February 9, 2024 revised June 7, 2024

Matt Hammerstein, P.E.
Land Development Engineer
Woith Engineering, Inc.
3860 O'Leary Street, Suite A
Missoula, MT 59808

RE: Geotechnical Evaluation
RYN Homes Subdivision
Chuckwagon Drive and England Boulevard
Missoula, Montana
ALLWEST Project No. 723-122G

Mr. Hammerstein,

ALLWEST has completed the following geotechnical evaluation for the proposed RYN Homes Subdivision to be located at Chuckwagon Drive and England Boulevard in Missoula, Montana. The purpose of this evaluation was to characterize the soil and geologic conditions on the property and provide recommendations to assist with the design and construction of the proposed project.

We appreciate the opportunity to provide these services to you on this project. If you have any questions or need additional information, please call us at (406) 206-5911.

Sincerely,

ALLWEST

Prepared by:

Cole Warrick, P.G.
Area Manager

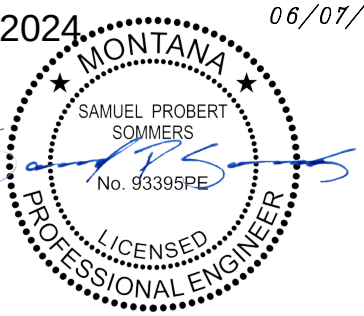
Reviewed by:

Samuel P. Sommers, P.E. (WA, ID, MT)
Senior Geotechnical Engineer

GEOTECHNICAL EVALUATION
RYN HOMES SUBDIVISION
CHUCKWAGON DRIVE AND ENGLAND BOULEVARD
MISSOULA, MONTANA
ALLWEST PROJECT NO. 723-122G

February 9, 2024 revised June 7, 2024

06/07/2024



Prepared for:
Matt Hammerstein, P.E.
Land Development Engineer
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Missoula, MT 59808

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EXECUTIVE SUMMARY

ALLWEST has completed the authorized geotechnical evaluation for the proposed RYN Homes Subdivision project located east and adjacent to the future intersection of Chuckwagon Road and England Boulevard in Missoula, Montana. The general location of the project is shown on the Vicinity Map, Figure A-1, in Appendix A of this report. The purpose of the evaluation was to assess the subsurface conditions throughout the project site with respect to the proposed design and construction. This report details the results of the field evaluation and presents recommendations to assist in the design and construction of the proposed development. A summary of geotechnical considerations follows:

- The general subsurface soil profile observed in the test pits consisted of a layer of topsoil approximately 0.5 to 1.0 feet thick on top of interbedded silty sand and sandy silt overlying poorly graded gravel. A 16-inch-thin layer of lean clay was encountered in test pit TP-03 underlying the topsoil layer. Groundwater was not observed at the time of excavation.

- For local roads, a pavement section with minimum thicknesses of 5-inches of asphaltic concrete over a minimum of 6-inches crushed base course over 12 inches of aggregate subbase is recommended. For minor collectors, a pavement section of 5-inches asphaltic concrete over a minimum of 6-inches of crushed base course over a minimum of 16 inches of aggregate subbase is recommended.

- This geotechnical evaluation was prepared based on the Overall Utility Plan prepared by Woith Engineering, Inc. dated November 15, 2023 that was made available at the time of exploration. ALLWEST must be informed of future changes to the site layout, proposed structure locations/layout, and/or loading criteria that differ from the assumptions stated in this report.

Close monitoring of the construction operations discussed herein will be critical in achieving the design subgrade support. If we are not retained to provide required construction observation and materials testing services, we cannot be responsible for soil engineering related construction errors or omissions. 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 report section titled *10.0 EVALUATION LIMITATIONS* should be read for an understanding of the report limitations.

1.0 SCOPE OF SERVICES

To complete this geotechnical evaluation, ALLWEST accomplished the following scope of services:

1) Performed a field evaluation by observing the excavation of 21 test pits throughout the project site. Subsurface conditions observed in the test pits were described and visually classified, and the subsurface profiles were logged.

2) Performed infiltration testing at two of the test pit locations in accordance with Appendix 6-F of the current City of Missoula Public Works Standards and Specifications Manual.

3) Performed laboratory tests on soil samples to assess the appropriate engineering soil properties and characteristics for the proposed development.

4) Performed engineering analyses and prepared recommendations to assist project planning, design, and construction.

Services were provided in general accordance with ALLWEST's proposal 723-122G dated November 22, 2023.

2.0 PROJECT DESCRIPTION

The proposed project will consist of the development of approximately 40 acres into a residential subdivision. We understand the project will be a mix of single and multi-family units. Stormwater is planned to be managed on-site. Site grading and stormwater plans were not available to ALLWEST at the time of the preparation of this report and currently the location and exact number of infiltration structures is not known.

A network of asphalt paved roadways will also be constructed throughout the development serving the various lots and multiplexes. Based on conversations with Woith Engineering, we understand that a mixture of passenger car and occasional truck traffic is anticipated with daily traffic counts of approximately 4,000 to 4,200.

3.0 EVALUATION PROCEDURES

To complete this evaluation, ALLWEST reviewed soil and geologic literature for the project area. Prior to mobilization, Montana 811 was contacted to request the location and clearance of public underground utilities. A review of the site was also performed to determine possible access limitations to proposed exploration locations prior to excavation.

Subsurface conditions were evaluated at the site by observing the excavation of 21 test pits at the project site on December 20 and 21, 2023. The test pits were excavated using a track-mounted Kubota U55-4 mini-excavator equipped with a 30-inch soil excavation bucket. Disturbed grab and bulk samples representative of soil conditions from select locations were obtained from excavation spoils. Approximate locations of the test pits are shown on Figure

A-2, Site and Exploration Plan in Appendix A.

Subsurface conditions observed in the test pits were visually described and classified in general accordance with ASTM D 2487 and the subsurface profiles were logged by a qualified ALLWEST representative. Detailed descriptions of the soil observed in the test pits are presented on the test pit logs in Appendix B of this report. The descriptive soil terms used on the test pit logs, and in this report, can be referenced from the Soil Classification Chart based on the *United Soil Classification System (USCS)* included in Appendix B.

4.0 SITE CONDITIONS

The project site is a vacant parcel currently used for agricultural purposes. The existing site topography consists of approximately 2 to 4 feet of elevation difference across the site sloping gently to the south. The property is bordered by residential developments to the south and vacant agricultural land to the north, east and west.

4.1 GENERAL GEOLOGIC CONDITIONS

The site is expected to be underlain by natural soil deposits mapped in the Southwest Missoula 7.5" Quadrangle as Quaternary alluvial terrace deposits (Qat) by the Montana Bureau of Mines and Geology (MBMG). This unit is described as fine to medium grained sand with variable silt and gravel content. The natural soils observed in the test pits were generally consistent with the MBMG geologic mapping and assumptions made by ALLWEST.

5.0 SUBSURFACE CONDITIONS

5.1 SOIL CONDITIONS

Detailed descriptions of the soil observed within the explorations are presented on individual exploration logs in Appendix B of this report. The descriptive soil terms used on the exploration logs, and in this report, can be referenced from the Soil Classification Chart based on the *United Soil Classification System (USCS)* included in Appendix B. The subsurface conditions may vary between exploration locations; such changes in subsurface conditions may not be apparent until construction.

The general subsurface soil profile observed in the test pits consisted of a layer of topsoil approximately 0.5 to 1.0 feet thick covering interbedded silty sand and sandy silt overlying poorly graded gravel. A thin layer of lean clay was encountered in one test pit near the surface between the topsoil and silty sand layers. Groundwater was not observed at the time of excavation.

<u>Topsoil</u>
Topsoil was observed from the surface to depths on the order of 6 to 12-inches in the test pits.

<u>Sand and Silt</u>
Silty sand and non-plastic sandy silt were observed below the topsoil in all the test pits extending to depths from 5.5 feet to beyond our maximum depth of exploration in test pit TP-18 of 11.5 feet below the ground surface. Test pit TP-01 terminated within this layer at a depth

of 10 feet and the layer may extend to greater depths. The sand and silt were tan to brown to red brown in color, fine-grained, and medium dense or medium stiff. In TP-03, lean clay of medium plasticity was observed beneath the topsoil to a depth of 1.7 feet.

Gravel
Poorly graded gravel with silt and sand was encountered below the sand and silt in all test pits except for TP-01 and TP-18 where no gravel was encountered and extended beyond our maximum depth of exploration of 11.5 feet below the ground surface. The gravel was observed to be fine to coarse grained, medium dense, and red brown to multi-colored.

5.2 GROUNDWATER CONDITIONS

At the time of exploration, groundwater was not observed in any of the test pits to the maximum depth explored. We understand shallow groundwater has been encountered toward the north end of the site in the past. During our exploration, a temporary groundwater piezometer was installed in test pit TP-02 to monitor groundwater levels during the spring and summer months. Changes in precipitation, irrigation, construction, or other factors may impact depth to groundwater and surface water flow on the property and therefore, conditions may be different during construction.

6.0 INFILTRATION TESTING

In-situ infiltration testing was performed at two of the test pit locations, TP-12, and TP-14, to assist in on-site stormwater management design. Infiltration testing was performed in accordance with the procedures outlined in Appendix 6-F (Test Pit Infiltration Method) of the current Missoula Public Works Standard Specifications Manual.

At each of these locations, the test pits were excavated to a depth of 10 feet below ground surface. Upon achieving the required depth, solid 4-inch schedule 40 PVC pipes were installed to the bottom of the test pits. Approximately 4 to 6 inches of pea gravel was placed within the pipes as a splash guard. Following installation of the pipe and pea gravel, the excavation surrounding the pipe was backfilled with excavation spoils.

ALLWEST returned to the site to perform infiltration testing on January 3rd and 4th, 2024. Approximately 1-foot of water head was introduced into the PVC pipe for a one-hour saturation period. Following the saturation period of one hour, an approximate 6-foot head of water was used to begin each trial, and the time for the water column to drop 24 inches was recorded. Per the test method procedures, if less than one hour is required for the water column to drop 24 inches, the average rate of the final four trials, if not varying by more than 10 percent for each test, is reported as the infiltration rate. For trials with extremely rapid infiltration rates, the limitations of water depth recording instruments may not allow for the capture of precise time results, therefore, measured rates are assumed to be representative. These data are presented in the following *Table 1 - Infiltration Test Results*. It is recommended that the civil engineer apply appropriate factors of safety to the measured values or select lower values based on previously observed and documented performance of drywells in the vicinity of the project. Until drywell locations and the actual depths of infiltration are known, rates presented in this report shall be considered preliminary.

Test Location	Depth of Test Below Ground Surface (ft)	Measured Infiltration Rate (in/hr)	Soil Classification (USCS)
TP-12	10	7,357	GP-GM
TP-14	10	1,553	GP-GM

Table 1 - Infiltration Test Results

7.0 LABORATORY TESTING

ALLWEST performed laboratory testing to supplement field classifications and to assess the appropriate soil engineering properties for use in design of the proposed improvements.

Table 2 - *Assigned Laboratory Testing* presents the laboratory testing program conducted for this project.

