S-1. TP-14, TP-15 and TP-16 were combined to create a second composite sample designated S-2. The composite samples were classified for engineering purposes and the descriptions may be found on the attached Figures.

MOISTURE CONTENT OF SOIL: The moisture content of the soil samples (percent by dry mass) was determined in general accordance with ASTM D 2216. The results are shown on the attached Figures.

PARTICLE SIZE ANALYSIS OF SOILS: The composite samples were tested to determine the particle distribution of material in general accordance with ASTM D 6913. The results are summarized on the attached Particle Size Distribution Report, Figure 1, which also provides information regarding the classification of the sample.

LABORATORY COMPACTION CHARACTERISTICS OF SOIL (PROCTOR TEST): The composite samples were tested using method ASTM D 1557 (Modified Proctor) Method C. The test was performed on the portion of the sample passing ¾", as required by the test procedure. The maximum dry density and optimum moisture content result have been corrected for the amount of over-sized material using method ASTM D 4718. The test results are summarized on the attached Moisture Density Relationship Test Report, Figures 2-3.

21312 30th Drive SE
Suite 110
Bothell, WA 98021-7010
Tel: 425.774.0106
Fax: 425.774.2714
www.hwageo.com

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOILS: The samples were tested in general accordance with method ASTM D 1883. The samples were conditioned to optimum moisture content as determined by ASTM D 1557 and then compacted into molds for testing. Three specimens of differing compactive effort were remolded for each sample. The first specimen was compacted using 56 blows per layer, the second specimen using 25 blows per layer, and the third specimen using 10 blows per layer. The test results are summarized on the attached CBR of Lab Compacted Soils report, Figures 4 and 5.

CLOSURE: Experience has shown that test values on soil and other natural materials vary with each representative sample. As such, HWA has no knowledge as to the extent and quantity of material the tested samples may represent. HWA also makes no warranty as to how representative either the samples tested or the test results obtained are to actual field conditions. It is a well-established fact that sampling methods present varying degrees of disturbance that affect sample representativeness.

No copy should be made of this report except in its entirety.

We appreciate the opportunity to provide laboratory testing services on this project. Should you have any questions or comments, or if we may be of further service, please call.

HWA GEOSCIENCES INC.

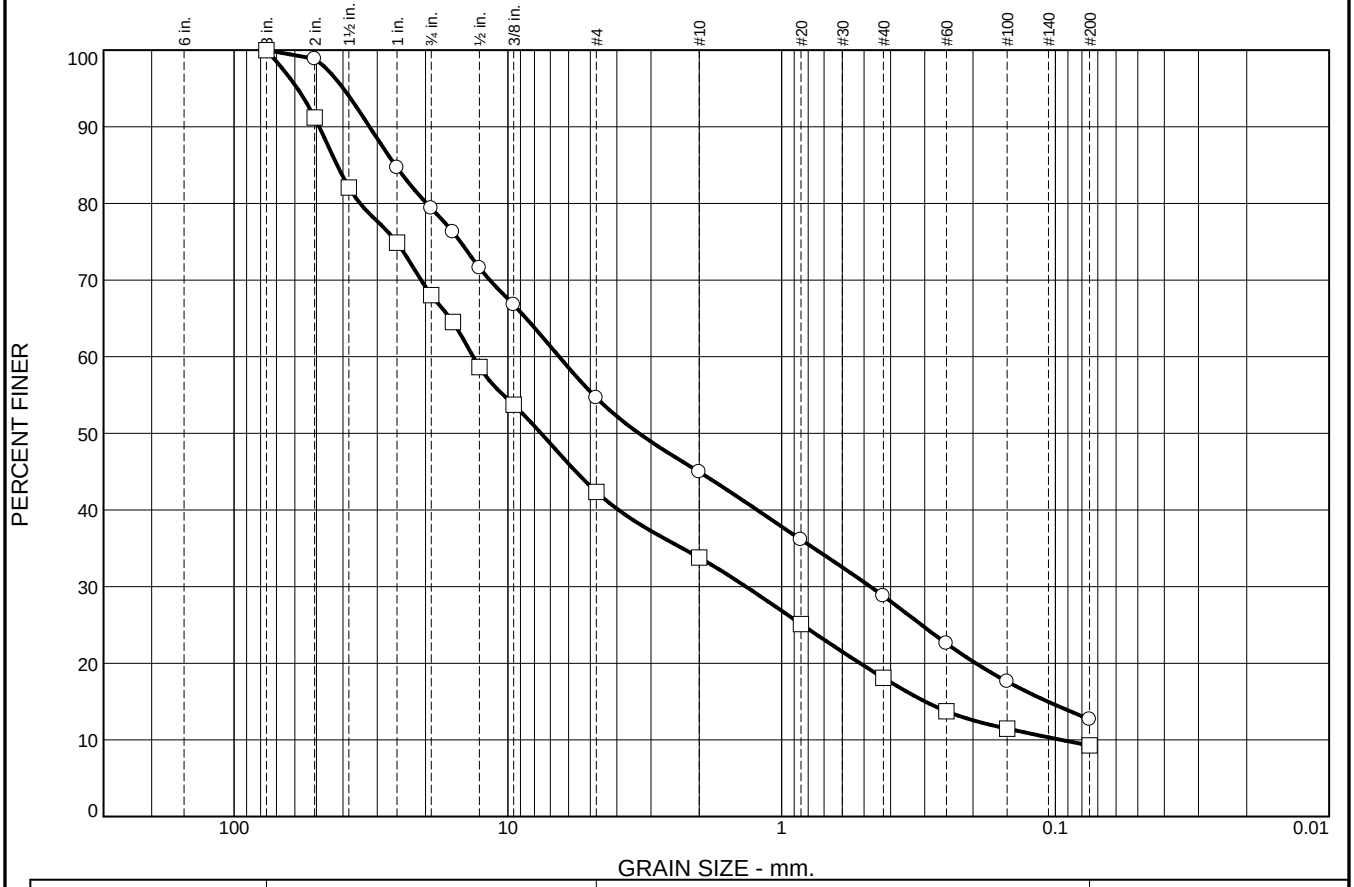
Daniel Walton
Materials Laboratory Supervisor

Steven E. Greene, L.G., L.E.G.
Vice-President

Attachments:

Figure 1	Particle Size Distribution Report
Figures 2-3	Moisture Density Relationship Test Report
Figures 4-5	CBR of Lab Compacted Soils

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	Silt
○	0	21	24	10	16	16	13
□	0	32	26	8	16	9	9

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			25.7920	6.4961	3.3204	0.4738	0.1065			
□			42.0571	13.3890	7.5595	1.3498	0.2987	0.0950	1.43	140.93

Material Description	USCS	AASHTO
○ Strong brown, silty GRAVEL with sand	GM	
□ Strong brown, well-graded GRAVEL with silt and sand	GW-GM	

Project No. 2012-045 **Client:** Terracon

Project: Love's Easton

Remarks:

○ **Source:** TP-9,-11,-12 Composite Sample **Depth:** 1.5 - 3.0 **Sample No.:** S-1

□ **Source:** TP-14,-15,-16 Composite Sample **Depth:** 2.5-3.0 **Sample No.:** S-2

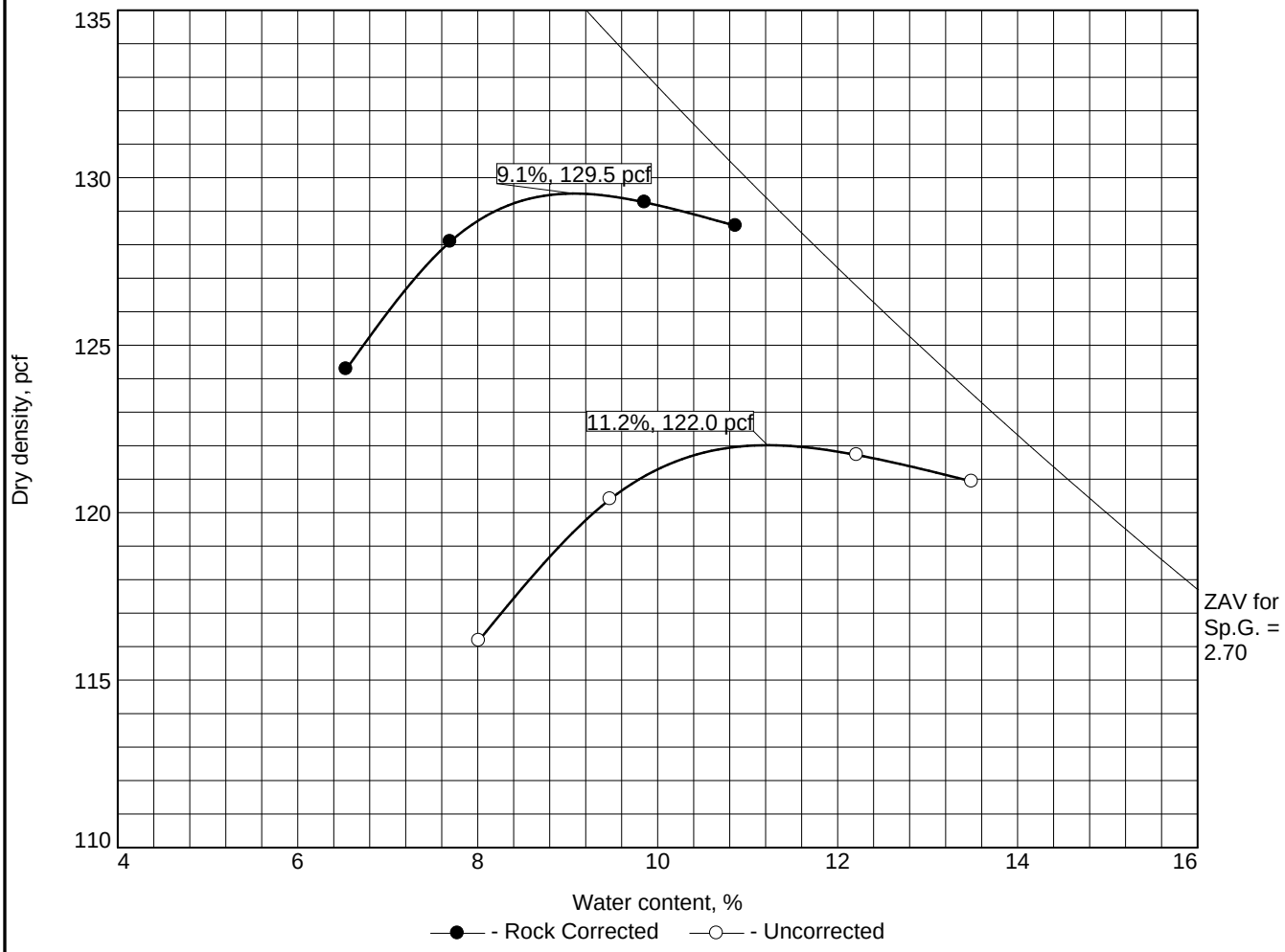
HWA GeoSciences Inc.

