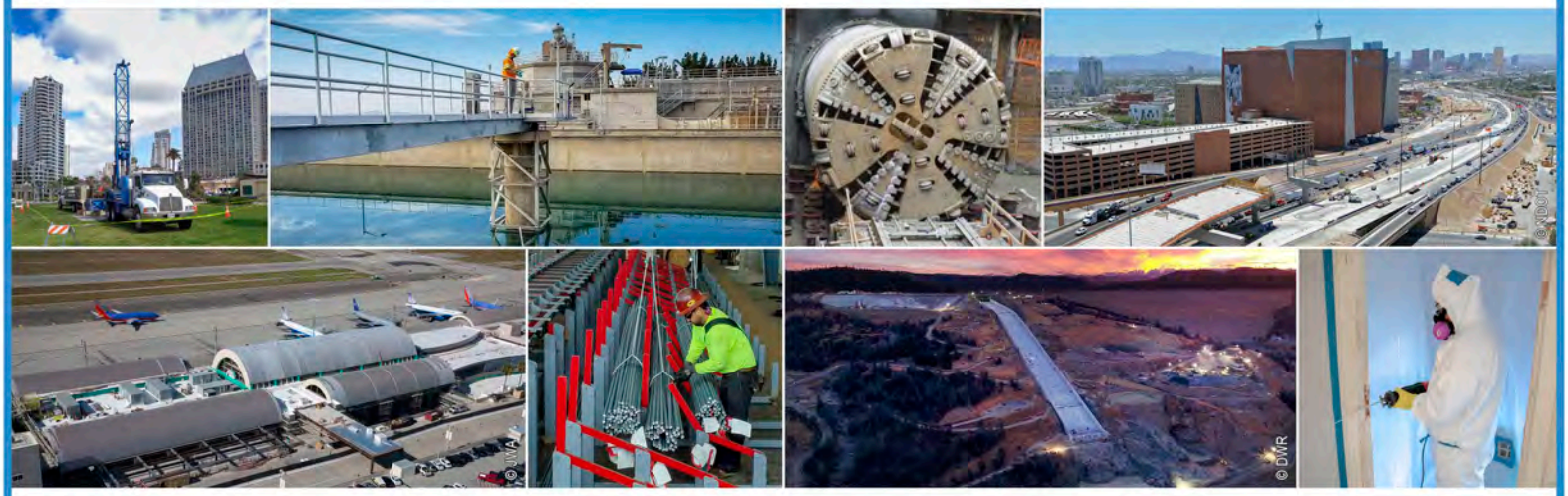
Geotechnical Evaluation
NW Wastewater MP Package 4B
51st Avenue Sewer
Phoenix, Arizona

Wilson Engineers

1620 West Fountainhead Parkway, Suite 501 | Tempe, Arizona 85282

October 20, 2023 | Project No. 606692006



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October 20, 2023
Project No. 606692006

Mr. Stephen M. Todd, PE
Wilson Engineers
1620 West Fountainhead Parkway, Suite 501
Tempe, Arizona 85282

Subject: Geotechnical Evaluation
NW Wastewater MP Package 4B
51st Avenue Sewer
Phoenix, Arizona

Dear Mr. Todd:

In accordance with our proposal dated March 25, 2022 and April 27, 2023, and your authorization, Ninyo & Moore has performed a geotechnical evaluation for the above-referenced project. The attached report presents our methodology, findings, conclusions, and recommendations regarding the geotechnical conditions at the project site.

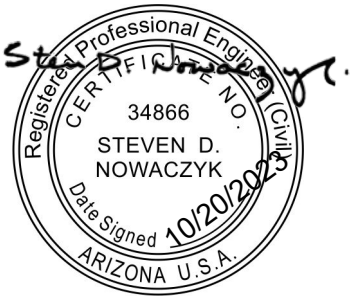
Ninyo & Moore appreciates the opportunity to be of service to you on this project.

Respectfully submitted,
NINYO & MOORE

Kenneth Rush III, PE
Senior Engineer

Steven D. Nowaczyk, PE
Managing Principal Engineer

KR/SDN/tlp



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1 INTRODUCTION

In accordance with our proposals dated March 25, 2022 and April 27, 2023, and your authorization, we have performed a geotechnical evaluation for the Northwest (NW) Wastewater Master Plan (MP) Package 4B, 51st Avenue Sewer project in Phoenix, Arizona. This project segment is situated from just north of the Central Arizona Project (CAP) canal to Pinnacle Peak within City of Phoenix right-of-way (ROW). The purpose of our evaluation was to assess the subsurface conditions at the project site in order to provide geotechnical recommendations for design and construction. This report presents the results of our evaluation, and our geotechnical considerations and recommendations regarding the proposed construction.