Test Performed	Information Acquired
Natural Water Content (ASTM D2216)	Water content representative of soil conditions at the time and location samples were collected.
Particle-size Distribution (ASTM D6913)	Size and distribution of soil particles (i.e., gravel, sand, and silt/clay) of a particular sample.
Atterberg Limits (ASTM D4318)	Effects of varying water content on the consistency of fine-grained soils present in a particular sample.

Table 2 - Assigned Laboratory Testing

Laboratory test results are presented in Appendix C and included on the test pit logs presented in Appendix B.

8.0 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are presented to assist in planning and design of the proposed improvements. Recommendations are based on ALLWEST's understanding of the proposed construction, conditions observed in the test pits, laboratory testing, and engineering analyses. If the construction scope changes, or if conditions are encountered during construction which are different than those described in this report, ALLWEST should be notified so the recommendations herein can be reviewed and revisions can be provided, if necessary. Additionally, ALLWEST should be given the opportunity to review plans and specifications to determine whether the recommendations presented in this report were properly incorporated as intended.

8.1 SITE GRADING

The following recommendations are provided for site grading considerations.

Clearing and Stripping

Prior to placement of fill, the site should be stripped of organics, debris, and other deleterious material in the construction footprint. Based on observations of subsurface conditions in the test pits and general site reconnaissance, the stripping depth for removal of topsoil within pavement envelopes is estimated to be on the order of 6 to 12 inches (varying in thickness across the site). Removed materials should be replaced with compacted granular structural fill to achieve design elevations, if required.

Excavation

Based on conditions observed in the test pits, it is anticipated that excavation of the on-site soil can be achieved with typical heavy-duty excavation equipment.

Unsupported vertical slopes or cuts deeper than 4 feet are not recommended if worker access is necessary. Cuts should be adequately sloped, shored, or supported to prevent injury to personnel from local sloughing and spalling. Excavations should conform to applicable federal, state, and local regulations. Regarding trench wall support, the site soil is considered Type C soil according to OSHA guidelines and therefore should not exceed a 1.5H:1V temporary slope.

Subgrade Preparation

ALLWEST defines the subgrade as the native soil exposed at the base of excavation prior to placement of fill, concrete, or asphalt. Soils at subgrade elevations are anticipated to vary across the site, however we expect the subgrade to consist mostly of silty sand or sandy silt depending on locale and depth within the parcel.

The subgrade requires an evaluation by the geotechnical engineer-of-record or staff under their supervision to confirm the site conditions are consistent with those observed during our geotechnical evaluation. Following clearing and stripping, the subgrade should be compacted to a firm and unyielding condition and proof rolled with heavy rubber-tired construction equipment such as a loader with a full bucket or a loaded dump truck.

In the event the exposed subgrade becomes unstable, yielding, or unable to be compacted due to high moisture conditions or construction traffic, the materials should be removed to a sufficient depth to develop stable subgrade soils that can be compacted to the minimum recommended levels. The severity of construction problems will be dependent, in part, on the precautions that are taken by the contractor to protect the subgrade soil.

Prior to construction of footings or slabs, or placement of imported granular structural fill where necessary, the natural subgrade soils should be properly moisture conditioned and compacted as described in subsection *8.1.1 Materials* of this report. Moisture conditioning of the subgrade surface may involve wetting or drying of the soil to help facilitate compaction. No moisture specification for subgrade soil preparation is provided herein but the earthwork contractor should adhere to typical good practice and not attempt to compact soils that are visually either too dry or too moist.

Pavement and exterior flatwork subgrades should be sloped to promote runoff and reduce the potential for ponding of water on the subgrade surface. Proper grading of pavement subgrades is critical to their long-term performance. Any areas of soft or saturated subgrade soils which exhibit pumping or significant deflection should be over-excavated to firm, non-yielding soil and replaced with import granular structural fill placed and compacted as described in subsection *8.1.1 Materials*.

Weather conditions should be given careful attention during subgrade preparation to prevent excess moisture from collecting on or penetrating and possibly saturating the subgrade before and after compaction. It is recommended that the subgrade be temporarily sloped to provide drainage to a low area of the excavation and any excess water pumped from the excavation. Such collection and discharge must comply with the Contractor's site-specific storm water pollution prevention plan (SWPPP). Should portions of the subgrade become excessively saturated, those areas should be sufficiently excavated, replaced with moisture conditioned soil, and properly compacted.

8.1.1 Materials

On-site Soil

The soil present throughout the project site is not suitable for re-use as structural fill. On-site soil can be used for general site grading provided deleterious materials are removed, and the material is placed in accordance with the recommendations outlined in section *8.1 Site Grading*.

Import Soil

Imported soil, where required, should be free of organics, debris, and other deleterious material and meet the recommendations in the following table. Imported soils should approved by the Geotechnical Engineer prior to delivery to the site.

Fill Type	Recommendations	
	Sieve	***Percent Passing***
Import Granular Structural Fill[1,2]	3-inch	100
	¾-inch	70 – 100
	No. 40	10 – 20
	No. 200	0 – 15

Table 3 - Imported Structural Fill Recommendations

[1] Soils with more than 30% retained on the ¾-inch sieve may be considered for re-use as structural fill, however they are classified as 'oversized' and may require method-based compaction observation.
[2] Material should be non-plastic.

Fill Placement and Compaction

Fill should be placed in lift thicknesses appropriate for the compaction equipment used. Typically, six to eight-inch loose lifts are appropriate for typical rubber tire and steel drum compaction equipment. Lift thicknesses should be reduced to a maximum of four inches for hand operated compaction equipment. Fill should be moisture conditioned to within two percentage points of the optimum moisture content prior to placement to facilitate compaction. Non-expansive low-permeability fill, however, should be moisture conditioned to two

percentage points over the optimum moisture content to facilitate desired effects of the material.

Fill placed in structural areas should be compacted to the following percentages of the maximum dry density as determined by ASTM D698 (standard Proctor).

Fill Area	Compaction (%) ASTM D698
Subgrade	Proof Roll
Site Grading	98
Utility Trench Backfill	98
Base Course	98

Table 4 - Compaction Recommendations

8.1.2 Wet Weather Construction

Due to the climatic effects in this region during late fall, winter, and spring (generally wet conditions), it is recommended that construction (especially site grading) take place during the summer and early fall season, if possible. If construction occurs during or immediately after excessive precipitation, it may be necessary to over-excavate and replace wet subgrade soil which might otherwise be suitable.

If construction is undertaken in wet periods of the year, it will be important to slope the ground surface to provide drainage away from construction. In addition, groundwater levels will likely be higher during wet periods of the year.

8.1.3 Cold Weather Construction

We recommend removal of frost susceptible soil within the frost-depth zone below concrete flatwork (sidewalks, patios, etc.) to reduce the potential detrimental effects of frost heave. Soil with fines content greater than 10 percent is considered to be susceptible to frost heaving. We consider the frost depth in the county of Missoula to be a minimum of 36 inches for the proposed improvements per guidance provided by Montana state code MT 24.310.142(9).

If site grading and construction are anticipated during cold weather, proper winter construction practices should be observed. Snow and ice should be removed from excavated and fill areas prior to additional earthwork or construction. Structural portions of the construction should not be placed on frozen ground; nor should the supporting soil for buildings be permitted to freeze during or after construction. Frozen soils should not be used as fill.

8.2 PAVEMENT

Based on the subsurface conditions observed in the test pits, it is anticipated that the pavement subgrade will vary across the development, mostly consisting of silty sand and sandy silt. A CBR of 5 percent was assumed for the site soils and was used for pavement design purposes.

Recommended pavement sections for the project are based on the assumptions presented in *Table 5 - Flexible Pavement Design Assumptions*.

Criteria	Assumed Value
Pavement Life	20 years
Local Road / Minor Collector Traffic (ESALs)	650,000 / 1,200,000
Subgrade California Bearing Ratio (CBR)	5%
Reliability	85%
Initial Serviceability	4.2
Terminal Serviceability	2.0

Table 5 - Flexible Pavement Design Assumptions

The pavement sections presented in the following table are recommended for the proposed roadway sections for this project based on assumed ESAL values and minimum recommendations contained in the 2024 Missoula City Public Works Standards & Specifications Manual (MCPWSS).

Roadway Type	AC[1] (in)	CBC[2] (in)	AS[3] (in)	Total (in)
Local Road	3.0	6.0	12.0	23.0
Minor Collector	4.0	6.0	16.0	27.0

[1]AC = Asphaltic Concrete
[2]CBC = Crushed Base Course
[3]AS = Aggregate Subbase

Table 6 - Recommended Pavement Sections

Crushed base course meeting the requirements of MPWSS section 02235 gradation for crushed base course should be specified for use. It is recommended the asphaltic concrete surface be compacted per MPWSS requirements.

The pavement sections provided in this report represent minimum recommended thicknesses. Therefore, preventive maintenance should be planned and provided for through an on-going pavement management program. Preventive maintenance activities are intended to slow the rate of pavement deterioration, and to preserve the pavement investment. Preventive 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 first priority when implementing a planned pavement maintenance program and provides the highest return on investment for pavements. Prior to implementing any maintenance, additional engineering observation is recommended to determine the type and extent of preventive maintenance. Even with periodic maintenance, some movements and related cracking may still occur, and repairs may be required.

8.3 OWNER OPERATION AND MAINTENANCE RESPONSIBILITIES

Property owners must accept the responsibility for maintaining the site grading, drainage, monitoring utility connections, and having a defined schedule for verifying and making necessary repairs to maintain the overall as designed positive site grading to ensure long term performance of the site improvements as defined herein. The property owner shall not make modifications to site grading that compromises the as-designed positive surface drainage. In addition, landscaping and irrigation must be designed, installed, and maintained to not impact the overall site grading.