A Minority & Women Owned Business Federal and State Certified DBE/MWBE

Figure 1

Tested By: JP **Checked By:** SEG

MOISTURE DENSITY RELATIONSHIP TEST REPORT



Test specification: ASTM D 1557-12 Method C Modified
ASTM D4718-15 Oversize Corr. Applied to Each Test Point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/4 in.	% < No.200
	USCS	AASHTO						
1.5 - 3.0	GM		9.2	2.7			21	13

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 129.5 pcf	122.0 pcf	Strong brown, silty GRAVEL with sand
Optimum moisture = 9.1 %	11.2 %	

Project No. 2012-045 **Client:** Terracon
Project: Love's Easton

○**Source of Sample:** TP-9,-11,-12 Composite Sample **Sample Number:** S-1

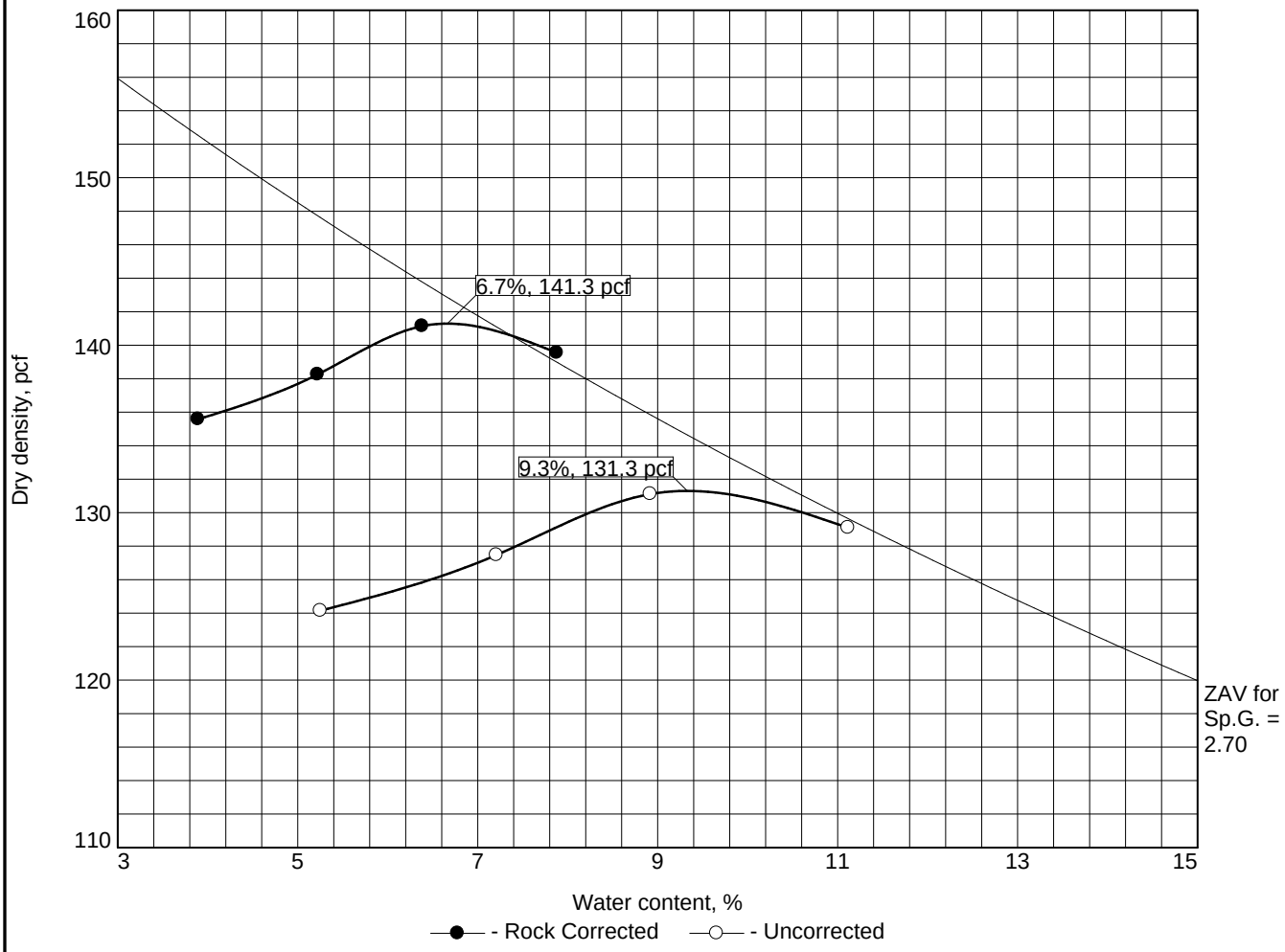
Remarks:
Specific Gravity Assumed

HWA GeoSciences Inc.
A Minority & Women Owned Business
Federal and State Certified DBE/MWBE

Figure 2

Tested By: DM **Checked By:** SEG

MOISTURE DENSITY RELATIONSHIP TEST REPORT



Test specification: ASTM D 1557-12 Method C Modified
ASTM D4718-15 Oversize Corr. Applied to Each Test Point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/4 in.	% < No.200
	USCS	AASHTO						
2.5-3.0	GW-GM		9.6	2.65			32	9.3

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 141.3 pcf	131.3 pcf	Strong brown, well-graded GRAVEL with silt and sand
Optimum moisture = 6.7 %	9.3 %	

Project No. 2012-045 **Client:** Terracon
Project: Love's Easton

○**Source of Sample:** TP-14,-15,-16 Composite Sample **Sample Number:** S-2

HWA GEOSCIENCES INC.
A Minority & Women Owned Business
Federal and State Certified DBE/MWBE

Remarks:
Specific Gravity Assumed

Figure 3

Tested By: JP **Checked By:** SEG

CBR (California Bearing Ratio) OF LAB COMPACTED SOILS
(ASTM D 1883)

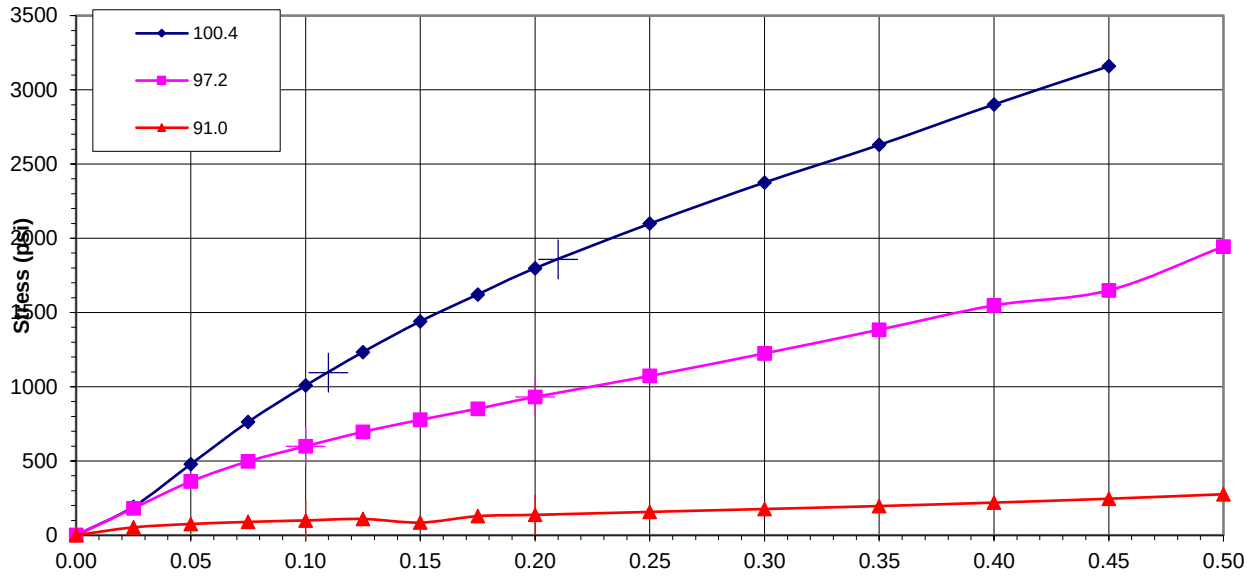
HWA GEOSCIENCES INC.