2 SCOPE OF SERVICES

The scope of our services for this project segment generally included:

- Reviewing readily available geotechnical data, aerial photographs, and published geologic literature, including maps and reports pertaining to the project site and vicinity.
- Conducting a geologic reconnaissance of the site.
- Marking out the boring locations at the project site and obtaining permits from City of Phoenix.
- Notifying Arizona 811 of the boring locations prior to drilling.
- Drilling, logging, and sampling 34 exploratory borings to a depth ranging approximately 5 to 59 feet below ground surface (bgs). The boring logs are presented in Appendix A.
- Collecting soil samples in the boring at approximately 2.5 and 5.0-foot intervals using ASTM International (ASTM) Methods D1586 (Standard Penetration Test with split-spoon barrel sampling of soils) and D3550 (ring-lined barrel sampling of soils) for laboratory testing and analysis.
- Performing laboratory tests on selected samples obtained from the boring to evaluate in-situ moisture content and dry density, gradation, Atterberg limits, consolidation and corrosivity characteristics (including pH, minimum electrical resistivity, and soluble sulfate and chloride contents). The in-situ moisture content and dry density results are presented on the boring logs in Appendix A. The remainder of the laboratory test results are presented in Appendix B.
- Preparing this report presenting our findings, conclusions, and recommendations regarding the design and construction of the project.

Our scope of services did not include environmental consulting services such as hazardous waste sampling or analytical testing at the site. A detailed scope of services and estimated fee for such services can be provided upon request.

3 SITE DESCRIPTION

The project segment we evaluated for this project is located along the existing 51st Avenue alignment and begins just north of the CAP and extends to Pinnacle Peak Road in Phoenix, Arizona (Figure 1), a distance of about 3.4 miles. At the time of our evaluation, the site consisted of paved roadways, sidewalks, curb and gutter and portions of alignment with unpaved shoulders. The site is bound by CAP to the north, residential development along most of the alignment and recreational areas to the south.

According to the Hedgpeth Hills, Arizona 7.5-Minute United States Geological Survey Topographic Quadrangle Map (2021), the site is at an average elevation of roughly 1,535 feet relative to mean sea level (MSL) and slopes south to roughly 1,370 feet MSL. Based on information from this topographic quadrangle map, the ground surface at the site vicinity is relatively flat, but slopes from north to south along the alignment.

4 AERIAL PHOTOGRAPH REVIEW

Aerial photographs dated 1953 through 2020 from the Maricopa County website were reviewed for this project. A summary of the observations noted for each aerial photograph is presented in Table 1:

Table 1 – Summary of Aerial Photograph Review

Photograph Date(s)	Site	Adjacent Properties	
1949, 1953	Undeveloped land with ephemeral washes.	North:	Undeveloped land with ephemeral washes.
		South:	Undeveloped land with ephemeral washes.
		East:	Undeveloped land with ephemeral washes. Mountains.
		West:	Undeveloped land with ephemeral washes. Mountains.

Table 1 – Summary of Aerial Photograph Review			
Photograph Date(s)	**Site**	**Adjacent Properties**	
1969, 1976, 1979, 1982, 1986	51st Avenue roadway from Happy Valley to Pinnacle Peak Road. Pinnacle Peak and Happy Valley roadways.	North:	Undeveloped land with ephemeral washes.
		South:	Undeveloped land with ephemeral washes.
		East:	Residential development south of Happy Valley Road. Mountains.
		West:	Residential development south of Happy Valley Road. Mountains.
1991, 1993, 1996, 200-2003	CAP Canal. 51st Avenue roadway from Happy Valley to Pinnacle Peak Road. Pinnacle Peak and Happy Valley roadways.	North:	Undeveloped land with ephemeral washes. CAP canal.
		South:	Recreational Areas.
		East:	Residential development south of Happy Valley Road and at northeast corner of Happy Valley Road and 51st Avenue. Mountains.
		West:	Residential development south of Happy Valley Road. Mountains.
2004-2020	51st Avenue (Stetson Parkway) from Happy Valley Road to CAP constructed.	North:	Undeveloped land with ephemeral washes. CAP canal.
		South:	Recreational Areas.
		East:	Residential development. Mountains.
		West:	Residential development. Mountains.

5 PROPOSED CONSTRUCTION

We understand that the project consists of the design and construction of a new forcemain and gravity sewer roughly extending along 51st Avenue, roughly from just north of the CAP to Pinnacle Peak Road. Associated junction and manhole structures will also be constructed. These structures are generally expected to extend on the order of 22 feet or less below grade, however, they will extend up to 50 feet bgs near the CAP canal. The new forcemain line and gravity sewer will typically extend less than 25 feet below grade. Much of the alignment will be constructed using traditional cut-and-cover methods; however, some segments will call for the utilization of trenchless construction techniques, specifically under the CAP canal where the new forcemain line and gravity sewer will extend less than 50 feet below grade.

6 FIELD EXPLORATION AND LABORATORY TESTING

On July 28, July 29, and August 5, 2022, and July 18 through July 25, 2023, Ninyo & Moore conducted a subsurface exploration at the site in order to evaluate the subsurface conditions and to collect soil samples for laboratory testing. Our evaluation consisted of drilling, logging, and sampling of 34 small-diameter borings using a CME-75 truck-mounted drill rig equipped with hollow-stem augers and TUBEX percussion drilling equipment. The borings, denoted as B-1 through B-29.1 (Figure 2), extended depths of approximately 5 to 59 feet bgs. Boring B-22 was terminated at a depth of 5 feet due to the presence of an unmarked waterline claimed by Maricopa County Parks Department. Bulk and relatively undisturbed soil samples were collected at selected intervals. Descriptions of the soils encountered are presented in the boring logs in Appendix A.