9.0 ADDITIONAL RECOMMENDED SERVICES

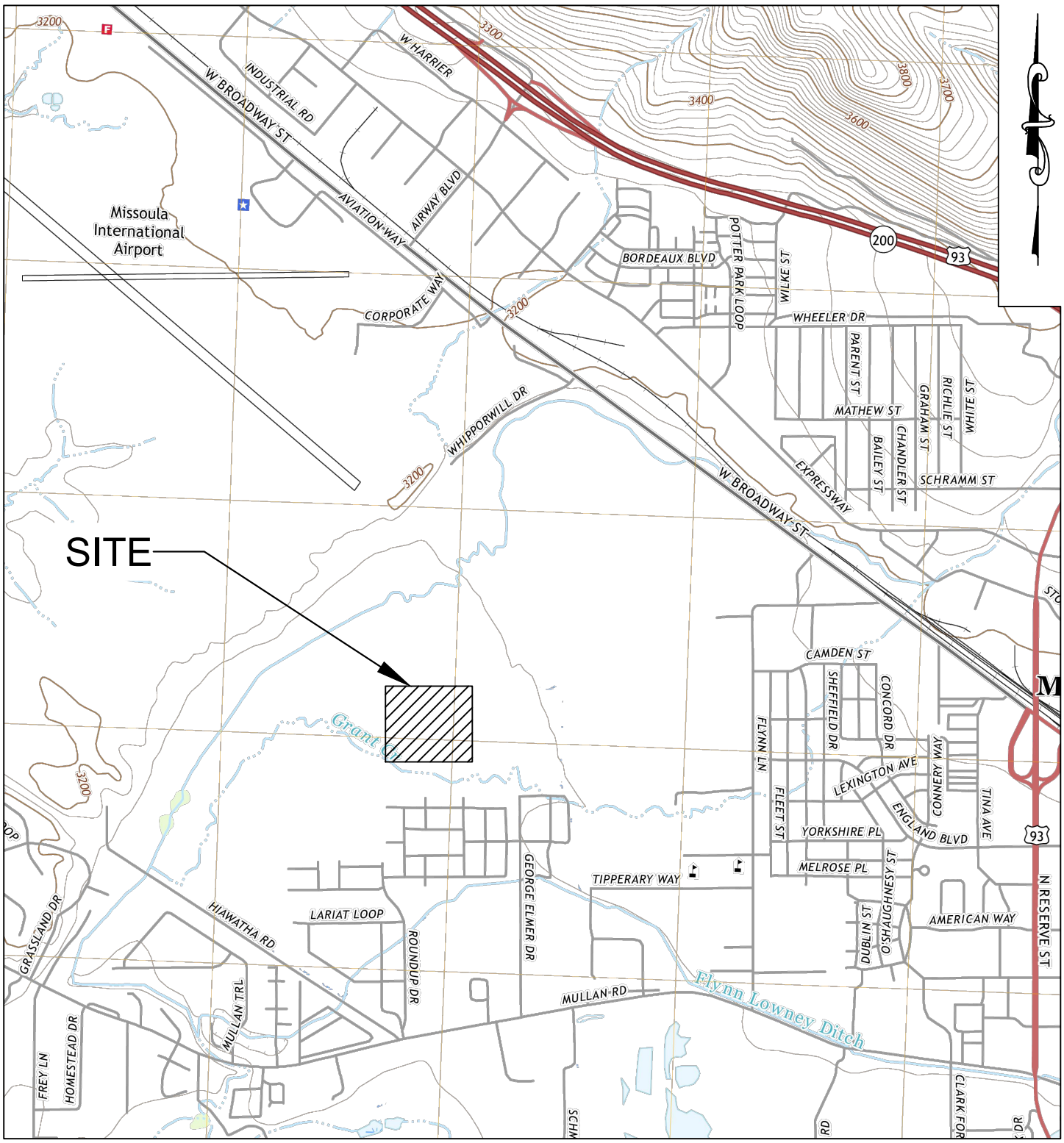
ALLWEST should be retained to provide construction materials testing and observation to verify the soil and geologic conditions and the report recommendations are incorporated into the actual construction. The design engineer-of-record should determine applicable testing and special inspection requirements in accordance with the governing code documents. If ALLWEST is not retained to provide required construction observation and materials testing services, ALLWEST cannot be responsible for soil engineering related construction errors or omissions.

10.0 EVALUATION LIMITATIONS

This report has been prepared to assist the planning and design for the proposed RYN Homes Subdivision project located at Chuckwagon Drive and England Boulevard in Missoula, Montana. The evaluation was provided based on preliminary plans that were made available at the time of exploration. The geotechnical engineer must be informed of significant changes to the building layout and/or loading criteria that differ from the assumptions stated in this report. Reliance by any other party is prohibited without the written authorization of ALLWEST. Services consist of professional opinions and conclusions made in accordance with generally accepted geotechnical engineering principles and practices in the local area at the time this report was prepared. This acknowledgement is in lieu of all warranties, express or implied.

Appendix A

Vicinity Map (Figure A-1)
Site and Exploration Plan (Figure A-2)



BASEMAP SOURCE: USGS TOPOGRAPHIC MAP, NORTHWEST MISSOULA QUADRANGLE MONTANA, 7.5-MINUTE SERIES, DATED 2020

ALLWEST
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Missoula, Montana
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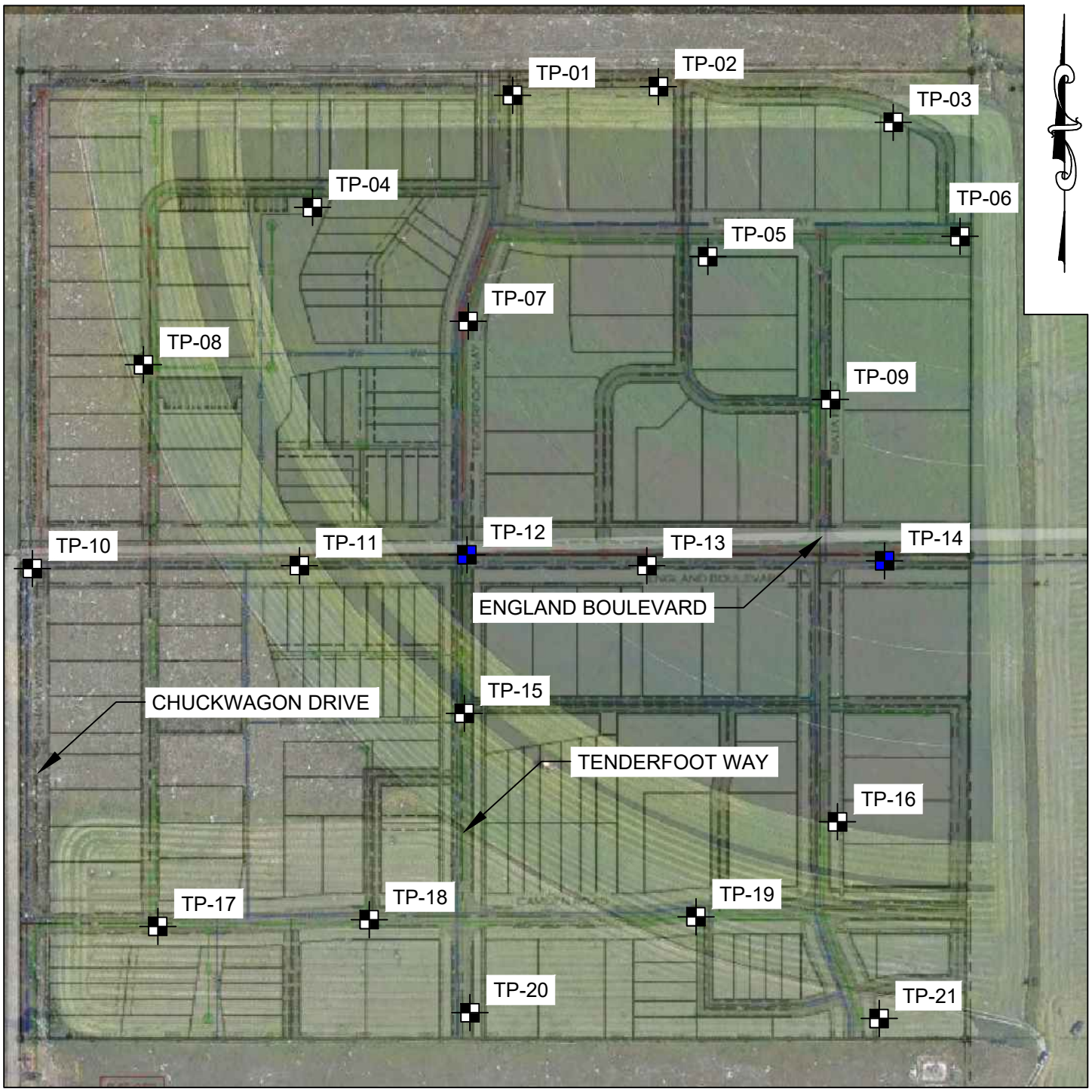
FIGURE A-1: VICINITY MAP

PROJECT:	723-122G RYN HOMES SUBDIVISION		
LOCATION:	MISSOULA, MONTANA		
CLIENT:	WOITH ENGINEERING, INC.		
DATE:	FEBRUARY 2024	SCALE:	1-IN = 2,000 FT



BASEMAP SOURCE: GOOGLE EARTH HIGH RESOLUTION IMAGERY, 2016
OVERALL UTILITY PLAN, WOITH ENGINEERING, INC., 11/02/2023

SCALE IN FEET

200 0 100 200

LEGEND:

APPROXIMATE TEST PIT LOCATION

TEST PIT LOCATION WITH INFILTRATION TEST

ALLWEST
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Missoula, Montana
(406) 206-5911
www.allwesttesting.com

FIGURE A-2: SITE AND EXPLORATION PLAN

PROJECT:	723-122G RYN HOMES SUBDIVISION		
LOCATION:	MISSOULA, MONTANA		
CLIENT:	WOITH ENGINEERING, INC.		
DATE:	JANUARY 2024	SCALE:	AS SHOWN

Appendix B

Test Pit Logs
Soil Classification Chart

RYN Subdivision

NE of Chuckwagon Road and Horn Road Intersection

TP-01

Drilling Co.:	ARW Construction	Project No.:	723-122G	Remarks: See Test Pit Location Map (Figure A-1)	
Driller:	Aaron Wutschke	Date Drilled:	12/20/23		
Logged By:	Halee Love	Boring Depth:	10'		
Equipment:	Kubota U55-4	Boring Elevation:	~3151.0'		
Hammer Type:	-	Coordinates:	46.90131, -114.07355		
Drilling Method:	Test Pit	▽ Water Level At Time Of Drilling:	N/A	▼ Delayed Water Level:	N/A
		Cave-in At Time Of Drilling:	N/A	Delayed Water Observation Date:	N/A

Depth (ft)	Soil Description and Remarks	Graphic Log	Samples	Lab			
			Sample Type	Moisture Content (%)	% Gravel	% Sand	% Fines
	TOPSOIL Silty Sand (SM), medium dense, moist, fine grained, dark brown (1.0)						
5	Silty SAND (SM) medium dense, slightly moist, fine grained, tan to red brown, increasing moisture with depth (9.0)						
10	Silty SAND with gravel (SM) medium dense, moist, fine to coarse grained, red brown to multicolored (10.0)						
	Test Pit terminated at approximately 10.0 feet below existing ground surface. No groundwater observed.						

Graphics Legend

Topsoil

SM

Water Levels

▽ -

▼ -

RYN Subdivision

NE of Chuckwagon Road and Horn Road Intersection

TP-02

Drilling Co.:	ARW Construction	Project No.:	723-122G	Remarks: See Test Pit Location Map (Figure A-1)	
Driller:	Aaron Wutschke	Date Drilled:	12/20/23		
Logged By:	Halee Love	Boring Depth:	10.5'		
Equipment:	Kubota U55-4	Boring Elevation:	~3151.0'		
Hammer Type:	-	Coordinates:	46.90135, -114.07276		
Drilling Method:	Test Pit	▽ Water Level At Time Of Drilling:	N/A	▼ Delayed Water Level:	N/A
		Cave-in At Time Of Drilling:	N/A	Delayed Water Observation Date:	N/A

Depth (ft)	Soil Description and Remarks	Graphic Log	Samples: Sample Type	Lab: Moisture Content (%)	Lab: % Gravel	Lab: % Sand	Lab: % Fines
	TOPSOIL Silty Sand (SM), medium dense, moist, fine to medium grained, dark brown 0.8						
	Silty SAND (SM) medium dense, slightly moist, fine grained, red brown, increasing moisture with depth						
5							
	8.0						
	Poorly Graded GRAVEL (GP-GM) with silt and sand, medium dense, moist, fine to coarse grained, red brown to multicolored						
10	10.5						
	Test Pit terminated at approximately 10.5 feet below existing ground surface. No groundwater observed.						