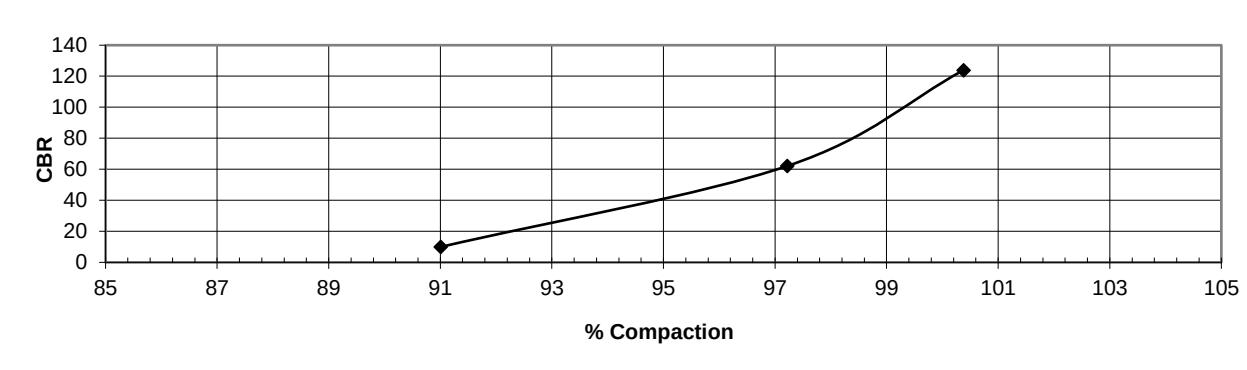
CLIENT: ***Terracon***
PROJECT: ***Love's Easton*** **SAMPLE ID:** ***S-1***
PROJECT NO: ***2012-045 T10*** Sampled By: *Client* Tested By: *DW*
Date Sampled: *NA* Date Received: *6/26/2019* Date Tested: *7/12/2019*

Material Description: *Strong brown, silty GRAVEL with sand (GM)*
Sample Location: *TP-9, TP-11, TP-12 Composite Sample*

Compaction Standard: [ ] D698 [X] D1557 Condition: [X] Soaked for 96 hrs [ ] Unsoaked
Max. Dry Density: *122* pcf @ *11.2* % M.C. with *21* % scalped-off on the 3/4" sieve

	Trial 1	Trial 2	Trial 3
Dry Density (pcf)	**122.5**	**118.6**	**111.0**
Percent Compaction	**100.4**	**97.2**	**91.0**
Moisture before Compaction (%)	**11.3**	**11.3**	**11.3**
Moisture after Compaction (%)	**11.3**	**11.3**	**11.3**
Percent Swell (initial ht = 7")	**0.0**	**0.0**	**0.0**
Moisture, after Soaking (%)	**12.5**	**14.0**	**16.9**
Moisture, Top 1", after Soak (%)	**13.0**	**13.1**	**15.6**
Surcharge Weight (lbs)	**10**	**10**	**10**
CBR at 0.1" Penetration	**109.5**	**60.0**	**10.0**
CBR at 0.2" Penetration	**123.9**	**62.1**	**9.2**
CBR Value	**123.9**	**62.1**	**10.0**





REVIEWED BY: S. Greene FIGURE: 4

CBR (California Bearing Ratio) OF LAB COMPACTED SOILS
(ASTM D 1883)

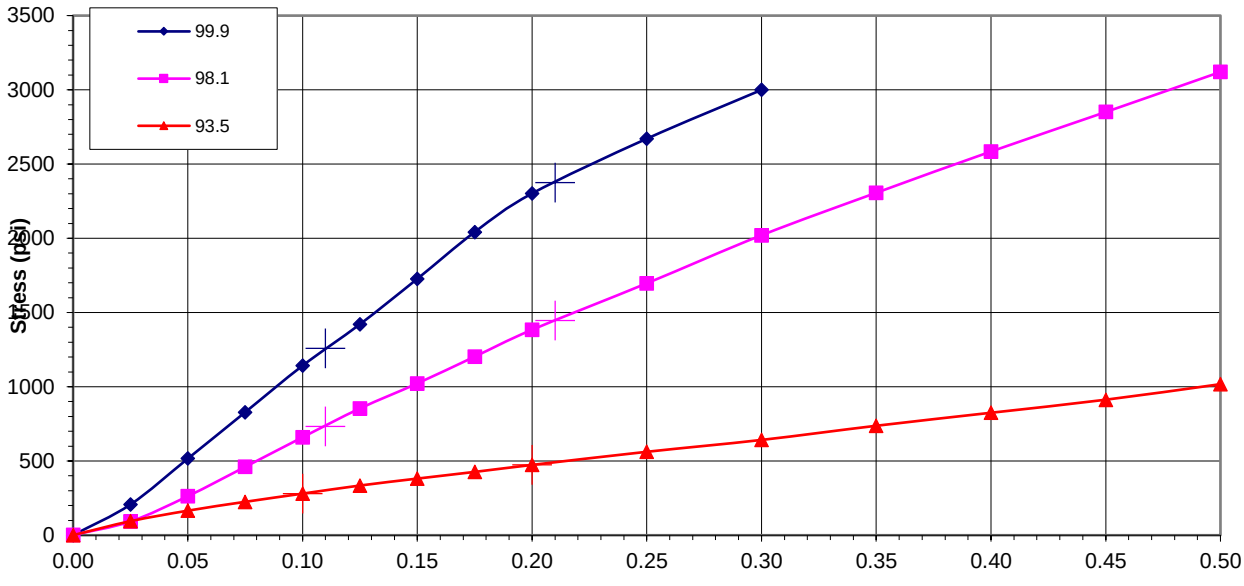
HWA GEOSCIENCES INC.

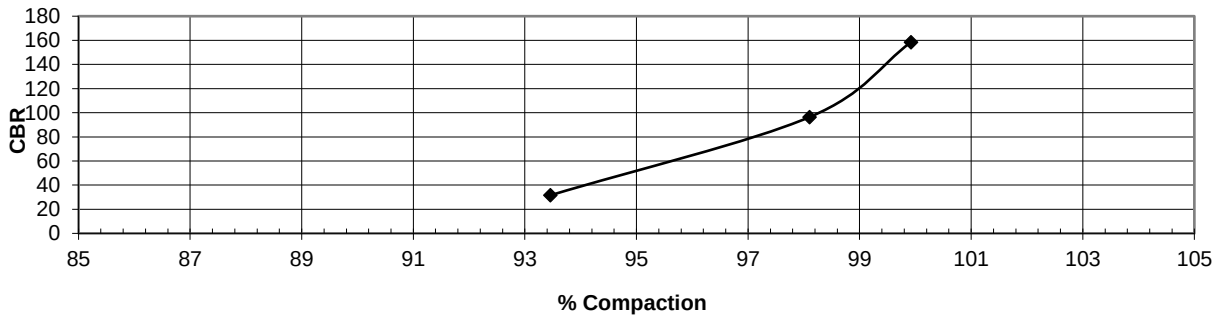
CLIENT: ***Terracon***
PROJECT: ***Love's Easton*** **SAMPLE ID:** ***S-2***
PROJECT NO: ***2012-045 T10*** Sampled By: *Client* Tested By: *DW*
Date Sampled: *NA* Date Received: *6/26/2019* Date Tested: *7/12/2019*

Material Description: *Strong brown, well-graded GRAVEL with silt and sand*
Sample Location: *TP-14, TP-15, TP-16 Composite Sample*

Compaction Standard: [ ] D698 [X] D1557 Condition: [X] Soaked for 96 hrs [ ] Unsoaked
Max. Dry Density: *131.3* pcf @ *9.3* % M.C. with *32* % scalped-off on the 3/4" sieve

	Trial 1	Trial 2	Trial 3
Dry Density (pcf)	**131.2**	**128.8**	**122.7**
Percent Compaction	**99.9**	**98.1**	**93.5**
Moisture before Compaction (%)	**9.5**	**9.5**	**9.5**
Moisture after Compaction (%)	**9.5**	**9.5**	**9.5**
Percent Swell (initial ht = 7")	**0.0**	**0.0**	**0.0**
Moisture, after Soaking (%)	**10.1**	**10.5**	**12.2**
Moisture, Top 1", after Soak (%)	**9.8**	**11.9**	**11.7**
Surcharge Weight (lbs)	**10**	**10**	**10**
CBR at 0.1" Penetration	**125.9**	**73.2**	**28.0**
CBR at 0.2" Penetration	**158.4**	**96.4**	**31.6**
CBR Value	**158.4**	**96.4**	**31.6**





REVIEWED BY: S. Greene FIGURE: 5

Am Test Inc.
13600 NE 126TH PL
Suite C
Kirkland, WA 98034
(425) 885-1664
www.amtestlab.com

Professional Analytical Services

ANALYSIS REPORT

Terracon
10029 S. TACOMA WAY SUITE E2
TACOMA, WA 98499
Attention: KRISTEN MCFARLAND
Project #: 81195078
All results reported on an as received basis.