The soil samples collected from our drilling activities were transported to the Ninyo & Moore laboratory in Phoenix, Arizona. In addition, Ninyo & Moore performed laboratory tests on selected samples obtained from the boring to evaluate the in-situ moisture content and dry density, gradation, Atterberg limits, corrosivity characteristics (including pH, minimum electrical resistivity, and soluble sulfate and chloride contents).

The in-situ moisture content and dry density results are presented on the boring logs in Appendix A. A description of the laboratory testing as well as the remainder of the laboratory test results are presented in Appendix B.

7 GEOLOGY AND SUBSURFACE CONDITIONS

The geology and subsurface conditions at the site are described in the following sections.

7.1 Geologic Setting

The project site is located in the Sonoran Desert Section of the Basin and Range physiographic province, which is typified by broad alluvial valleys separated by steep, discontinuous, subparallel mountain ranges. The mountain ranges generally trend north-south and northwest-southeast. The basin floors consist of alluvium with thickness extending to several thousands of feet.

The basins and surrounding mountains were formed approximately 10 to 18 million years ago during the Mid- to Late-Tertiary. Extensional tectonics resulted in the formation of horsts (mountains) and grabens (basins) with vertical displacement along high-angle normal faults. Intermittent volcanic activity also occurred during this time. The surrounding basins filled with alluvium from the erosion of the surrounding mountains as well as from deposition from rivers.

Coarser-grained alluvial material was deposited at the margins of the basins near the mountains.

The surficial geology of the site is described as late to early middle Pleistocene (10,000 to 790,000 years) age sand, gravel and cobble deposits (Demsey, 1988). The United States Department of Agriculture Web Soil Survey described the site as generally consisting of Carefree Cobbly Clay Loam, Tremant Gravelly Sandy Loam and Suncity-Cipriano complex. Loam is an agriculture soil classification that refers to a soil comprised of a mixture of clay, silt, and sand.

7.2 Subsurface Conditions

Our knowledge of the subsurface conditions at the project site is based on the results of our exploratory borings and our understanding of the general geology of the area. The boring logs contain our field test results, as well as our interpretation of the conditions anticipated to exist between actual samples retrieved. Therefore, the boring logs contain both factual and interpretive information. Lines delineating subsurface strata on the boring logs are intended to group soils having similar engineering properties and characteristics. They should be considered approximate, as the actual transition between soil types may be gradual. Detailed stratigraphic information as well as a key to the soil symbols and terms used on the boring logs are provided in Appendix A.

7.2.1 Asphalt Concrete and Aggregate Fill

Asphalt concrete (AC) was encountered at the surface of each of our borings except borings B-1, B-1.1, B-5.1, B-12, B-13, B-21.1, and B-29.1 was measured to be 5 to 8 inches thick at our exploration locations. Aggregate fill (AB) material was encountered below the AC within our borings and was measured to be 4 to 7 inches thick.

7.2.2 Fill

Undocumented fill soils were encountered at the surface of boring B-1, B-1.1, B-5.1, and B-21.1; and below the AB in borings, B-2.1, B-3.1, B-22, B-25 and B-28 to depths of approximately 2.0 to 6.0 feet bgs. The fill generally consisted of clayey sand (SC) and silty sand (SM) with varying amounts of gravel in our borings.

7.2.3 Alluvium

Native alluvium soil was encountered below the fill soil described above, at the surface in boring B-29.1 and below the AB in our remaining borings, and extended to the boring termination depths. In our borings, the alluvium generally consisted of medium dense to very dense clayey sands (SC), dense to very dense silty sands (SM), very dense gravel (GM) and very stiff to hard sandy lean clay and fat clay (CL, CH). Varying quantities of gravel and scattered caliche were also observed in our borings.

7.2.4 Groundwater

Groundwater was not encountered in our borings. Based on well data from the Arizona Department of Water Resources, the depth to groundwater has been estimated to be about 140 to 200 feet bgs along the alignment. Groundwater levels can fluctuate due to seasonal variations, irrigation, groundwater withdrawal or injection, and other factors.

8 GEOLOGIC HAZARDS

The following sections describe regional geologic hazards, including land subsidence, earth fissures, faults, and liquefaction.

8.1 Land Subsidence and Earth Fissures

Groundwater depletion, due to groundwater pumping, has caused land subsidence and earth fissures in numerous alluvial basins in Arizona. It has been estimated that subsidence has affected more than 3,000 square miles and has caused damage to a variety of engineered structures and agricultural land. From 1948 to 1983, excessive groundwater withdrawal has been documented in several alluvial valleys where groundwater levels have been reportedly lowered by up to 500 feet. With such large depletions of groundwater, the alluvium has undergone consolidation resulting in large areas of land subsidence (Schumann and Genualdi, 1986).

In Arizona, earth fissures are generally associated with land subsidence and pose an ongoing geologic hazard. Earth fissures generally form near the margins of geomorphic basins where significant amounts of groundwater depletion have occurred. Earth fissures form due to tensional stress caused by differential subsidence of the unconsolidated alluvial materials over buried bedrock ridges and irregular bedrock surfaces.