Graphics Legend

Topsoil

SM

GP-GM

Water Levels

▽ -

▼ -

RYN Subdivision

NE of Chuckwagon Road and Horn Road Intersection

TP-03

Drilling Co.:	ARW Construction	Project No.:	723-122G	Remarks: See Test Pit Location Map (Figure A-1)	
Driller:	Aaron Wutschke	Date Drilled:	12/20/23		
Logged By:	Halee Love	Boring Depth:	10'		
Equipment:	Kubota U55-4	Boring Elevation:	~3149.7'		
Hammer Type:	-	Coordinates:	46.90121, -114.07148		
Drilling Method:	Test Pit	▽ Water Level At Time Of Drilling:	N/A	▼ Delayed Water Level:	N/A
		Cave-in At Time Of Drilling:	N/A	Delayed Water Observation Date:	N/A

Depth (ft)	Soil Description and Remarks	Graphic Log	Samples: Sample Type	Lab: Moisture Content (%)	Lab: % Gravel	Lab: % Sand	Lab: % Fines
	TOPSOIL Silty Sand (SM), medium dense, moist, fine grained, dark brown 0.5						
	Sandy Lean CLAY (CL) medium stiff, slightly moist, fine grained, medium to dark brown 1.8				0	34	66
5	Silty SAND (SM) medium dense, slightly moist, fine grained, tan to light brown, gravel lenses from 1.75' to 2.25' and 4.0' to 4.5', trace roots to 8.0' 9.0						
10	Poorly Graded GRAVEL (GP-GM) with silt and sand, medium dense, slightly moist, fine to coarse grained, tan to multicolored 10.0						
	Test Pit terminated at approximately 10.0 feet below existing ground surface. No groundwater observed.						

Graphics Legend

Topsoil

SM

CL

GP-GM

Water Levels

▽ -

▼ -

RYN Subdivision

NE of Chuckwagon Road and Horn Road Intersection

TP-04

Drilling Co.:	ARW Construction	Project No.:	723-122G	Remarks: See Test Pit Location Map (Figure A-1)	
Driller:	Aaron Wutschke	Date Drilled:	12/20/23		
Logged By:	Halee Love	Boring Depth:	10.5'		
Equipment:	Kubota U55-4	Boring Elevation:	~3151.7'		
Hammer Type:	-	Coordinates:	46.90090, -114.07466		
Drilling Method:	Test Pit	▽ Water Level At Time Of Drilling:	N/A	▼ Delayed Water Level:	N/A
		Cave-in At Time Of Drilling:	N/A	Delayed Water Observation Date:	N/A

Depth (ft)	Soil Description and Remarks	Graphic Log	Samples: Sample Type	Lab: Moisture Content (%)	Lab: % Gravel	Lab: % Sand	Lab: % Fines
	TOPSOIL Silty Sand (SM), medium dense, moist, fine grained, dark brown 1.0						
	Silty SAND (SM) medium dense, slightly moist, fine grained, tan to medium brown						
5							
	Sandy SILT (ML) medium stiff, slightly moist, fine grained, light red-brown 8.0						
	Poorly Graded GRAVEL (GP-GM) with silt and sand, medium dense, slightly moist, fine to coarse grained, tan to multi-colored						
10	10.5						

Test Pit terminated at approximately 10.5 feet below existing ground surface. No groundwater observed.

Graphics Legend

Topsoil

SM

ML

GP-GM

Water Levels

▽ -

▼ -

RYN Subdivision

NE of Chuckwagon Road and Horn Road Intersection

TP-05

Drilling Co.:	ARW Construction	Project No.:	723-122G	Remarks: See Test Pit Location Map (Figure A-1)	
Driller:	Aaron Wutschke	Date Drilled:	12/20/23		
Logged By:	Halee Love	Boring Depth:	10'		
Equipment:	Kubota U55-4	Boring Elevation:	~3150.0'		
Hammer Type:	-	Coordinates:	46.90071, -114.07251		
Drilling Method:	Test Pit	▽ Water Level At Time Of Drilling:	N/A	▼ Delayed Water Level:	N/A
		Cave-in At Time Of Drilling:	N/A	Delayed Water Observation Date:	N/A

Depth (ft)	Soil Description and Remarks	Graphic Log	Samples: Sample Type	Lab: Moisture Content (%)	Lab: % Gravel	Lab: % Sand	Lab: % Fines
	TOPSOIL Silty Sand (SM), medium dense, moist, fine to medium grained, dark brown 0.8						
	Silty SAND (SM) medium dense, slightly moist, fine grained, tan to medium brown 4.0						
5	Sandy SILT (ML) medium stiff, slightly moist, fine grained, tan						
	Poorly Graded GRAVEL (GP-GM) with silt and sand, medium dense, slightly moist, fine to coarse grained, tan to multicolored 10.0						
10	Test Pit terminated at approximately 10.0 feet below existing ground surface. No groundwater observed.						

Graphics Legend

Topsoil

SM

ML

GP-GM

Water Levels

▽ -

▼ -

RYN Subdivision

NE of Chuckwagon Road and Horn Road Intersection

TP-06

Drilling Co.:	ARW Construction	Project No.:	723-122G	Remarks: See Test Pit Location Map (Figure A-1)	
Driller:	Aaron Wutschke	Date Drilled:	12/20/23		
Logged By:	Halee Love	Boring Depth:	10.5'		
Equipment:	Kubota U55-4	Boring Elevation:	~3151.3'		
Hammer Type:	-	Coordinates:	46.90079, -114.07112		
Drilling Method:	Test Pit	▽ Water Level At Time Of Drilling:	N/A	▼ Delayed Water Level:	N/A
		Cave-in At Time Of Drilling:	N/A	Delayed Water Observation Date:	N/A

Depth (ft)	Soil Description and Remarks	Graphic Log	Samples: Sample Type	Lab: Moisture Content (%)	Lab: % Gravel	Lab: % Sand	Lab: % Fines
	TOPSOIL Sandy Silt (ML), medium stiff, moist, fine grained, dark brown						
	1.0						
	Sandy SILT (ML) medium stiff, slightly moist, fine grained, brown						
5							
	7.0						
	Silty SAND (SM) medium dense, slightly moist, fine grained, tan						
	8.5						
	Sandy SILT (ML) medium stiff, slightly moist, fine grained, tan						
10	10.0						
	Poorly Graded GRAVEL (GP-GM) with silt and sand, medium dense, slightly moist, fine to coarse grained, tan to multicolored						
	10.5						
	Test Pit terminated at approximately 10.5 feet below existing ground surface. No groundwater observed.						

Graphics Legend

Topsoil

ML

SM

GP-GM

Water Levels

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RYN Subdivision

NE of Chuckwagon Road and Horn Road Intersection

TP-07

Drilling Co.:	ARW Construction	Project No.:	723-122G	Remarks: See Test Pit Location Map (Figure A-1)	
Driller:	Aaron Wutschke	Date Drilled:	12/20/23		
Logged By:	Halee Love	Boring Depth:	10.5'		
Equipment:	Kubota U55-4	Boring Elevation:	~3150.3'		
Hammer Type:	-	Coordinates:	46.90047, -114.07381		
Drilling Method:	Test Pit	▽ Water Level At Time Of Drilling:	N/A	▼ Delayed Water Level:	N/A
		Cave-in At Time Of Drilling:	N/A	Delayed Water Observation Date:	N/A

Depth (ft)	Soil Description and Remarks	Graphic Log	Samples: Sample Type	Lab: Moisture Content (%)	Lab: % Gravel	Lab: % Sand	Lab: % Fines
	TOPSOIL silty sand (SM), medium dense, moist, fine grained, dark brown 0.8						
	Silty SAND (SM) medium dense, slightly moist, fine grained, light brown to grey, gravel lens from 3.5' to 4.0'.						
5	7.5						
	Poorly Graded GRAVEL (GP-GM) with silt and sand, medium dense, slightly moist, fine to coarse grained, red brown to multicolored						
10	10.5						
	Test Pit terminated at approximately 10.5 feet below existing ground surface. No groundwater observed.						

Graphics Legend

Topsoil

SM

GP-GM

Water Levels

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RYN Subdivision

NE of Chuckwagon Road and Horn Road Intersection

TP-08

Drilling Co.:	ARW Construction	Project No.:	723-122G	Remarks: See Test Pit Location Map (Figure A-1)	
Driller:	Aaron Wutschke	Date Drilled:	12/20/23		
Logged By:	Halee Love	Boring Depth:	10.5'		
Equipment:	Kubota U55-4	Boring Elevation:	~3148.3'		
Hammer Type:	-	Coordinates:	46.90031, -114.07558		
Drilling Method:	Test Pit	▽ Water Level At Time Of Drilling:	N/A	▼ Delayed Water Level:	N/A
		Cave-in At Time Of Drilling:	N/A	Delayed Water Observation Date:	N/A

Depth (ft)	Soil Description and Remarks	Graphic Log	Samples: Sample Type	Lab: Moisture Content (%)	Lab: % Gravel	Lab: % Sand	Lab: % Fines
	TOPSOIL Silty Sand (SM) medium dense, moist, fine grained, dark brown 0.5						
	Silty SAND (SM) medium dense, slightly moist, fine grained, tan to dark and/or red brown						
5							
	10.0						
10	Poorly Graded GRAVEL (GP-GM) with silt and sand, medium dense, slightly moist, fine to coarse grained, red brown to multicolored 10.5						
	Test pit terminated at approximately 10.5 feet below existing ground surface. No groundwater observed.						

Graphics Legend

Topsoil

SM

GP-GM

Water Levels

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RYN Subdivision

NE of Chuckwagon Road and Horn Road Intersection

TP-09

Drilling Co.:	ARW Construction	Project No.:	723-122G	Remarks: See Test Pit Location Map (Figure A-1)	
Driller:	Aaron Wutschke	Date Drilled:	12/20/23		
Logged By:	Halee Love	Boring Depth:	10'		
Equipment:	Kubota U55-4	Boring Elevation:	~3149.6'		
Hammer Type:	-	Coordinates:	46.90018, -114.07183		
Drilling Method:	Test Pit	▽ Water Level At Time Of Drilling:	N/A	▼ Delayed Water Level:	N/A
		Cave-in At Time Of Drilling:	N/A	Delayed Water Observation Date:	N/A

Depth (ft)	Soil Description and Remarks	Graphic Log	Samples: Sample Type	Lab: Moisture Content (%)	Lab: % Gravel	Lab: % Sand	Lab: % Fines
	TOPSOIL silty sand (SM), medium dense, moist, fine to medium grained, dark brown 0.5						
	Silty SAND (SM) medium dense, slightly moist, fine grained, tan to red brown						
5							
	7.0						
	Poorly Graded GRAVEL (GP-GM) with silt, sand, and cobbles, medium dense, slightly moist, fine to coarse grained, red brown to multicolored						
	10.0						
10	Test Pit terminated at approximately 10.0 feet below existing ground surface. No groundwater observed.						