Date Received: 06/27/19
Date Reported: 7/22/19

AMTEST Identification Number **19-A008799**
Client Identification **TP-1, S-3 DEPTH: 8'**
Sampling Date **06/19/19**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
pH	4.7	unit		1	SW-846 9045D	KW	07/19/19
pH	4.8	unit			AASHTO T 289-91	KW	06/27/19
Resistivity	180000	ohms cm		100	ASTM G-187	JH	07/11/19
Redox Potential	373.	unit		200	ASTM D1498-76	AW	07/01/19
Sulfide	< 5	ug/g		5	SM 4500 S2	JH	07/02/19

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	< 10	ug/g		10	EPA 300.0	AG	07/18/19
Sulfate	12.	ug/g		10	EPA 300.0	AG	07/18/19

Terracon
Project Name:
AmTest ID: 19-A008800

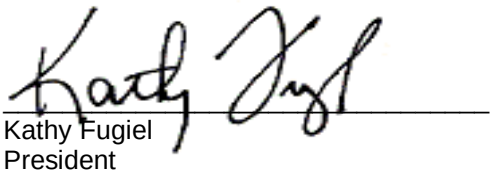
AMTEST Identification Number **19-A008800**
Client Identification **TP-2, S-4 DEPTH: 10'**
Sampling Date **06/19/19**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
pH	4.7	unit		1	SW-846 9045D	KW	07/19/19
pH	4.4	unit			AASHTO T 289-91	KW	06/27/19
Resistivity	120000	ohms cm		100	ASTM G-187	JH	07/11/19
Redox Potential	388.	unit		200	ASTM D1498-76	AW	07/01/19
Sulfide	< 5	ug/g		5	SM 4500 S2	JH	07/02/19

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	< 10	ug/g		10	EPA 300.0	AG	07/18/19
Sulfate	< 10	ug/g		10	EPA 300.0	AG	07/18/19



Kathy Fugiel
President

SUPPORTING INFORMATION

Contents:

Note: All attachments are one page unless noted above.

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

Love's - Easton ■ Easton, WA

Terracon Project No. 81195078

SAMPLING	WATER LEVEL	FIELD TESTS
 Grab Sample	**Water Initially Encountered** **Water Level After a Specified Period of Time** **Water Level After a Specified Period of Time** Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.	**N** Standard Penetration Test Resistance (Blows/Ft.) **(HP)** Hand Penetrometer **(T)** Torvane **(DCP)** Dynamic Cone Penetrometer **UC** Unconfined Compressive Strength **(PID)** Photo-Ionization Detector **(OVA)** Organic Vapor Analyzer

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

LOCATION AND ELEVATION NOTES

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance		CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
Descriptive Term (Density)	**Standard Penetration or N-Value Blows/Ft.**	**Descriptive Term (Consistency)**	**Unconfined Compressive Strength Qu, (tsf)**	**Standard Penetration or N-Value Blows/Ft.**
Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1
Loose	4 - 9	Soft	0.25 to 0.50	2 - 4
Medium Dense	10 - 29	Medium Stiff	0.50 to 1.00	4 - 8
Dense	30 - 50	Stiff	1.00 to 2.00	8 - 15
Very Dense	> 50	Very Stiff	2.00 to 4.00	15 - 30
		Hard	> 4.00	> 30

RELATIVE PROPORTIONS OF SAND AND GRAVEL		RELATIVE PROPORTIONS OF FINES	
Descriptive Term(s) of other constituents	Percent of Dry Weight	**Descriptive Term(s) of other constituents**	**Percent of Dry Weight**
Trace	<15	Trace	<5
With	15-29	With	5-12
Modifier	>30	Modifier	>12

GRAIN SIZE TERMINOLOGY		PLASTICITY DESCRIPTION	
Major Component of Sample	**Particle Size**	**Term**	**Plasticity Index**
Boulders	Over 12 in. (300 mm)	Non-plastic	0
Cobbles	12 in. to 3 in. (300mm to 75mm)	Low	1 - 10
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)	Medium	11 - 30
Sand	#4 to #200 sieve (4.75mm to 0.075mm	High	> 30
Silt or Clay	Passing #200 sieve (0.075mm)		

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]					Soil Classification	
					Group Symbol	Group Name [B]
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	Cu ≥ 4 and 1 ≤ Cc ≤ 3 [E]		GW	Well-graded gravel [F]
			Cu < 4 and/or [Cc<1 or Cc>3.0] [E]		GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH		GM	Silty gravel [F, G, H]
			Fines classify as CL or CH		GC	Clayey gravel [F, G, H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	Cu ≥ 6 and 1 ≤ Cc ≤ 3 [E]		SW	Well-graded sand [I]
			Cu < 6 and/or [Cc<1 or Cc>3.0] [E]		SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH		SM	Silty sand [G, H, I]
			Fines classify as CL or CH		SC	Clayey sand [G, H, I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots on or above "A"		CL	Lean clay [K, L, M]
			PI < 4 or plots below "A" line [J]		ML	Silt [K, L, M]
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay [K, L, M, N]
			Liquid limit - not dried			Organic silt [K, L, M, O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line		CH	Fat clay [K, L, M]
			PI plots below "A" line		MH	Elastic Silt [K, L, M]
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay [K, L, M, P]
			Liquid limit - not dried			Organic silt [K, L, M, Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor				PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve.

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

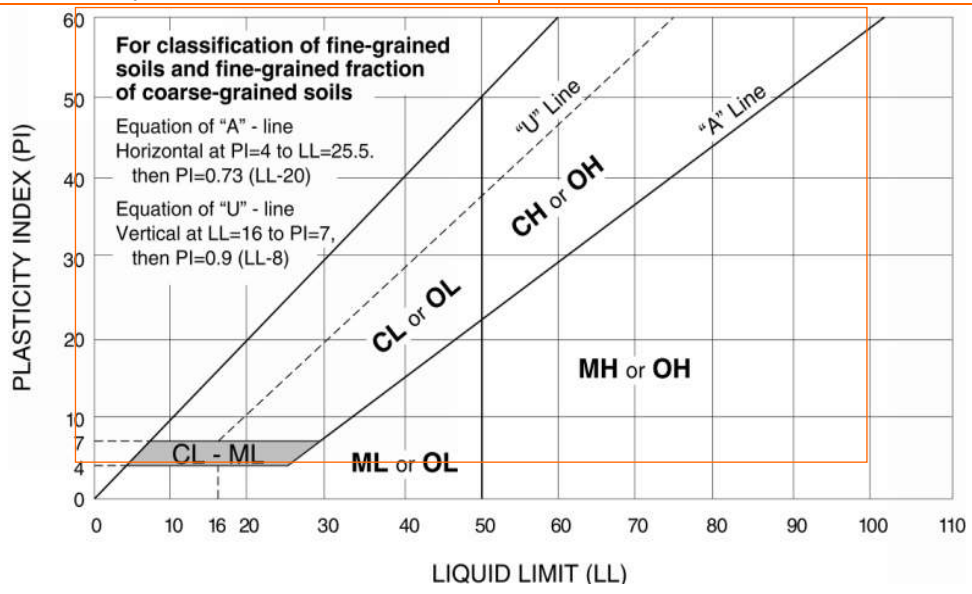
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

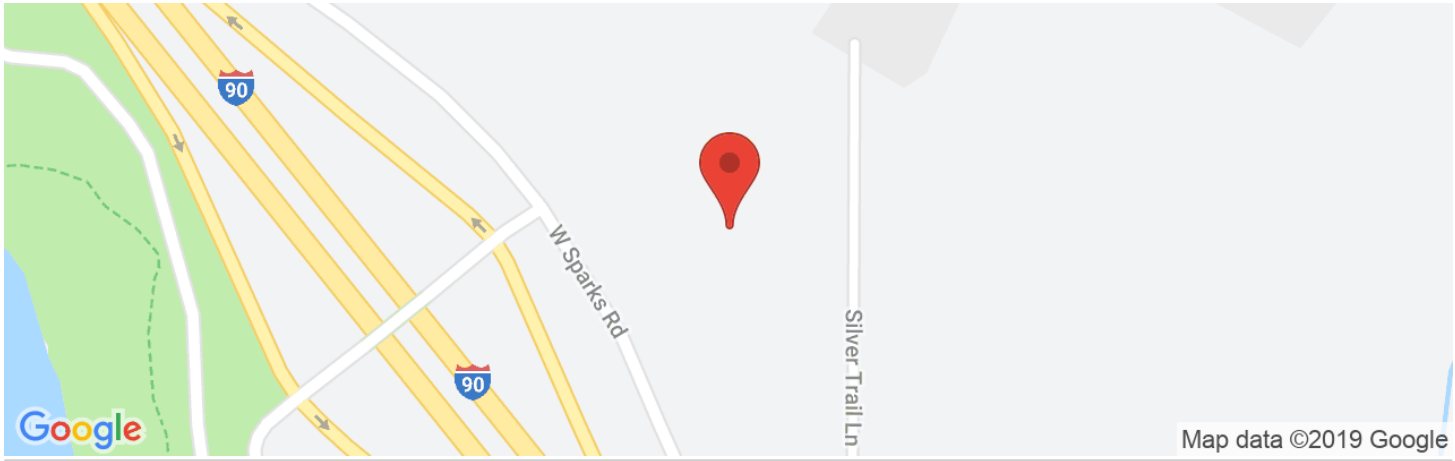
[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.