Based on our field reconnaissance and review of the referenced material, there are no known or exposed earth-fissures present at the subject site. The closest documented earth fissure to this site is approximately 16 miles to the southeast of the site (AZGS, 2017). Continued groundwater withdrawal in the area may result in subsidence of the valley and the formation of new fissures or the extension of existing fissures. In general, land subsidence and earth fissures are not considered to be a constraint to development on this project site.

8.2 Faulting and Seismicity

The site lies within the Sonoran zone, which is a relatively stable tectonic region located in southwestern Arizona, southeastern California, southern Nevada, and northern Mexico (Euge et al., 1992). This zone is characterized by sparse seismicity and few Quaternary faults. Based on our field observations, review of pertinent geologic data, and analysis of aerial photographs, Quaternary faults are not located on or adjacent to the property.

The closest documented Quaternary fault to the site is the Carefree Fault Zone, located approximately 19 miles to the northeast of the site (Pearthree, 1998). Approximately 2 meters of displacement has occurred along this fault within middle to late Pleistocene deposits (200,000 to 750,000 years), but the Holocene deposits (<250,000 years) are not displaced. Seismic design considerations are provided in Section 10.3.

9 GEOTECHNICAL CONSIDERATIONS

Based on the results of our subsurface evaluation, laboratory testing, and data analysis, it is our opinion that the proposed construction is feasible from a geotechnical standpoint, provided that the recommendations of this report are incorporated into the design and construction of the proposed project, as appropriate. Geotechnical considerations include the following:

- Due to the widely spaced nature of our borings, soil conditions that differ from what was encountered in our borings may be encountered during construction.
- Earthwork contractors should be made aware of the moisture sensitivity of the near surface silty and clayey soils and potential compaction difficulties.
- The near-surface on-site materials are considered generally excavatable with heavy-duty earthmoving equipment. However, very dense sands, variable percentages of gravel, strong levels of cementation, varying amounts of caliche, as well as cobbles and possibility boulders were encountered in our borings at various depths, which could be more difficult to excavate during construction.
- Imported soils and soils generated from on-site excavation activities that exhibit relatively low plasticity and low organic contents can generally be used as engineered fill. On the basis of our limited evaluation, some of the on-site soils are not considered suitable for re-use as engineered fill, if supporting settlement-sensitive features.

- Pipeline trenches may capture surface or subsurface flows because the bedding material may be more pervious than the adjacent native soils.

- Pipes and connections should be designed with sufficient flexibility to avoid damage at connections due to settlement of backfill.

- Groundwater was not observed in our borings. The static groundwater table is anticipated to be approximately 140 to 200 feet bgs based on the nearby well data. In general, groundwater is not anticipated to be a constraint to the construction of the project; however, wet conditions should be anticipated during construction due to the presence of ephemeral washes crossing the site.

- Corrosivity test results indicate that subgrade soils at the site are considered corrosive to ferrous metals, and the sulfate content of the soils present a negligible sulfate exposure to concrete.

- No known or reported geologic hazards are present underlying or immediately adjacent to the site.

10 RECOMMENDATIONS

The following sections present our geotechnical recommendations and were developed based on our understanding of the proposed construction (Section 5), the observed subsurface conditions (Section 7.2), and our experience. If the proposed construction is changed from that discussed herein or subsurface conditions other than those shown on the boring logs (Appendix A) are observed at the time of construction, Ninyo & Moore should be retained to conduct a review of the new information and to evaluate the need for additional recommendations.

10.1 Earthwork

In general, the recommendations and guidelines outlined in the Maricopa Association of Governments (MAG) Standard Specifications and Details and/or any City of Phoenix supplement should be used unless recommended differently herein. If the proposed construction is changed from that discussed in this report, Ninyo & Moore should be contacted for additional recommendations. Soil conditions not observed in our boring may be encountered during construction.

10.1.1 Wet Weather Conditions

Earthwork contractors should be made aware of the moisture sensitivity of the near surface clayey and/or silty soils and potential compaction difficulties. If construction is undertaken during wet weather conditions, the surficial soils may become saturated, soft, and

unworkable. Therefore, we recommend that consideration be given to construction during the dryer months and positive drainage be established and maintained during construction.

10.1.2 Excavations

Our evaluation of the excavation characteristics of the on-site materials is based on the results of our exploratory boring, site observations, and experience with similar materials. Excavation of the materials can generally be accomplished with heavy-duty earthmoving equipment. However; very dense sands, as well as varying amounts of gravel and caliche as well as cobbles and possibility boulders were encountered in our boring and may be more difficult to excavate and/or slow the rate of excavation during construction.

The contractor should provide safely sloped excavations or an adequately constructed and braced shoring system, in compliance with Occupational Safety and Health Administration (OSHA) regulations for employees working in an excavation that may expose employees to the danger of moving ground. If material is stored or equipment is operated near an excavation, stronger shoring should be used to resist the extra pressure due to superimposed loads.

The contractor should provide safely sloped excavations or an adequately constructed and braced shoring system in compliance with OSHA Regulations for employees working in an excavation that may expose them to the danger of moving ground. Based on the soil conditions at the site, we recommend that OSHA Soil “Type C” classification be used for excavations at the site. This corresponds to temporary slopes of 1.5:1 (horizontal: vertical). This side slope is for excavations that are less than 20 feet deep. If material is stored or equipment is operated near an excavation, stronger shoring should be used to resist the extra pressure due to superimposed loads.