Graphics Legend

Topsoil

SM

GP-GM

Water Levels

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RYN Subdivision

NE of Chuckwagon Road and Horn Road Intersection

TP-10

Drilling Co.:	ARW Construction	Project No.:	723-122G	Remarks: See Test Pit Location Map (Figure A-1)	
Driller:	Aaron Wutschke	Date Drilled:	12/21/23		
Logged By:	Halee Love	Boring Depth:	11.5'		
Equipment:	Kubota U55-4	Boring Elevation:	~3149.6'		
Hammer Type:	-	Coordinates:	46.89955, -114.07618		
Drilling Method:	Test Pit	▽ Water Level At Time Of Drilling:	N/A	▼ Delayed Water Level:	N/A
		Cave-in At Time Of Drilling:	N/A	Delayed Water Observation Date:	N/A

Depth (ft)	Soil Description and Remarks	Graphic Log	Samples: Sample Type	Lab: Moisture Content (%)	Lab: % Gravel	Lab: % Sand	Lab: % Fines
	TOPSOIL silty sand (SC-SM), medium dense, moist, fine grained, dark brown						
	1.0						
	Silty SAND (SM) medium dense, slightly moist, fine grained, tan to red brown, increased moisture with depth						
5							
	9.0						
	Sandy SILT (ML) medium stiff, very moist, fine grained, tan to light brown						
	10.0						
10	Silty SAND (SM) medium dense, moist, fine to medium grained, red brown						
	11.0						
	Poorly Graded GRAVEL (GP-GM) with silt and sand, medium dense, moist, fine to coarse grained, red brown to multicolored						
	11.5						

Test Pit terminated at approximately 11.5 feet below existing ground surface. No groundwater observed.

Graphics Legend

Topsoil

ML

SM

GP-GM

Water Levels

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RYN Subdivision

NE of Chuckwagon Road and Horn Road Intersection

TP-11

Drilling Co.:	ARW Construction	Project No.:	723-122G	Remarks: See Test Pit Location Map (Figure A-1)	
Driller:	Aaron Wutschke	Date Drilled:	12/20/23		
Logged By:	Halee Love	Boring Depth:	11'		
Equipment:	Kubota U55-4	Boring Elevation:	~3151.1'		
Hammer Type:	-	Coordinates:	46.89953, -114.07473		
Drilling Method:	Test Pit	▽ Water Level At Time Of Drilling:	N/A	▼ Delayed Water Level:	N/A
		Cave-in At Time Of Drilling:	N/A	Delayed Water Observation Date:	N/A

Depth (ft)	Soil Description and Remarks	Graphic Log	Samples: Sample Type	Lab: Moisture Content (%)	Lab: % Gravel	Lab: % Sand	Lab: % Fines
	TOPSOIL Silty Sand (SM), medium dense, moist, fine grained, dark brown 0.5						
	Silty SAND (SM) medium dense, slightly moist, fine grained, tan to dark brown, increasing moisture with depth						
5							
	8.0						
	Sandy SILT (ML) medium stiff, slightly moist, fine grained, tan to red brown						
10							
	10.5						
	Poorly Graded GRAVEL (GP-GM) with silt and sand, medium dense, moist, fine to coarse grained, brown to red brown 11.0						
	Test Pit terminated at approximately 11.0 feet below existing ground surface. No groundwater observed.						

Graphics Legend

Topsoil

SM

ML

GP-GM

Water Levels

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RYN Subdivision

NE of Chuckwagon Road and Horn Road Intersection

TP-12

Drilling Co.:	ARW Construction	Project No.:	723-122G	Remarks: See Test Pit Location Map (Figure A-1)	
Driller:	Aaron Wutschke	Date Drilled:	12/21/23		
Logged By:	Halee Love	Boring Depth:	10'		
Equipment:	Kubota U55-4	Boring Elevation:	~3151.5'		
Hammer Type:	-	Coordinates:	46.89962, -114.07377		
Drilling Method:	Test Pit	▽ Water Level At Time Of Drilling:	N/A	▼ Delayed Water Level:	N/A
		Cave-in At Time Of Drilling:	N/A	Delayed Water Observation Date:	N/A

Depth (ft)	Soil Description and Remarks	Graphic Log	Samples: Sample Type	Lab: Moisture Content (%)	Lab: % Gravel	Lab: % Sand	Lab: % Fines
	TOPSOIL Sandy Silt (ML), medium stiff, moist, fine grained, dark brown 0.8						
	Sandy SILT (ML) medium stiff, slightly moist, fine grained, tan 2.3				0	46	54
5	Silty SAND (SM) medium dense, slightly moist, fine grained, tan, roots prominent to 3.0' 5.5						
	Sandy SILT (ML) medium stiff, slightly moist, fine grained, tan						
	Silty SAND (SM) medium dense, slightly moist, fine grained, tan to red brown 8.0						
	Poorly Graded GRAVEL (GP-GM) with silt and sand, medium dense, slightly moist, fine to coarse grained, red brown to multicolored 10.0						
10	Test Pit terminated at approximately 10.0 feet below existing ground surface. No groundwater observed.						

Graphics Legend

Topsoil

ML

SM

GP-GM

Water Levels

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RYN Subdivision

NE of Chuckwagon Road and Horn Road Intersection

TP-13

Drilling Co.:	ARW Construction	Project No.:	723-122G	Remarks: See Test Pit Location Map (Figure A-1)	
Driller:	Aaron Wutschke	Date Drilled:	12/20/23		
Logged By:	Halee Love	Boring Depth:	10'		
Equipment:	Kubota U55-4	Boring Elevation:	~3151.4'		
Hammer Type:	-	Coordinates:	46.89956, -114.07282		
Drilling Method:	Test Pit	▽ Water Level At Time Of Drilling:	N/A	▼ Delayed Water Level:	N/A
		Cave-in At Time Of Drilling:	N/A	Delayed Water Observation Date:	N/A

Depth (ft)	Soil Description and Remarks	Graphic Log	Samples: Sample Type	Lab: Moisture Content (%)	Lab: % Gravel	Lab: % Sand	Lab: % Fines
	TOPSOIL lean clay (CL), medium stiff, moist, fine grained, dark brown 0.5						
	Sandy SILT (ML) medium stiff, slightly moist, fine grained, tan to dark brown 3.0				0	36	64
5	Silty SAND (SM) medium dense, slightly moist, fine grained, tan 9.0						
	Poorly Graded GRAVEL (GP-GM) with silt and sand, medium dense, slightly moist, fine to coarse grained, tan to multicolored 10.0						
10	Test Pit terminated at approximately 10.0 feet below existing ground surface. No groundwater observed.						

Graphics Legend

Topsoil

ML

SM

GP-GM

Water Levels

▽ -

▼ -

RYN Subdivision

NE of Chuckwagon Road and Horn Road Intersection

TP-14

Drilling Co.:	ARW Construction	Project No.:	723-122G	Remarks: See Test Pit Location Map (Figure A-1)	
Driller:	Aaron Wutschke	Date Drilled:	12/20/23		
Logged By:	Halee Love	Boring Depth:	10'		
Equipment:	Kubota U55-4	Boring Elevation:	~3151.5'		
Hammer Type:	-	Coordinates:	46.89958, -114.07154		
Drilling Method:	Test Pit	▽ Water Level At Time Of Drilling:	N/A	▼ Delayed Water Level:	N/A
		Cave-in At Time Of Drilling:	N/A	Delayed Water Observation Date:	N/A

Depth (ft)	Soil Description and Remarks	Graphic Log	Samples: Sample Type	Lab: Moisture Content (%)	Lab: % Gravel	Lab: % Sand	Lab: % Fines
	TOPSOIL Silty sand (SM), medium dense, slightly moist, fine grained, dark brown 0.5						
	Silty SAND (SM) medium dense, slightly moist, fine grained, tan						
5	5.5						
	Poorly Graded GRAVEL (GP-GM) with silt and sand, medium dense, dry to slightly moist, fine to coarse grained, red brown to multicolored, silt lens from 0.75' to 8.0'						
10	10.0						
	Test Pit terminated at approximately 10.0 feet below existing ground surface. No groundwater observed.						

Graphics Legend

Topsoil

SM

GP-GM

Water Levels

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RYN Subdivision

NE of Chuckwagon Road and Horn Road Intersection

TP-15

Drilling Co.:	ARW Construction	Project No.:	723-122G	Remarks: See Test Pit Location Map (Figure A-1)	
Driller:	Aaron Wutschke	Date Drilled:	12/20/23		
Logged By:	Halee Love	Boring Depth:	10'		
Equipment:	Kubota U55-4	Boring Elevation:	~3151.4'		
Hammer Type:	-	Coordinates:	46.89901, -114.07382		
Drilling Method:	Test Pit	▽ Water Level At Time Of Drilling:	N/A	▼ Delayed Water Level:	N/A
		Cave-in At Time Of Drilling:	N/A	Delayed Water Observation Date:	N/A

Depth (ft)	Soil Description and Remarks	Graphic Log	Samples: Sample Type	Lab: Moisture Content (%)	Lab: % Gravel	Lab: % Sand	Lab: % Fines
	TOPSOIL Sandy silt (ML), medium stiff, moist, fine grained, dark brown 0.5						
	Sandy SILT (ML) medium dense, slightly moist, fine grained, tan to dark brown 4.5						
5	Silty SAND (SM) medium dense, slightly moist, fine grained, tan to red brown						
	Sandy SILT (ML) medium stiff, very moist, fine grained, tan 8.0						
	Silty SAND (SM) medium dense, slightly moist, fine grained, red brown 9.0						
	Poorly Graded GRAVEL (GP-GM) with silt and sand, medium dense, slightly moist, fine to coarse grained, red brown to multicolored 10.0						
10	Test Pit terminated at approximately 10.0 feet below existing ground surface. No groundwater observed.						

Graphics Legend

Topsoil

ML

SM

GP-GM

Water Levels

▽ -

▼ -

RYN Subdivision

NE of Chuckwagon Road and Horn Road Intersection

TP-16

Drilling Co.:	ARW Construction	Project No.:	723-122G	Remarks: See Test Pit Location Map (Figure A-1)	
Driller:	Aaron Wutschke	Date Drilled:	12/21/23		
Logged By:	Halee Love	Boring Depth:	10.5'		
Equipment:	Kubota U55-4	Boring Elevation:	3154.2'		
Hammer Type:	-	Coordinates:	46.89860, -114.07179		
Drilling Method:	Test Pit	▽ Water Level At Time Of Drilling:	N/A	▼ Delayed Water Level:	N/A
		Cave-in At Time Of Drilling:	N/A	Delayed Water Observation Date:	N/A

Depth (ft)	Soil Description and Remarks	Graphic Log	Samples: Sample Type	Lab: Moisture Content (%)	Lab: % Gravel	Lab: % Sand	Lab: % Fines
	TOPSOIL Silty Sand (SM), medium dense, slightly moist, fine grained, dark brown 0.5						
	Silty SAND (SM) medium dense, slightly moist, fine grained, tan to dark brown						
5							
	9.5						
10	Poorly Graded GRAVEL (GP-GM) with silt and sand, medium dense, slightly moist, fine to coarse grained, red brown to multicolored 10.5						
	Test Pit terminated at 10.5 feet below existing ground surface. No groundwater observed.						