OSHPD

Latitude, Longitude: 47.250656, -121.186575

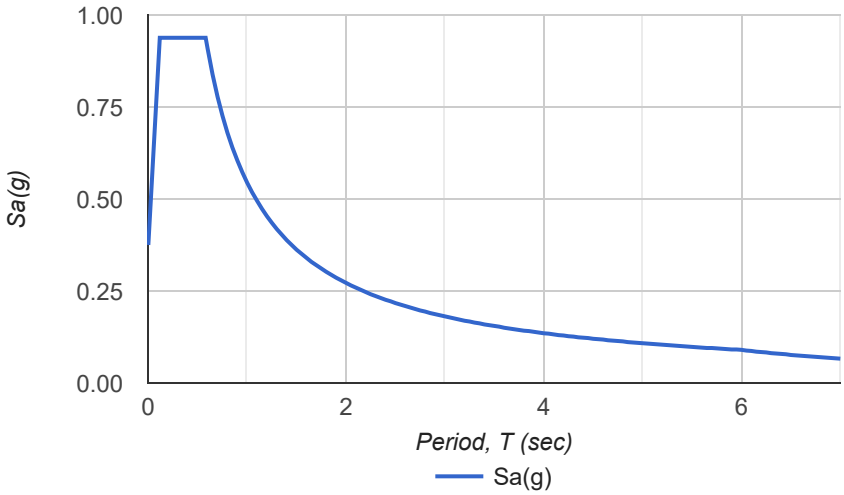


Date	7/17/2019, 12:10:20 PM
Design Code Reference Document	ASCE7-10
Risk Category	II
Site Class	D - Stiff Soil

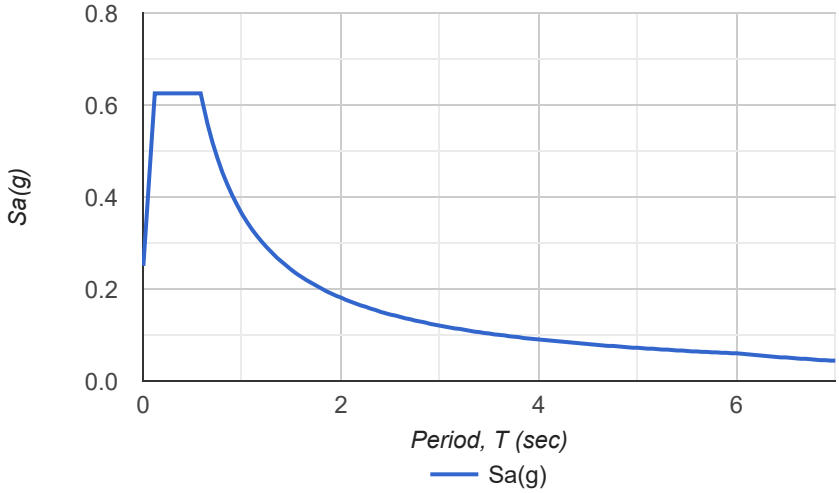
Type	Value	Description
S_S	0.795	MCE_R ground motion. (for 0.2 second period)
S_1	0.304	MCE_R ground motion. (for 1.0s period)
S_{MS}	0.939	Site-modified spectral acceleration value
S_{M1}	0.545	Site-modified spectral acceleration value
S_{DS}	0.626	Numeric seismic design value at 0.2 second SA
S_{D1}	0.363	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	D	Seismic design category
F_a	1.182	Site amplification factor at 0.2 second
F_v	1.791	Site amplification factor at 1.0 second
PGA	0.321	MCE_G peak ground acceleration
F_{PGA}	1.179	Site amplification factor at PGA
PGA_M	0.378	Site modified peak ground acceleration
T_L	6	Long-period transition period in seconds
SsRT	0.795	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	0.817	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
S1RT	0.304	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.322	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.6	Factored deterministic acceleration value. (1.0 second)
PGAd	0.5	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.973	Mapped value of the risk coefficient at short periods
C_{R1}	0.945	Mapped value of the risk coefficient at a period of 1 s

MCER Response Spectrum



Design Response Spectrum



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APPENDIX 6

CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

Construction Stormwater General Permit (CSWGP)

Stormwater Pollution Prevention Plan (SWPPP)

for

Easton, WA Love's Travel Stops Development

Prepared for:
Department of Ecology
Central Region

Permittee / Owner	Developer	Operator / Contractor
T.B.D.	Love's Travel Stops	T.B.D.

Intersection of Sparks Road & Lake Easton Road
Easton, WA 98925

Certified Erosion and Sediment Control Lead (CESCL)

Name	Organization	Contact Phone Number
T.B.D.	T.B.D.	T.B.D.

SWPPP Prepared By

Name	Organization	Contact Phone Number
Zach Severs	SCJ Alliance	(360) 669-0700

SWPPP Preparation Date

September 10, 2019

Project Construction Dates

Activity / Phase	Start Date	End Date
Commercial Construction	T.B.D.	T.B.D.

List of Acronyms and Abbreviations

Acronym / Abbreviation	Explanation
303(d)	Section of the Clean Water Act pertaining to Impaired Waterbodies
BFO	Bellingham Field Office of the Department of Ecology
BMP(s)	Best Management Practice(s)
CESCL	Certified Erosion and Sediment Control Lead
CO_2	Carbon Dioxide
CRO	Central Regional Office of the Department of Ecology
CSWGP	Construction Stormwater General Permit
CWA	Clean Water Act
DMR	Discharge Monitoring Report
DO	Dissolved Oxygen
Ecology	Washington State Department of Ecology
EPA	United States Environmental Protection Agency
ERO	Eastern Regional Office of the Department of Ecology
ERTS	Environmental Report Tracking System
ESC	Erosion and Sediment Control
GULD	General Use Level Designation
NPDES	National Pollutant Discharge Elimination System
NTU	Nephelometric Turbidity Units
NWRO	Northwest Regional Office of the Department of Ecology
pH	Power of Hydrogen
RCW	Revised Code of Washington
SPCC	Spill Prevention, Control, and Countermeasure
su	Standard Units
SWMMEW	Stormwater Management Manual for Eastern Washington
SWMMWW	Stormwater Management Manual for Western Washington
SWPPP	Stormwater Pollution Prevention Plan
TESC	Temporary Erosion and Sediment Control
SWRO	Southwest Regional Office of the Department of Ecology
TMDL	Total Maximum Daily Load
VFO	Vancouver Field Office of the Department of Ecology
WAC	Washington Administrative Code
WSDOT	Washington Department of Transportation
WWHM	Western Washington Hydrology Model

Project Information (1.0)

Project/Site Name: Moses Lake, WA Love's Travel Stops Development Project
Street/Location: Intersection of Sparks Road and Lake Easton Road
City: Easton
State: WA
Zip code: 98925
Subdivision: N/A
Receiving waterbody: Lake Easton/Yakima River

Existing Conditions (1.1)

Total acreage (including support activities such as off-site equipment staging yards, material storage areas, borrow areas).

Total acreage: 17.14 acres

Disturbed acreage: ±15.5 acres

Existing structures: N/A

Landscape topography: Vacant, undeveloped and gently sloping towards the southwest

Drainage patterns: Collection and on-site infiltration

Existing Vegetation: Trees throughout the site with some shrubs and prairie grasses

Table 1 includes a list of suspected and/or known contaminants associated with the construction activity.

Table 1 – Summary of Site Pollutant Constituents

Pollutant (and source, if applicable)
Benzene
Gasoline
Diesel

Proposed Construction Activities / Project Narrative (1.2)

The proposed commercial redevelopment project is located at the intersection of Sparks Road and Lake Easton Road, Easton, WA 98925. Specifically, the proposed site improvements / construction activities include the following:

- Site preparation, grading, and erosion control activities
- Construction of new convenience store with attached restaurant & petroleum filling stations
- Construction of an asphalt parking lot northeast of Sparks Road
- Construction of Large On-Site Septic System (LOSS)
- Construction/installation of stormwater facilities and extension/reconnection of available utilities

The construction activities are not expected to encounter groundwater and/or contaminated soils. In the event that the construction activities do encounter groundwater and/or contaminated soils, the following will be implemented:

Encountered contaminated soils from excavation activities for the excavation for building footings, driving surfaces, and installation of proposed utilities will be excavated for off-site disposal; re-use of contaminated soils is not allowed. Soil disposal shall be removed by an approved contractor permitted to recycle or dispose of soils in Kittitas County. Contact Kittitas County Solid Waste for approved contractors.

Encountered groundwater and construction stormwater that is removed from the proposed construction activity area will be discharged (via gravity or pumped) into the existing on-site storm drain catch basin (with installed silt sock inlet protection, BMP C220) or into a sediment trap (BMP C240), that will discharges into an private on-site detention pond. Once the proposed storm system is installed, groundwater and construction stormwater can discharge into this system with approved BMP's installed.

"Track-out" is an illicit discharge. To prevent truck "track-out," quarry spall construction entrances will be installed at the construction entrance for both project sites. Brooming of tires, wheel washing, etc. may be required to prevent "track-out." Silt fencing will be installed along the perimeter of both project sites. The bottom of the silt fencing shall be lined with plastic lining to prevent filtration through the silt fencing on the south site.