If the proposed construction extends deeper than the extent of our test boring in any part of this project, Ninyo & Moore should be contacted for additional consultation and possible further evaluation of the subsurface materials.

10.1.3 Subgrade Improvement

We recommend that new deeper foundations associated with the junction and manhole structures be supported on a zone of adequately moisture conditioned and compacted engineered fill that extends 6 inches below the foundation level. This improvement zone should be moisture conditioned and compacted in accordance with Section 10.1.10 of this report.

10.1.4 Bottom Stability

The proposed excavations are not anticipated to encounter significant groundwater (with the possible exception of surface run-off or perched zones) during construction. Therefore, trench bottom stability problems during construction are generally not anticipated at this site. However, if excavations are to be located within the wash or floodplain, if the excavations are open during a heavy rain event, the trench material(s) might become saturated and unstable and a dewatering system may be needed for these conditions. Should this occur, further remedial measures may be needed.

10.1.5 Construction Dewatering

Surface run-off, and perched groundwater will vary seasonally depending on rainfall in the site vicinity. Excavations that do encounter surface run-off (if any) could be dewatered by pumping the water out from the bottom and away from the excavation. However, heavily saturated units or perched groundwater zones, if encountered, may call for more aggressive means of dewatering and consultation with a qualified expert. Discharge of water from the excavations to natural drainage channels may entail securing a special permit.

10.1.6 Vertical Shoring and Trench Boxes

Because of the cohesionless nature of some of the on-site soils, the proposed depths of the excavations, and presence of existing utilities and structures (e.g., roadways, utilities, and buildings), it may be preferable to shore or brace new excavations rather than using open cuts to the base of the excavations. Temporary earth retaining systems will be subjected to lateral loads resulting from earth pressures. Shored and braced trench excavations may be designed using the parameters on Figure 3.

The earth pressure values presented on Figure 3 assume that spoils from the excavation or other surcharge loads will not be placed above the excavation within a 1:1 (H:V) plane extending up and back from the base of the excavation. If spoil piles are placed closer than this to the braced excavation, the resulting surcharge loads should be considered in the bracing design. We recommend that an experienced structural engineer design the shoring system. The shoring parameters presented in this report should be considered as guidelines.

The contractor should anticipate repairing cracks in pavements adjacent to shored portions of the excavation due to anticipated lateral displacements of the shoring system. Horizontal and vertical movements of the shoring system should be monitored by a surveyor and the results reviewed by the project Geotechnical Engineer.

Trench boxes may also be a suitable alternative to laying back the side walls; however, due to the presence of granular soils, the excavations may not stand open long enough to install the trench boxes. The contractor should be prepared to deal with these soil conditions and plan accordingly. Once installed, some sloughing is possible at the ends of the trench box; therefore, any loose material should be removed prior to backfilling of the trench.

10.1.7 Pipe Bedding and Modulus of Soil Reaction (E')

We recommend new pipelines being installed using cut-and-cover techniques be supported on 4 inches, or 1/12th the outside diameter of the pipe, (whichever is thicker) or more of granular bedding material such as sand and gravel, or crushed rock meeting the MAG Section 702 Standard Specifications (pea gravel or crushed chips are not acceptable). This bedding/pipe-zone backfill should extend 1 foot above the pipe crown. Care should be taken not to allow voids to form beneath the pipe (i.e., the pipe haunches should be continuously supported) to avoid damaging the pipeline. This may involve fill placement by hand or small compaction equipment. The pipe bedding should be moisture-conditioned and compacted as discussed in Section 10.1.10. Pipe bedding guidelines are presented on Figure 4.

The modulus of soil reaction (E´) is used to characterize the stiffness of soil backfill placed on the sides of buried pipelines for the purpose of evaluating deflection caused by the weight of the backfill over the pipe. Based on MAG guidelines, the definition of "granular backfill" material is material which the sum of the plasticity index (PI) and the percent of material passing a No. 200 sieve does not exceed 23.

E' for native materials will vary with material type and stiffness of the trench sidewalls. Approximate values of E' for the materials encountered in our boring are presented in Table 2 below.

Table 2 – Modulus of Soil Reaction (E') for Native Soils			
Trench Wall Soil Classification (USCS)	Approximate E' (psi)		
	Loose/Firm	Medium Dense/ Stiff	Dense – Very Dense/ Stiff-Hard
Sandy Silt/Clay (ML, CL, CH)	200	500	1500
Clayey Sand, Silty Sand (SC, SM)	400	1000	2000

10.1.8 Fill Materials

On-site and imported soils that exhibit relatively low plasticity indices are generally suitable for re-use as engineered fill. For this site, we recommend engineered fill should have a PI of 15 or less, as evaluated by ASTM D4318. Higher PI value soils (up to a PI value of 25) can be placed as trench backfill, provided these soils are situated deeper than 3 feet below a new pavement or slab surface and 1 or more foot above the top of the pipe.