Graphics Legend

Topsoil

SM

GP-GM

Water Levels

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▼ -

RYN Subdivision

NE of Chuckwagon Road and Horn Road Intersection

TP-17

Drilling Co.:	ARW Construction	Project No.:	723-122G	Remarks: See Test Pit Location Map (Figure A-1)	
Driller:	Aaron Wutschke	Date Drilled:	12/21/23		
Logged By:	Halee Love	Boring Depth:	11.5'		
Equipment:	Kubota U55-4	Boring Elevation:	~3151.3'		
Hammer Type:	-	Coordinates:	46.89821, -114.07550		
Drilling Method:	Test Pit	▽ Water Level At Time Of Drilling:	N/A	▼ Delayed Water Level:	N/A
		Cave-in At Time Of Drilling:	N/A	Delayed Water Observation Date:	N/A

Depth (ft)	Soil Description and Remarks	Graphic Log	Samples: Sample Type	Lab: Moisture Content (%)	Lab: % Gravel	Lab: % Sand	Lab: % Fines
	TOPSOIL Sandy silt (ML), medium stiff, slightly moist, fine grained, dark brown						
	0.8						
	Sandy SILT (ML) medium stiff, slightly moist, fine grained, tan to gray brown						
5	5.5						
	Silty SAND (SM) medium dense, slightly moist, fine grained, red-brown						
	8.0						
	Sandy SILT (ML) medium stiff, slightly moist, fine grained, red-brown						
10	11.3						
	Poorly Graded GRAVEL (GP-GM) with silt and sand, medium dense, slightly moist, fine to coarse grained, red brown						
	11.5						
	Test Pit terminated at 11.5 feet below existing ground surface. No groundwater observed.						

Graphics Legend

Topsoil

ML

SM

GP-GM

Water Levels

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RYN Subdivision

NE of Chuckwagon Road and Horn Road Intersection

TP-18

Drilling Co.:	ARW Construction	Project No.:	723-122G	Remarks: See Test Pit Location Map (Figure A-1)	
Driller:	Aaron Wutschke	Date Drilled:	12/20/23		
Logged By:	Halee Love	Boring Depth:	11.5'		
Equipment:	Kubota U55-4	Boring Elevation:	~3151.3'		
Hammer Type:	-	Coordinates:	46.89824, -114.07435		
Drilling Method:	Test Pit	▽ Water Level At Time Of Drilling:	N/A	▼ Delayed Water Level:	N/A
		Cave-in At Time Of Drilling:	N/A	Delayed Water Observation Date:	N/A

Depth (ft)	Soil Description and Remarks	Graphic Log	Samples: Sample Type	Lab: Moisture Content (%)	Lab: % Gravel	Lab: % Sand	Lab: % Fines
	TOPSOIL Silty Sand (SM), medium dense, moist, fine grained, dark brown 0.5						
	Silty SAND (SM) medium dense, slightly moist, fine to coarse grained, tan to dark brown 4.5				0	58	42
5	Sandy SILT (ML) medium stiff, slightly moist, fine grained, tan 6.0						
	Silty SAND (SM) medium dense, slightly moist, fine to medium grained, red brown						
10	11.5						
	Test Pit terminated at 11.5 feet below existing ground surface. No groundwater observed.						

Graphics Legend

Topsoil

ML

SM

Water Levels

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RYN Subdivision

NE of Chuckwagon Road and Horn Road Intersection

TP-19

Drilling Co.:	ARW Construction	Project No.:	723-122G	Remarks: See Test Pit Location Map (Figure A-1)	
Driller:	Aaron Wutschke	Date Drilled:	12/20/23		
Logged By:	Halee Love	Boring Depth:	11.5'		
Equipment:	Kubota U55-4	Boring Elevation:	~3153.6'		
Hammer Type:	-	Coordinates:	46.89825, -114.07256		
Drilling Method:	Test Pit	▽ Water Level At Time Of Drilling:	N/A	▼ Delayed Water Level:	N/A
		Cave-in At Time Of Drilling:	N/A	Delayed Water Observation Date:	N/A

Depth (ft)	Soil Description and Remarks	Graphic Log	Samples: Sample Type	Lab: Moisture Content (%)	Lab: % Gravel	Lab: % Sand	Lab: % Fines
	TOPSOIL Silty Sand (SM), medium dense, slightly moist, fine grained, dark brown 0.5						
	Silty SAND (SM) medium dense, slightly moist, fine grained, tan to red brown						
5							
	10.0						
10	Poorly Graded GRAVEL (GP-GM) with silt and sand, medium dense, slightly moist, fine to coarse grained, red brown to multicolored 11.5						
	Test Pit terminated at 11.5 feet below existing ground surface. No groundwater observed.						

Graphics Legend

Topsoil

SM

GP-GM

Water Levels

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RYN Subdivision

NE of Chuckwagon Road and Horn Road Intersection

TP-20

Drilling Co.:	ARW Construction	Project No.:	723-122G	Remarks: See Test Pit Location Map (Figure A-1)	
Driller:	Aaron Wutschke	Date Drilled:	12/20/23		
Logged By:	Halee Love	Boring Depth:	10'		
Equipment:	Kubota U55-4	Boring Elevation:	~3152.3'		
Hammer Type:	-	Coordinates:	46.89789, -114.07379		
Drilling Method:	Test Pit	▽ Water Level At Time Of Drilling:	N/A	▼ Delayed Water Level:	N/A
		Cave-in At Time Of Drilling:	N/A	Delayed Water Observation Date:	N/A

Depth (ft)	Soil Description and Remarks	Graphic Log	Samples: Sample Type	Lab: Moisture Content (%)	Lab: % Gravel	Lab: % Sand	Lab: % Fines
	TOPSOIL Silty Sand (SM), medium dense, slightly moist, fine grained, dark brown 0.5						
	Silty SAND (SM) medium dense, slightly moist, fine grained, tan to gray brown 4.5						
5	Sandy SILT (ML) medium stiff, slightly moist, fine grained, tan to red brown						
	at 10.0 feet - Poorly Graded GRAVEL (GP-GM) with silt and sand, loose to medium dense, slightly moist, fine to coarse grained, red brown to multicolored. 10.0						
10	Test Pit terminated at 10.0 feet below existing ground surface. No groundwater observed.						

Graphics Legend

Topsoil

SM

ML

GP-GM

Water Levels

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RYN Subdivision

NE of Chuckwagon Road and Horn Road Intersection

TP-21

Drilling Co.:	ARW Construction	Project No.:	723-122G	Remarks: See Test Pit Location Map (Figure A-1)	
Driller:	Aaron Wutschke	Date Drilled:	12/20/23		
Logged By:	Halee Love	Boring Depth:	10.5'		
Equipment:	Kubota U55-4	Boring Elevation:	~3153.5'		
Hammer Type:	-	Coordinates:	46.89787, -114.07157		
Drilling Method:	Test Pit	▽ Water Level At Time Of Drilling:	N/A	▼ Delayed Water Level:	N/A
		Cave-in At Time Of Drilling:	N/A	Delayed Water Observation Date:	N/A

Depth (ft)	Soil Description and Remarks	Graphic Log	Samples: Sample Type	Lab: Moisture Content (%)	Lab: % Gravel	Lab: % Sand	Lab: % Fines
	TOPSOIL Silty Sand (SM), medium dense, slightly moist, fine grained, dark brown 0.5						
	Silty SAND (SM) medium dense, slightly moist, fine grained, tan						
5							
	9.0						
	Poorly Graded GRAVEL (GP-GM) with silt and sand, medium dense, slightly moist, fine to coarse grained, red brown to multicolored						
10	10.5						

Test Pit terminated at 10.5 feet below existing ground surface. No groundwater observed.

Graphics Legend

Topsoil

SM

GP-GM

Water Levels

▽ -

▼ -

SOIL CLASSIFICATION CHART (ASTM D2487 & D2488)

MAJOR DIVISIONS		GROUP SYMBOL	TYPICAL SOIL NAMES
COARSE-GRAINED SOILS (>50% is retained on the #200 sieve)	GRAVEL	GW	Well-graded gravel, gravel-sand mixtures, little or no fines.
		GP	Poorly-graded gravel, gravel-sand mixtures, little or no fines.
		GM	Silty gravel, gravel-sand-silt mixtures.
		GC	Clayey gravel, gravel-sand-silt-clay mixtures.
	SAND	SW	Well-graded sand, gravelly sand, little or no fines.
		SP	Poorly-graded sand, gravelly sand, little or no fines.
		SM	Silty sand, sand-silt mixtures.
		SC	Clayey sand, sand-clay mixtures.
FINE-GRAINED SOILS (>50% passes through the #200 sieve)	SILT AND CLAY (Liquid Limit <50)	ML	Inorganic silt, non-plastic to low plasticity, gravelly silt, sandy silt, clayey silt.
		CL	Inorganic clay of low to medium plasticity, gravelly clay, sandy clay, silty clay (CL-ML), lean clay.
		OL	Organic silt and organic silty clay of low plasticity.
	SILT AND CLAY (Liquid Limit >50)	MH	Inorganic silt, micaceous or diatomaceous fine sandy or silty soils, elastic silt.
		CH	Inorganic clay of high plasticity, fat clay.
		OH	Organic clay of medium to high plasticity.
ORGANIC SOILS		PT	Peat and other highly organic soils.
MOISTURE		Dry	Absence of moisture in sample. Dusty, dry to the touch.
		Slightly Moist	Moisture in sample is below the optimum moisture content. Grains adhere slightly though surface tension.
		Moist	Moisture in sample is at or near optimum moisture content. No free water is visible.
		Wet	Moisture in sample is above the optimum moisture content. Free water is visible in sample.
CEMENTATION		Weak	Crumbles or breaks with handling or slight finger pressure.
		Moderate	Crumbles or breaks with considerable finger pressure.
		Strong	Will not crumble or break with finger pressure.