Contingency Planning

In the event that the previously described construction stormwater strategies or following BMPs fail to satisfy the permit requirements, additional measures shall be taken. Additional measures may include auxiliary treatment facilities, retention or impoundment of untreated wastes, stopping production, or transport of untreated wastes to another treatment facility. Contact Department of Ecology's Central Regional Office in Union Gap at (509) 575-2490.

Construction Stormwater Best Management Practices (BMPs) (2.0)

The purpose of a Construction Stormwater Pollution Prevention Plan (SWPPP) is to describe the potential for pollution problems during the duration of a construction project. The SWPPP also explains and illustrates the measures that may need to be taken on the construction site to control said problems. The SWPPP is a guideline for the Contractor to follow during the construction process to prevent erosion and migration of sediments. Erosion control measures are not limited to those that are identified in this SWPPP or on the temporary erosion and sediment control plans. Construction Best Management Practices (BMPs) shall be installed as necessary to meet the Department of Ecology's guidelines for construction stormwater pollution prevention and the requirements that are set forth in the National Pollutant Discharge Elimination System (NPDES) Permit.

This SWPPP was prepared in accordance to the established guidelines and BMPs that are set forth in *Volume* 2 *of the 2019 Department of Ecology Stormwater Management Manual for Eastern Washington (SWMMEW)*. The *SWMMEW* describes the twelve (12) elements of construction stormwater pollution prevention. The twelve (12) elements include the following:

- Element 1 – Mark Clearing Limits
- Element 2 – Establish Construction Access
- Element 3 – Control Flow Rates
- Element 4 – Install Sediment Controls
- Element 5 – Stabilize Soils
- Element 6 – Protect Slopes
- Element 7 – Protect Drain Inlets
- Element 8 – Stabilize Channels and Outlets
- Element 9 – Control Pollutants
- Element 10 – Control Dewatering
- Element 11 – Maintain BMPs
- Element 12 – Manage the Project
- Element 13 – Protection of Low Impact Development BMPs

The SWPPP is a living document reflecting current conditions and changes throughout the life of the project. These changes may be informal (i.e. hand-written notes and deletions). Update the SWPPP when the CESCL has noted a deficiency in BMPs or deviation from original design.

The 13 Elements (2.1)

Element 1: Preserve Vegetation / Mark Clearing Limits (2.1.1)

Prior to beginning land disturbing activities, which include site clearing and grading, the Contractor shall mark the clearing limits (including trees) that are to be preserved within the construction zone. High-visibility fences shall be installed/erected as shown on the temporary erosion and sediment control plan and in accordance with the landscaping plan. The following BMPs are applicable for this project. If the following BMPs are not shown on the construction plan set, the Engineer reserves the right to direct the Contractor to install, construct, and/or implement said BMPs.

- BMP C101: Preserving Natural Vegetation
- BMP C103: High-Visibility Plastic or Metal Fence with Backup Support
- BMP C104: Stake and Wire Fence

Element 2: Establish Construction Access (2.1.2)

A stabilized construction entrance shall be constructed to minimize the tracking of sediment onto any public road. The stabilized construction entrance shall be constructed per the TESC plans and details and in accordance with the requirements of BMP C105.

- BMP C105: Stabilized Construction Entrance

Element 3: Control Flow Rates (2.1.3)

Properties and waterways downstream from the development site shall be protected from erosion due to increases in the volume, velocity, and/or peak flow rates of stormwater runoff from the project site. The following BMPs are applicable for this project. If the following BMPs are not shown on the construction plan set, the Engineer reserves the right to direct the Contractor to install, construct, and/or implement said BMPs.

- BMP C240: Sediment Trap
- BMP C241: Temporary Sediment Pond

Element 4: Install Sediment Controls (2.1.4)

Prior to leaving a construction site or prior to discharging into an infiltration facility, stormwater runoff must pass through a sediment pond or some other appropriate BMP for removal of sediments. Silt fencing and straw bale barriers shall be constructed as shown on the temporary and erosion sediment control plans. The following BMPs are applicable for this project. If the following BMPs are not shown on the construction plan set, the Engineer reserves the right to direct the Contractor to install, construct, and/or implement said BMPs.

- BMP C230: Straw Bale Barrier
- BMP C231: Brush Barrier
- BMP C232: Gravel Filter Berm
- BMP C233: Silt Fence
- BMP C234: Vegetated Filter Strip
- BMP C235: Straw Wattles
- BMP C240: Sediment Trap
- BMP C241: Temporary Sediment Pond
- BMP C251: Construction Stormwater Filtration

Element 5: Stabilize Soils (2.1.5)

All exposed and unworked soils shall be stabilized by application of effective BMPs, which protect the soil from the erosive forces of raindrop impact, flowing water, and from wind erosion. From October 01 through April 30 of each calendar year, no soils shall remain exposed and unworked form more than fife (5) days. From May 01 to September 30 of each calendar year, no soils shall remain exposed and unworked for more than ten (10) days. This condition applies to all on-site soils, whether at final grade or not.

In areas where the on-site soils will remain unworked for more than the aforementioned time duration limits or have reached final grade, seeding and mulching shall be installed in accordance with BMP C120 and C121. Sod shall be installed in accordance with BMP C124 for disturbed areas that require immediate vegetative cover. Dust control shall be used as needed to prevent wind transport of dust from disturbed soil surfaces and in accordance with BMP C140. If the following BMPs are not shown on the construction plan set, the Engineer reserves the right to direct the Contractor to install, construct, and/or implement said BMPs.

- BMP C120: Temporary and Permanent Seeding
- BMP C121: Mulching
- BMP C123: Plastic Covering
- BMP C124: Sodding
- BMP C125: Topsoiling
- BMP C140: Dust Control

West of the Cascade Mountains Crest

Season	Dates	Number of Days Soils Can be Left Exposed
During the Dry Season	May 1 – September 30	7 days
During the Wet Season	October 1 – April 30	2 days

East of the Cascade Mountains Crest, except the Central Basin*

Season	Dates	Number of Days Soils Can be Left Exposed
During the Dry Season	July 1 – September 30	10 days
During the Wet Season	October 1 – June 30	5 days

The Central Basin*, East of the Cascade Mountain Crest

Season	Dates	Number of Days Soils Can be Left Exposed
During the Dry Season	July 1 – September 30	30 days
During the Wet Season	October 1 – June 30	15 days

*Note: The Central Basin is defined as the portions of Eastern Washington with mean annual precipitation of less than 12 inches.

Soils must be stabilized at the end of the shift before a holiday or weekend if needed based on the weather forecast.

Element 6: Protect Slopes (2.1.6)

Slopes shall be constructed in such a manner that will minimize erosion. This shall include, but is not limited to: placing excavated material on the uphill side of trenches, collecting drainage at the top of slopes, etc. If the following BMPs are not shown on the construction plan set, the Engineer reserves the right to direct the Contractor to install, construct, and/or implement said BMPs.

- BMP C200: Interceptor Dike and Swale
- BMP C205: Subsurface Drains
- BMP C206: Level Spreader
- BMP C207: Check Dams

Element 7: Protect Drain Inlets (2.1.7)

All storm drain catch basins/inlets that are in use during construction, as well as all existing structures within the project limits, shall be protected so that stormwater runoff shall not enter any conveyance system without first being filtered or treated to remove sediment from sediment laden runoff. Install storm drain inlet protection devices as shown on the erosion and sediment control plans and in accordance with BMP C220.

- BMP C220: Storm Drain Inlet Protection

Element 8: Stabilize Channels and Outlets (2.1.8)

All temporary on-site conveyance channels shall be constructed and stabilized to prevent erosion. Stabilization that is adequate to prevent erosion of outlets and drainage channels shall be provided. If the following BMPs are not shown on the construction plan set, the Engineer reserves the right to direct the Contractor to install, construct, and/or implement said BMPs.

- BMP C202: Channel Lining
- BMP C209: Outlet Protection

Provide stabilization, including armoring material, adequate to prevent erosion of outlets, adjacent stream banks, slopes, and downstream reaches, will be installed at the outlets of all conveyance systems.

Element 9: Control Pollutants (2.1.9)

The following pollutants are anticipated to be present on-site:

Table 2 – Pollutants

Pollutant (and source, if applicable)
Benzene
Gasoline
Diesel

All pollutants, including waste materials and demolition of debris, that are generated or brought on-site during construction activities shall be handled and disposed of in a manner that does not cause contamination of stormwater. Maintenance and repair of heavy equipment and vehicles involving oil changes, hydraulic system drawdown, solvent and degreasing cleaning operations, fuel tank drawdown and removal, and other activities which may result in discharge or spillage of pollutants to the ground or into stormwater runoff must be conducted using spill prevention measures. Contaminated surfaces shall be cleaned immediately following any discharge or spill incident. Emergency repairs may be performed on-site using temporary plastic placed beneath and, if raining, over the vehicle. Application of agricultural chemicals, including fertilizers and pesticides, shall be conducted in a manner and at application rates that will not result in loss of chemical(s) to stormwater runoff. Manufacturers' recommendations shall be followed for application rates and procedures. The following Source Control BMPs will be prepared/implemented by the Contractor for this project.

- A Spill Prevention Plan
- Maintenance of storm drainage facilities
- Street sweeping at an interval that's prescribed by DOE, the unincorprated city of Easton, and Kittitas County

Concrete trucks must not be washed out onto the ground, or into storm drains, open ditches, streets, or streams. Excess concrete must not be dumped on-site, except in designated concrete washout areas with appropriate BMPs installed.