In addition, suitable fill should not include construction debris, organic material, or other non-soil fill materials. Clay lumps and rock particles should not be larger than 4 inches in dimension. Unsuitable fill material should be disposed of off-site or in non-structural areas.

Imported fill, if used, should consist of soils with a relatively low PI (15 or less). Import material in contact with ferrous metals should preferably have low corrosion potential (minimum resistivity more than 2,000 ohm-cm, chloride content less than 25 parts per million [ppm]). In lieu of this, corrosion protection techniques (e.g., cathodic protection, pipe wrapping, etc.) can be implemented. A corrosion specialist should be consulted for recommendations of an appropriate corrosion protection technique. Imported material in contact with concrete should have a soluble sulfate content of less than 0.1 percent. The geotechnical consultant should evaluate such materials and details of their placement prior to importation.

10.1.9 Re-use of On-Site Soils

The Atterberg limits tests performed on soil samples obtained from our boring resulted in PI ranging from zero (non-plastic) to 28. Based on our test results, some of the on-site soils are not considered suitable for re-use as engineered fill, if supporting settlement-sensitive features for this project. Higher PI value soils (up to a PI value of 25) can be placed as trench backfill, provided these soils are situated deeper than 3 feet below a new pavement or slab surface and 1 or more foot above the top of the pipe. Additional field sampling and

laboratory testing should be conducted by the contractor either prior to or during construction to better screen for unsuitable materials.

10.1.10 Engineered Fill Placement and Compaction

Engineered fill should be moisture-conditioned within the moisture range shown below in Table 3 and mechanically compacted to the percent compaction shown. Engineered fill should generally be placed in 8-inch-thick loose lifts such that each lift is firm and non-yielding under the weight of construction equipment.

Engineered fill used to raise grade will settle a portion of its height due to its own weight prior to construction of the foundation systems. The magnitude of this settlement will depend on the type of fill used. In general, the engineered fill recommended in this report is expected to settle about 1 percent of its height.

Table 3 – Compaction Recommendations

Engineered Fill Description	Percent Compaction per ASTM D698	Moisture Content
Below grade structures	95 percent	-1% to +2 percent of optimum
Granular Trench Backfill – Within 2 feet below pavements	100 percent	±2 percent of optimum
Non-Granular* Trench Backfill – Within 2 feet below pavement	95 percent	-1% to +2 percent of optimum
Trench Backfill – Deeper than 2 feet below pavement	95 percent	

Note:
*Based on MAG guidelines, the definition of "granular backfill" materials is material in which the sum of the PI and the percent of material passing a No. 200 sieve does not exceed 23.

An earthwork (shrinkage) factor of 10 to 20 percent is estimated. This shrinkage factor range represents an average of the material tested and assumes that materials excavated from the site will be placed as fill. Potential bidders should consider this in preparing estimates and should review the available data to make their own conclusions regarding excavation conditions.

10.1.11 Controlled Low Strength Material (CLSM)

As an alternative to engineered fill, the backfill zones may be filled with either CLSM. CLSM consists of a fluid, workable mixture of aggregate, Portland cement, and water. The use of CLSM has some advantages:

- A narrower backfill zone can be used, thereby minimizing the quantity of soil to be excavated and possibly reducing disturbance to the near-by structures.
- Relatively higher E' values may be used (E'= 3,000 psi).
- The support given to the connecting pipes is generally better.
- Because little compaction is needed to place CLSM, there is less risk of damaging the connecting pipes.
- CLSM can be batched to flow into irregularities in the trench bottom and walls.

The CLSM design mix should be in accordance with current MAG or Standard Specifications for Public Works Construction standards. Additional mix design information can be provided upon request.

Buoyant or uplift forces on the piping should be considered when using CLSM and prudent construction techniques may result in multiple pours to avoid inducing excessive uplift forces. Sufficient time should be provided to allow the CLSM to cure before placing additional lifts of CLSM or trench backfill.

10.2 Trenchless Installation

Trenchless installation methods (i.e., jack-and-bore or micro-tunneling operations) may be needed to cross under roadways, washes, utilities and/or storm drains along the project alignment. However, as previously described in Section 7.2, very dense gravel and sands with varying quantities of gravel, scattered caliche nodules and strong levels of cementation, as well as cobbles and possibility boulders were encountered in our borings at various depths, which could be more difficult to excavate during construction and may pose challenges to trenchless installations.

Caving of the pipe shaft may occur, particularly if relative loose or wet surface soils are present. For stability and safety purposes, and to reduce ground movement, a perimeter shaft support system (carrier casing) should be installed as the excavation progresses.

Following the installation of the utility inside the carrier casing, the annulus space should be infilled with fine gravel or sand that is blown in with air from the end or CLSM. A portion of the gravel or sand could be blown first (so as to fill under the haunches of the utility) to reduce the potential for future movement of the pipe.

We recommend that the contractor be responsible for the design of access shaft shapes, dimensions and ground support of the system for the launching and receiving pit excavations so that such design can be compatible with their construction equipment and methods. Soldier piles with lagging or other types of shored excavation may serve as a suitable system for this project. Driven sheeting may be difficult to install because of the hard ground conditions and the possibility of encountering very dense sands or caliche soils. In addition, driven sheeting may cause real and perceived damage by vibrations to nearby structures.