TYPICAL SOIL DESCRIPTORS

Description	SPT Blow Counts
Very loose	less than 4
Loose	4 to 10
Medium dense	11 to 29
Dense	30 to 50
Very dense	greater than 50

Material	Sieve Sizes
Boulders	greater than 12"
Cobbles	3" to <12"
Coarse gravel	3/4" to <3"
Fine gravel	#4 to <3/4"
Coarse sand	<#4 to #10
Medium sand	<#10 to #40
Fine sand	<#40 to #200
Silt or clay	less than #200

Sieve Number	Aperture
#4	4.76 mm (0.187 in)
#10	2.00 mm (0.0787 in)
#40	0.42 mm (0.0165 in)
#200	0.074 mm (0.00291 in)

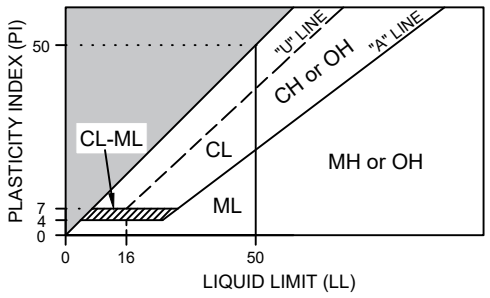
Description	SPT Blow Counts
Very soft	less than 2
Soft	2 to 3
Medium stiff	4 to 8
Stiff	9 to 15
Very stiff	16 to 29
Hard	30 to 50
Very Hard	greater than 50

Plasticity	Soil Characteristics
Non-plastic	Cannot be rolled at any water content.
Low	A thread can barely be rolled while moist.
Medium	A thread can be rolled easily but cannot be rerolled after reaching the plastic limit.
High	A thread can be rolled and re-rolled several times after reaching the plastic limit.

Definitions

Liquid Limit (LL)	Moisture content at which soil changes state from plastic to liquid.
Plastic Limit (PL)	Moisture content at which soil changes state from semi-solid to plastic.
Plasticity Index (PI)	Range of moisture contents at which a soil behaves plastically (LL-PL=PI).

PLASTICITY CHART (ASTM D4318)

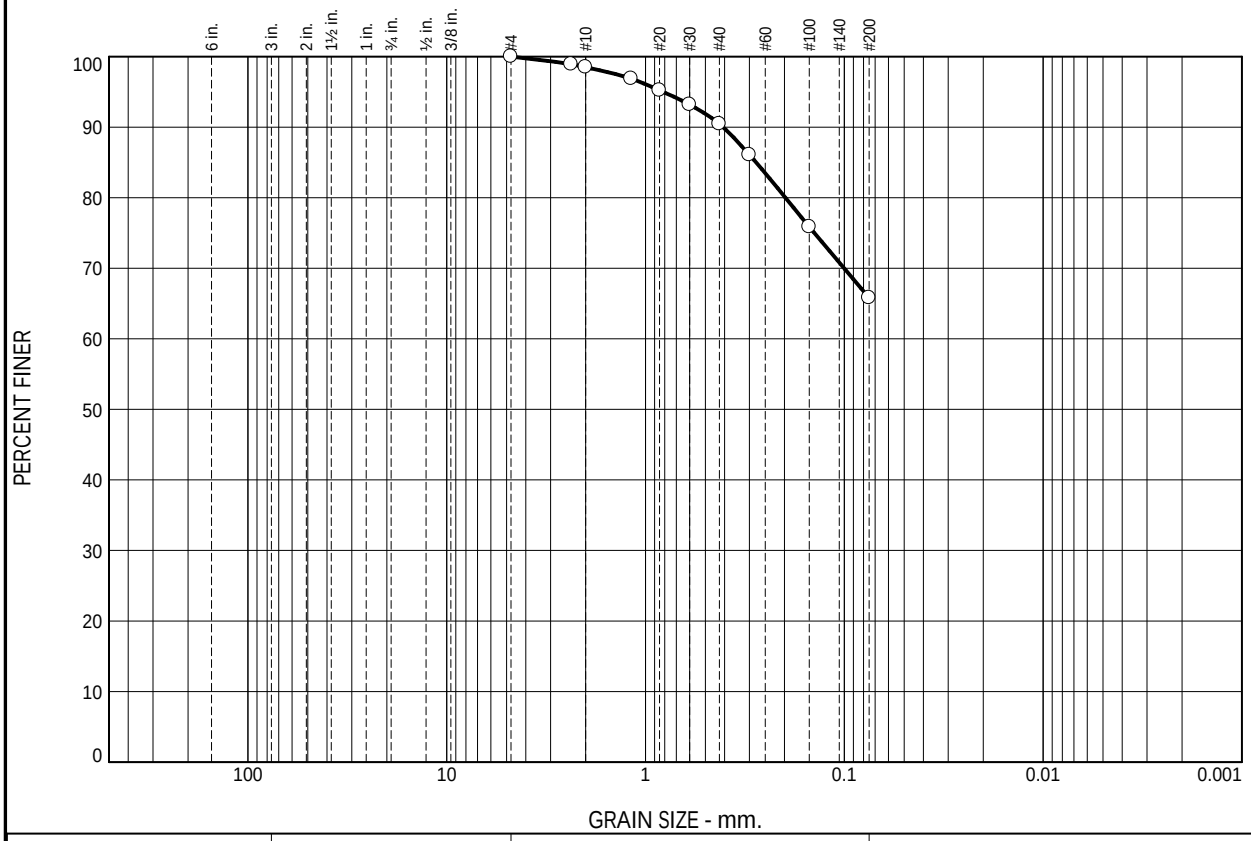


ALLWEST

Appendix C

Laboratory Test Results (Figures C-1 through C-5)

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	1	9	24	66	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100		
#8	99		
#10	99		
#16	97		
#20	95		
#30	93		
#40	90		
#50	86		
#100	76		
#200	66		

* (no specification provided)

Soil Description

Sandy Lean CLAY

Atterberg Limits

PL= 23 LL= 40 PI= 17

Coefficients

D_{90}= 0.4071 D_{85}= 0.2778 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(10)

Remarks

Sampled by H. Love (ALLWEST)
Wash Procedure A (entire sample)

Location: TP-03
Sample Number: S724-0001 Depth: 0.5'-1.75' Date: 1.24.2024

ALLWEST

Client: Woith Engineering, Inc.
Project: RYN Subdivision

Project No: 723-122G Figure C-1

Tested By: M. Miller Checked By: C. Warrick, PG

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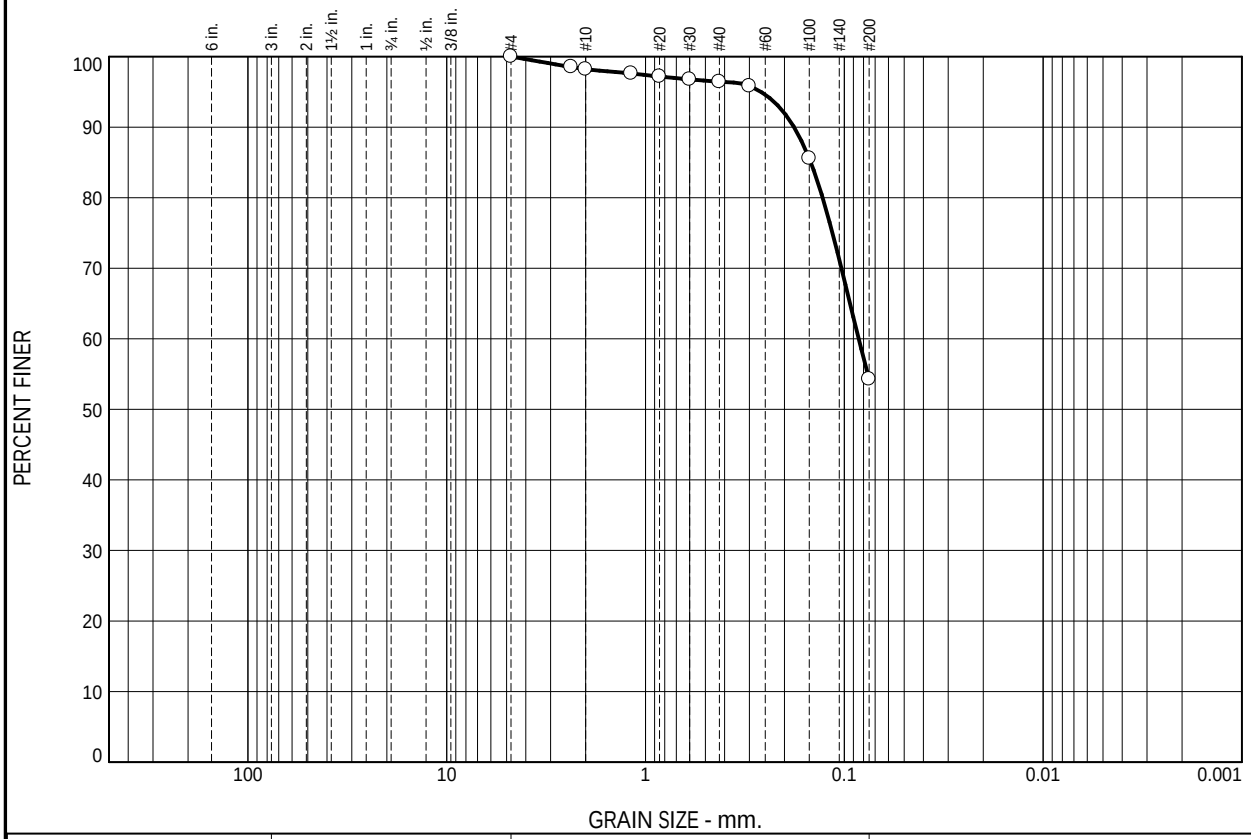
Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	2	2	42	54	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100		
#8	99		
#10	98		
#16	98		
#20	97		
#30	97		
#40	96		
#50	96		
#100	86		
#200	54		

* (no specification provided)

Soil Description

Sandy SILT

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.1791 D_{85}= 0.1473 D_{60}= 0.0846
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

Sampled by H. Love (ALLWEST)
Wash Procedure A (entire sample)