Element 10: Control Dewatering (2.1.10)

Clean, non-turbid dewatered water, as determined by the Certified Professional in Erosion and Sediment Control, can be discharged to systems tributary to state surface waters, provided the dewatering flow does not cause erosion or flooding to receiving waters.

Highly turbid or otherwise contaminated dewatered water that's from construction equipment operation, clamshell digging, concrete tremie pour, or work inside a cofferdam, shall be handled separately from stormwater at the site. Some disposal options, depending on site constraints, may include:

- Transport off-site in a vehicle, such as a vacuum flush truck, for legal disposal in a manner that does not pollute State waters
- On-site treatment using chemical treatment or other suitable treatment technologies
- Sanitary sewer discharge with local sewer district's approval if there is no other option

Element 11: Maintain BMPs (2.1.11)

All temporary and permanent Erosion and Sediment Control (ESC) BMPs shall be maintained and repaired as needed to ensure continued performance of their intended function.

Maintenance and repair shall be conducted in accordance with each particular BMP specification (see *Volume II of the SWMMWW or Chapter 7 of the SWMMEW*).

Visual monitoring of all BMPs installed at the site will be conducted at least once every calendar week and within 24 hours of any stormwater or non-stormwater discharge from the site. If the site becomes inactive and is temporarily stabilized, the inspection frequency may be reduced to once every calendar month.

All temporary ESC BMPs shall be removed within 30 days after final site stabilization is achieved or after the temporary BMPs are no longer needed.

Trapped sediment shall be stabilized on-site or removed. Disturbed soil resulting from removal of either BMPs or vegetation shall be permanently stabilized.

Additionally, protection must be provided for all BMPs installed for the permanent control of stormwater from sediment and compaction. BMPs that are to remain in place following completion of construction shall be examined and restored to full operating condition. If sediment enters these BMPs during construction, the sediment shall be removed and the facility shall be returned to conditions specified in the construction documents.

Element 12: Manage the Project (2.1.12)

The project will be managed based on the following principles:

- Projects will be phased to the maximum extent practicable and seasonal work limitations will be taken into account.
- Inspection and monitoring:
    - Inspection, maintenance and repair of all BMPs will occur as needed to ensure performance of their intended function.
    - Site inspections and monitoring will be conducted in accordance with Special Condition S4 of the CSWGP. Sampling locations are indicated on the Site Map. Sampling station(s) are located in accordance with applicable requirements of the CSWGP.
- Maintain an updated SWPPP.
    - The SWPPP will be updated, maintained, and implemented in accordance with Special Conditions S3, S4, and S9 of the CSWGP.

As site work progresses the SWPPP will be modified routinely to reflect changing site conditions. The SWPPP will be reviewed monthly to ensure the content is current.

Table 6 – BMP Implementation Schedule

Phase of Construction Project	Stormwater BMPs	Date	Wet/Dry Season
[Insert construction activity]	[Insert BMP]	[MM/DD/YYYY]	[Insert Season]
Phase of Construction Project	**Stormwater BMPs**	**Date**	**Wet/Dry Season**

[Insert construction activity]	[Insert BMP]	[MM/DD/YYYY]	[Insert Season]

Element 13: Protect Low Impact Development (LID) BMPs (2.1.13)

Protect all biofiltration swale and detention pond BMPs from sedimentation through installation and maintenance of erosion and sediment control BMPs on portions of the site that drain into the biofiltration swale and/or detention pond. Restore BMPs to their fully functioning condition if they accumulate sediment during construction. Restoring the BMP must include removal of sediment and any sediment-laden swale and/or pond soils, and replacing the removed soils with soils meeting the design specification.

Prevent compacting the biofiltration soil and detention pond BMPs by excluding construction equipment and foot traffic. Protect completed lawn and landscaped areas from compaction due to construction equipment. Keep all heavy equipment off existing soils under LID facilities that have been excavated to final grade to retain the infiltration rate of the soils.

- BMP C102: Buffer Zone
- BMP C103: High Visibility Fence
- BMP C200: Interceptor Dike and Swale
- BMP C201: Grass-Lined Channels
- BMP C207: Check Dams
- BMP C208: Triangular Silt Dike
- BMP C231: Brush Barrier
- BMP C233: Silt Fence
- BMP C234: Vegetated Strip

Pollution Prevention Team (3.0)

Table 7 – Team Information

Title	Name(s)	Phone Number
Certified Erosion and Sediment Control Lead (CESCL)		
Resident Engineer		
Emergency Ecology Contact		
Emergency Permittee/ Owner Contact		
Non-Emergency Owner Contact		
Monitoring Personnel		
Ecology Regional Office	Central Regional Office, Union Gap	(509) 575-2490

Monitoring and Sampling Requirements (4.0)

Monitoring includes visual inspection, sampling for water quality parameters of concern, and documentation of the inspection and sampling findings in a site log book. A site log book will be maintained for all on-site construction activities and will include:

- A record of the implementation of the SWPPP and other permit requirements
- Site inspections
- Stormwater sampling data

The site log book must be maintained on-site within reasonable access to the site and be made available upon request to Ecology or the local jurisdiction.

Numeric effluent limits may be required for certain discharges to 303(d) listed waterbodies. See CSWGP Special Condition S8 and Section 5 of this template.

Complete the following paragraph for sites that discharge to impaired waterbodies for fine sediment, turbidity, phosphorus, or pH:

Site Inspection (4.1)

Site inspections will be conducted at least once every calendar week and within 24 hours following any discharge from the site. For sites that are temporarily stabilized and inactive, the required frequency is reduced to once per calendar month.

The discharge point(s) are indicated on the Site Map (see Appendix A) and in accordance with the applicable requirements of the CSWGP.

Stormwater Quality Sampling (4.2)

Turbidity Sampling (4.2.1)

Requirements include calibrated turbidity meter or transparency tube to sample site discharges for compliance with the CSWGP. Sampling will be conducted at all discharge points at least once per calendar week.

Method for sampling turbidity:

Table 8 – Turbidity Sampling Method

	Turbidity Meter/Turbidimeter (required for disturbances 5 acres or greater in size)
	Transparency Tube (option for disturbances less than 1 acre and up to 5 acres in size)

The benchmark for turbidity value is 25 nephelometric turbidity units (NTU) and a transparency less than 33 centimeters.

If the discharge's turbidity is 26 to 249 NTU **or** the transparency is less than 33 cm but equal to or greater than 6 cm, the following steps will be conducted:

1. Review the SWPPP for compliance with Special Condition S9. Make appropriate revisions within 7 days of the date the discharge exceeded the benchmark.
2. Immediately begin the process to fully implement and maintain appropriate source control and/or treatment BMPs as soon as possible. Address the problems within 10 days of the date the discharge exceeded the benchmark. If installation of necessary treatment BMPs is not feasible within 10 days, Ecology may approve additional time when the Permittee requests an extension within the initial 10-day response period.
3. Document BMP implementation and maintenance in the site log book.

If the turbidity exceeds 250 NTU **or** the transparency is 6 cm or less at any time, the following steps will be conducted:

1. Telephone or submit an electronic report to the applicable Ecology Region's Environmental Report Tracking System (ERTS) within 24 hours. https://www.ecology.wa.gov/About-us/Get-involved/Report-an-environmental-issue
    - Central Region (Benton, Chelan, Douglas, Kittitas, Klickitat, Okanogan, Yakima): (509) 575-2490
    - Eastern Region (Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman): (509) 329-3400
    - Northwest Region (King, Kitsap, Island, San Juan, Skagit, Snohomish, Whatcom): (425) 649-7000
    - Southwest Region (Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Lewis, Mason, Pacific, Pierce, Skamania, Thurston, Wahkiakum,): (360) 407-6300
2. Immediately begin the process to fully implement and maintain appropriate source control and/or treatment BMPs as soon as possible. Address the problems within 10 days of the date the discharge exceeded the benchmark. If installation of necessary treatment BMPs is not feasible within 10 days, Ecology may approve additional time when the Permittee requests an extension within the initial 10-day response period
3. Document BMP implementation and maintenance in the site log book.
4. Continue to sample discharges daily until one of the following is true:
    - Turbidity is 25 NTU (or lower).
    - Transparency is 33 cm (or greater).
    - Compliance with the water quality limit for turbidity is achieved.
        - 1 - 5 NTU over background turbidity, if background is less than 50 NTU
        - 1% - 10% over background turbidity, if background is 50 NTU or greater
    - The discharge stops or is eliminated.

pH Sampling (4.2.2)

pH monitoring is required for “Significant concrete work” (i.e. greater than 1000 cubic yards poured concrete or recycled concrete over the life of the project).The use of engineered soils (soil amendments including but not limited to Portland cement-treated base [CTB], cement kiln dust [CKD] or fly ash) also requires pH monitoring.

For significant concrete work, pH sampling will start the first day concrete is poured and continue until it is cured, typically three (3) weeks after the last pour.

For engineered soils and recycled concrete, pH sampling begins when engineered soils or recycled concrete are first exposed to precipitation and continues until the area is fully stabilized.

If the measured pH is 8.5 or greater, the following measures will be taken:

1. Prevent high pH water from entering storm sewer systems or surface water.
2. Adjust or neutralize the high pH water to the range of 6.5 to 8.5 su using appropriate technology such as carbon dioxide (CO_2) sparging (liquid or dry ice).
3. Written approval will be obtained from Ecology prior to the use of chemical treatment other than CO_2 sparging or dry ice.