Jacking reaction force is developed by passive soil pressure resistance to the jacking operation against the surface of the opposite wall of the jacking pit. For the case of jacking pit geometry, which consists of a vertical face extending to the horizontal ground surface, an allowable passive resistance of 200 pounds per square foot per foot of depth may be used. This value assumes no groundwater conditions. For different jacking pit geometry, we should be contacted for supplemental recommendations.

Surface subsidence associated with these operations was not evaluated as part of our analysis. Nevertheless, the contractor should implement a monitoring program during these operations to observe any ground movement above and adjacent to the pipe being installed. If signs of subsidence or disturbance are noted, construction operations should be stopped to address the ground movement. The integrity of nearby utilities, roadways and structures will need to be protected during these operations.

10.2.1 Trenchless Installation Considerations

Excavations using trenchless construction techniques may encounter soils of little to no cohesion, as described previously in this report. If granular and/or cohesionless material occurs near the crown, the possibility exists for a “run-in” which could result in voids above the tunnel or a sinkhole at the ground surface. When granular materials are encountered at the invert, the possibility exists for bottom instability and difficulty in maintaining vertical alignment of the tunnel. Granular materials containing appreciable amount of silt or clay behave more favorably to tunneling techniques than clean sands, although not as well as cohesive soils. The contractor should be made aware of the potential for the difficult tunneling conditions described above, and plans for them accordingly.

In addition to the installation techniques described above, we also recommend that the installation of the pipe be continued with as little interruptions as possible. A delay in the advancement of the pipe sections within the tunnel can allow for set-up of the surrounding soils in contact with the pipe, causing increased frictional resistance along the surface of the pipe.

10.3 Seismic Design Parameters

Design of the proposed improvements should be performed in accordance with the requirements of the governing jurisdictions and applicable building codes. Table 4 presents the seismic design parameters for the site in accordance with ASCE 7 guidelines and adjusted maximum considered earthquake spectral response acceleration parameters evaluated using the USGS ground motion calculator (web-based):

Table 4 – ASCE 7 Seismic Design Criteria

Seismic Design Factors	Value
Site Class	D
Site Coefficient, F_a	1.6
Site Coefficient, F_v	2.4
Mapped Spectral Response Acceleration at 0.2-second Period, S_s	0.228 g
Mapped Spectral Response Acceleration at 1.0-second Period, S_1	0.075 g
Spectral Response Acceleration at 0.2-second Period Adjusted for Site Class, S_{MS}	0.365 g
Spectral Response Acceleration at 1.0-second Period Adjusted for Site Class, S_{M1}	0.179 g
Design Spectral Response Acceleration at 0.2-second Period, S_{DS}	0.244 g
Design Spectral Response Acceleration at 1.0-second Period, S_{D1}	0.119 g

10.4 Foundations

Based on the results of the field and laboratory evaluations, it is our opinion that the proposed junction and manhole structures can be founded on mat foundations. Recommendations for these foundation systems are presented below.

Mat foundations should be supported on engineered fill, as described in Section 10.1.3. Based on the available soil boring information, mat foundations may be designed using a net allowable bearing capacity of 4,000 psf for static conditions and a Modulus of Subgrade reaction of

200 pounds per cubic inch. Total and differential settlement of up to about 1 inch and ½ inch respectively, may occur. Differential settlements will depend upon the structural rigidity of the mat. For settlement sensitive structures that call for settlements less than the values provided above, we recommend that the structures be supported on deep foundations such as cast-in-place drilled shafts. Detailed settlement analyses should be performed during the design phase of the project when the actual building location and dimensions have been established. Recommendations related to cast-in-place drilled shafts (if needed) are not included in this report and can be provided under a separate cover letter.

10.5 Below-Grade Walls

Earth pressures are used to compute the lateral forces acting on below-grade structures. These pressures can be classified as at-rest, active, and passive. The direction and magnitude of the soil/wall movement just before failure affects the resulting pressure condition. At-rest conditions exist when there is no movement, such as for a restrained wall. Active stresses are exerted when the wall moves out and the soil moves toward the wall away from the soil mass, thereby mobilizing the shear strength of the soil. The active pressures are fully mobilized at horizontal movements of about 0.1 percent of the wall height for cohesionless soils such as sands and gravels. Passive stresses exist when the wall moved toward the soil mass. Movement typically needed to mobilize passive pressures greatly exceeds that needed to mobilize active pressures. The passive pressure is, therefore, rarely fully mobilized and are often overestimated when used to compute resistance forces. The recommended equivalent fluid pressures in Table 5 assume horizontal, free-draining, unsaturated granular backfill, with an angle of internal friction of 30 degrees, a unit weight equal to about 120 pcf, and static conditions.

Table 5 – Lateral Earth (Equivalent Fluid) Pressures

Soil Condition	Active Pressure (pcf)	At-rest Pressure (pcf)	Passive Pressure (pcf)
Unsaturated	40	60	360
Saturated	19 + (plus hydrostatic)	29 + (plus hydrostatic)	--

The use of heavy compaction equipment adjacent to below-grade walls could result in lateral earth pressures well in excess of those predicted in Table 5.