Location: TP-12
Sample Number: S724-0002 Depth: 0.75'-2.25' Date: 1.24.2024

ALLWEST

Client: Woith Engineering, Inc.
Project: RYN Subdivision

Project No: 723-122G Figure C-2

Tested By: M. Miller Checked By: C. Warrick, PG

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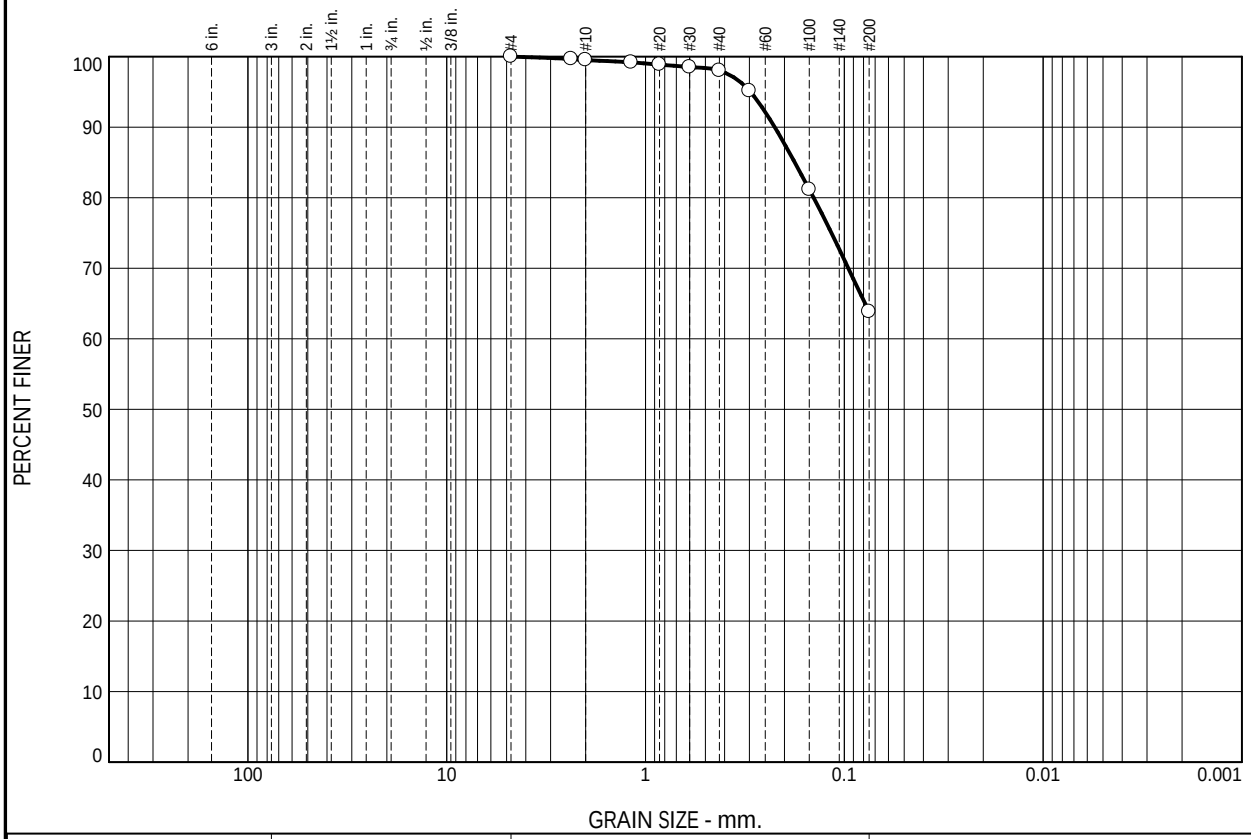
Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	2	34	64	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100		
#8	100		
#10	100		
#16	99		
#20	99		
#30	99		
#40	98		
#50	95		
#100	81		
#200	64		

* (no specification provided)

Soil Description

Sandy SILT

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.2239 D_{85}= 0.1777 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

Sampled by H. Love (ALLWEST)
Wash Procedure A (entire sample)

Location: TP-13
Sample Number: S724-0003 Depth: 2.0'-3.0' Date: 1.24.2024

ALLWEST

Client: Woith Engineering, Inc.
Project: RYN Subdivision

Project No: 723-122G Figure C-3

Tested By: M. Miller Checked By: C. Warrick, PG

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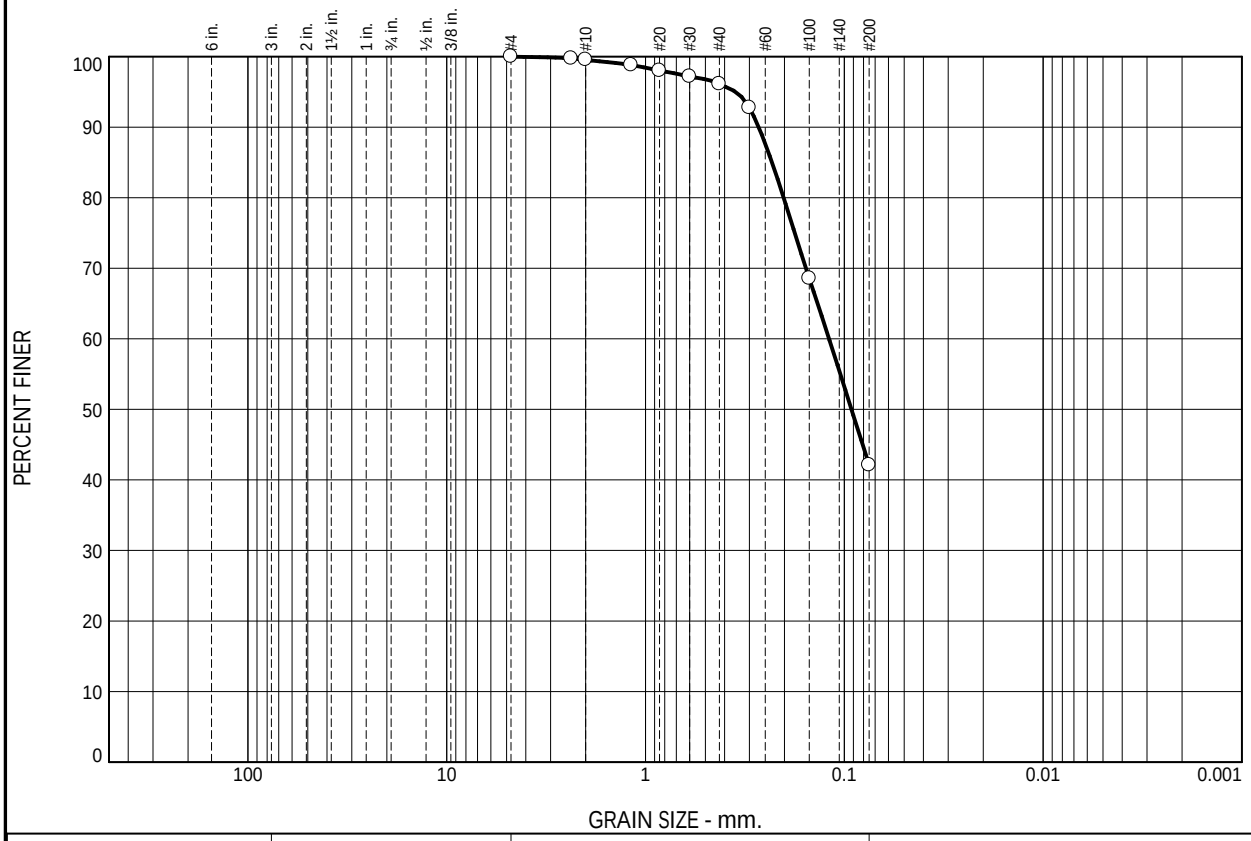
Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	4	54	42	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100		
#8	100		
#10	100		
#16	99		
#20	98		
#30	97		
#40	96		
#50	93		
#100	69		
#200	42		

* (no specification provided)

Soil Description

Silty SAND

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.2696 D_{85}= 0.2310 D_{60}= 0.1193
D_{50}= 0.0921 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-4(0)

Remarks

Sampled by H. Love (ALLWEST)
Wash Procedure A (entire sample)

Location: TP-18
Sample Number: S724-0004 Depth: 0.5'-1.5' Date: 1.24.2024

ALLWEST

Client: Woith Engineering, Inc.
Project: RYN Subdivision

Project No: 723-122G Figure C-4

Tested By: M. Miller Checked By: C. Warrick, PG

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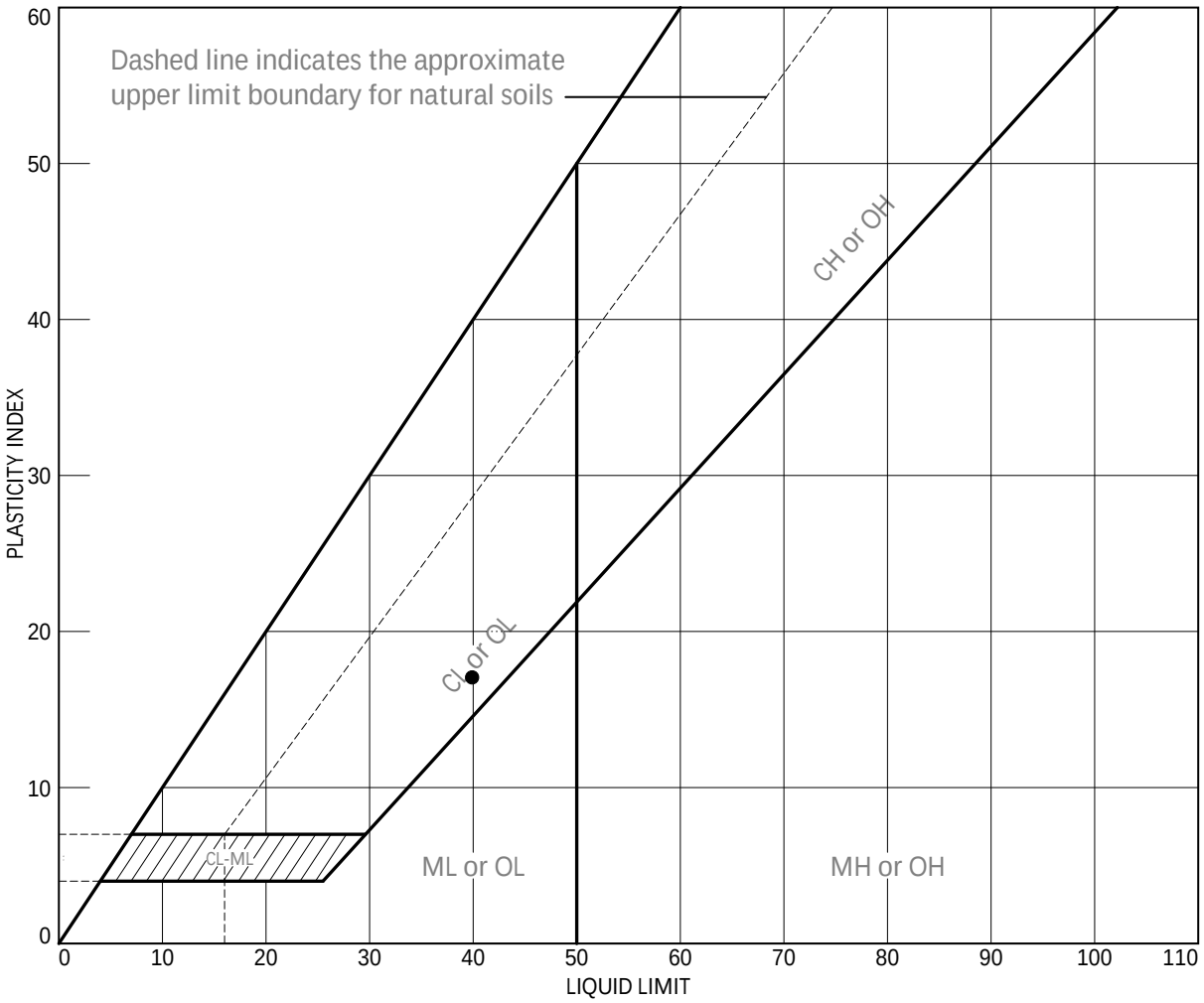
LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	TP-03	S724-0001	0.5'-1.75'	NT	23	40	17	CL
■	TP-12	S724-0002	0.75'-2.25'	NT	NP	NV	NP	ML
▲	TP-13	S724-0003	2.0'-3.0'	NT	NP	NV	NP	ML
◆	TP-18	S724-0004	0.5'-1.5'	NT	NP	NV	NP	SM

ALLWEST

Client: Woith Engineering, Inc.
Project: RYN Subdivision

Project No.: 723-122G Figure C-5

Tested By: H. Love Checked By: C. Warrick

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