Method for sampling pH:

Table 8 – pH Sampling Method

	pH meter
	pH test kit
	Wide range pH indicator paper

Reporting and Record Keeping (6.0)

Record Keeping (6.1)

Site Log Book (6.1.1)

A site log book will be maintained for all on-site construction activities and will include:

- A record of the implementation of the SWPPP and other permit requirements
- Site inspections
- Sample logs

Records Retention (6.1.2)

Records will be retained during the life of the project and for a minimum of three (3) years following the termination of permit coverage in accordance with Special Condition S5.C of the CSWGP.

Permit documentation to be retained on-site:

- CSWGP
- Permit Coverage Letter
- SWPPP
- Site Log Book

Permit documentation will be provided within 14 days of receipt of a written request from Ecology. A copy of the SWPPP or access to the SWPPP will be provided to the public when requested in writing in accordance with Special Condition S5.G.2.b of the CSWGP.

Updating the SWPPP (6.1.3)

The SWPPP will be modified if:

- Found ineffective in eliminating or significantly minimizing pollutants in stormwater discharges from the site.
- There is a change in design, construction, operation, or maintenance at the construction site that has, or could have, a significant effect on the discharge of pollutants to waters of the State.

The SWPPP will be modified within seven (7) days if inspection(s) or investigation(s) determine additional or modified BMPs are necessary for compliance. An updated timeline for BMP implementation will be prepared.

Reporting (6.2)

Discharge Monitoring Reports (6.2.1)

Cumulative soil disturbance is one (1) acre or larger; therefore, Discharge Monitoring Reports (DMRs) will be submitted to Ecology monthly. If there was no discharge during a given monitoring period the DMR will be submitted as required, reporting "No Discharge". The DMR due date is fifteen (15) days following the end of each calendar month.

DMRs will be reported online through Ecology's WQWebDMR System.

https://www.ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Water-quality-permits-guidance/WQWebPortal-guidance

Notification of Noncompliance (6.2.2)

If any of the terms and conditions of the permit is not met, and the resulting noncompliance may cause a threat to human health or the environment, the following actions will be taken:

1. Ecology will be notified within 24-hours of the failure to comply by calling the applicable Regional office ERTS phone number (Regional office numbers listed below).
2. Immediate action will be taken to prevent the discharge/pollution or otherwise stop or correct the noncompliance. If applicable, sampling and analysis of any noncompliance will be repeated immediately and the results submitted to Ecology within five (5) days of becoming aware of the violation.
3. A detailed written report describing the noncompliance will be submitted to Ecology within five (5) days, unless requested earlier by Ecology.

Anytime turbidity sampling indicates turbidity is 250 NTUs or greater, or water transparency is 6 cm or less, the Ecology Regional office will be notified by phone within 24 hours of analysis as required by Special Condition S5.A of the CSWGP.

- Central Region at (509) 575-2490 for Benton, Chelan, Douglas, Kittitas, Klickitat, Okanogan, or Yakima County
- Eastern Region at (509) 329-3400 for Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, or Whitman County
- Northwest Region at (425) 649-7000 for Island, King, Kitsap, San Juan, Skagit, Snohomish, or Whatcom County
- Southwest Region at (360) 407-6300 for Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Lewis, Mason, Pacific, Pierce, Skamania, Thurston, or Wahkiakum

Include the following information:

1. Your name and / Phone number
2. Permit number
3. City / County of project
4. Sample results
5. Date / Time of call

6. Date / Time of sample
7. Project name

In accordance with Special Condition S4.D.5.b of the CSWGP, the Ecology Regional office will be notified if chemical treatment other than CO_2 sparging is planned for adjustment of high pH water.

Appendix/Glossary

A. **Erosion Control Plans and Details (To be provided at a later date)**

B. **BMP Detail (To be provided at a later date)**

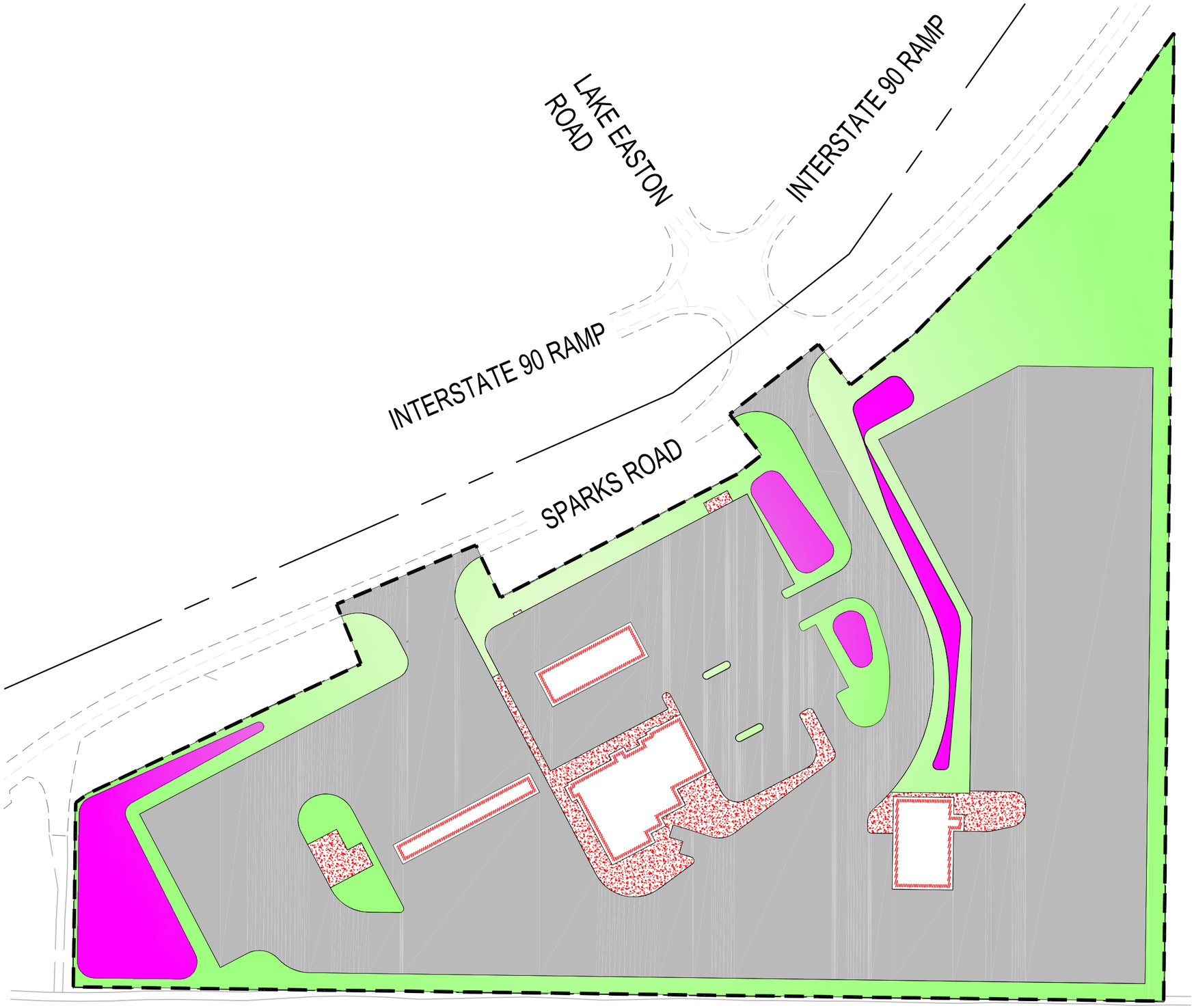
C. **Site Inspection Form (To be provided at a later date)**

D. **Construction Stormwater General Permit (CSWGP) (To be provided at a later date)**

APPENDIX 7

DEVELOPED BASIN AREA MAP

SEC. 2, T20N., R13E., W.M.



N

0 120 240

SCALE IN FEET

DEVELOPED BASIN SURFACE AREAS:

0.74 ACRES	IMPERVIOUS BUILDING AREA
11.37 ACRES	IMPERVIOUS DRIVING AREA
0.60 ACRES	IMPERVIOUS SIDEWALK AREA
3.53 ACRES	LANDSCAPING/PERVIOUS AREA
0.90 ACRES	PROPOSED STORMWATER POND
17.14 ACRES	

REVISIONS	DATE	BY
1		

SCJ ALLIANCE
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8730 TALLON LANE NE, SUITE 200, LACEY, WA 98516
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SCJALLIANCE.COM

SHEET TITLE: DEVELOPED BASIN MAP

PROJECT NAME: LOVE'S TRAVEL STOPS
EASTON, WASHINGTON

DESIGNER: -
DRAWN BY: ZS
APPROVED BY: -
DATE: SEPTEMBER 2019
JOB NO: 1398.18
DRAWING FILE NO: APPENDIX 07-DEVELOPED BASIN MAP
DRAWING NO: -
SHEET NO: 1 OF 1

Sep 10, 2019 2:15:30pm – User zach.sievers
N:\PROJECTS\1398 LOVE'S TRAVEL CENTER\1398.18 EASTON, WA LOVE'S\PHASE 03 - SITE ENTITLEMENTS\DESIGN\STORM\BIM\APPENDIX 07-DEVELOPED BASIN MAP.DWG