The pressures given in the first row of the table above are for unsaturated conditions. If water is allowed to accumulate behind the walls, then hydrostatic pressure should be added to the pressures of the saturated pressures shown in the second row of Table 5. Hydrostatic pressure should be calculated as a triangular area. The lower leg of this triangle should start at the

bottom of the wall with its pressure at this depth equivalent to 62.4 times the height of the groundwater column above this depth. The hydrostatic pressure should linearly increase with increasing depth. The top of the triangle should extend to the surface of the highest groundwater level, at which point the hydrostatic pressure will be zero.

Measures should be taken so that moisture does not build up behind the below-grade walls unless hydrostatic pressures are incorporated into the structural design. If desired, back drainage measures may be used and could include free-draining backfill material and perforated drain pipes or weepholes. Below-grade and retaining walls should be dampproofed or waterproofed in accordance with the recommendations of the project civil engineer. Waterstops and keyways should be used at construction and expansion joints.

Unless walls are designed to withstand hydrostatic forces, backfill material used within 18 inches behind below-grade and above-grade retaining walls should preferably consist of well-graded granular soils, with less than 5 percent passing the No. 200 sieve. This material should be in intimate contact with the wall's back drainage systems. We recommend that the upper 24 inches of soil not protected by pavement or a concrete slab, be neglected when calculating passing resistance. For frictional resistance to lateral loads, we recommend that an ultimate coefficient of friction of 0.40 be used between soil and concrete.

10.6 Corrosion

The corrosion potential of the on-site materials was tested to evaluate its potential effect on the foundations and structures. Our corrosion evaluation of the on-site soils is based on the results of our field and laboratory testing done for this project. A corrosion specialist should perform their own analysis.

Laboratory testing consisted of pH, minimum electrical resistivity, and chloride and soluble sulfate contents. The pH and minimum electrical resistivity tests were performed in general accordance with Arizona Test 236c, while sulfate and chloride tests were performed in accordance with Arizona Test 733 and 736, respectively. The results of these corrosivity tests are presented in Appendix B.

The soil pH values of the selected samples tested from our borings ranged from 7.0 to 9.8, which is considered to be alkaline. The minimum electrical resistivity of the samples tested were 804 and 2,506 ohm-cm, which is considered corrosive to ferrous materials. The chloride content of the samples tested were 3 and 102 ppm, which is also considered to represent a corrosive environment for ferrous materials. The soluble sulfate content of the soil samples tested ranged

between 0.0003 and 0.0097 percent, which is considered to represent a negligible sulfate exposure for concrete.

The results of the laboratory testing indicate that the on-site materials are corrosive to ferrous materials. To reduce the corrosion potential of buried metallic utilities, we recommend that topsoil, organic soils, soils, and mixtures of sand and clay not be placed adjacent to buried metallic utilities. Rather, we suggest a relatively clean sand and/or gravel, or CLSM, be placed around buried metal piping. Also, buried utilities of different metallic construction should be electrically isolated from each other to reduce galvanic corrosion problems. In addition, new piping should be electrically isolated from old piping so that the old metal will not increase the corrosion rate of the new metal. A corrosion specialist should be consulted for further recommendations.

10.7 Concrete

Laboratory chemical testing performed on an on-site soil samples indicates a sulfate content between 0.0003 and 0.0097 percent by weight, which represents a negligible sulfate exposure for concrete. Based on the following American Concrete Institute (ACI) table (Table 6), the on-site soils should be considered to have negligible sulfate exposure to concrete. Based on the sulfate test results, and based on our experience with similar soil conditions, the specific use of the facility, and nearby practice, we recommend the use of sulfate resistant cement (Type II or similar) for construction of concrete structures at this site. Due to potential uncertainties as to the use of reclaimed irrigation water, or topsoil that may contain higher sulfate contents, pozzolan or admixtures designed to increase sulfate resistance may be considered.

Table 6 – ACI Requirements for Concrete Exposed to Sulfate-Containing Soil

Sulfate Exposure	Water-Soluble Sulfate (SO_4) in Soil, Percentage by Weight	Cement Type	Water-Cementitious Materials Ratio, by Weight, Normal-Weight Aggregate Concrete[1]	f'c, Normal-Weight and Lightweight Aggregate Concrete, psi x 0.00689 for MPa
Negligible	0.00 - 0.10	--	--	--
Moderate[2]	0.10 - 0.20	II, IP(MS), IS (MS)	0.50 or less	4,000 or more
Severe	0.20 - 2.00	V	0.45 or less	4,500 or more
Very severe	Over 2.00	V plus pozzolan[3]	0.45 or less	4,500 or more

Notes:

[1] A lower water-cementitious materials ratio or higher strength may be needed for low permeability or for protection against corrosion of embedded items or freezing and thawing (ACI Table 4.2.2).

[2] Seawater.

[3] Pozzolan that has been evaluated by test or service record to improve sulfate resistance when used in concrete containing Type V cement.

We recommend that the structural concrete have a water-cementitious materials ratio no more than 0.50 by weight for normal weight aggregate concrete. The structural engineer should ultimately select the concrete design strength based on the project specific loading conditions. Higher strength concrete may be selected for increased durability and resistance to slab curling and shrinkage cracking.

10.8 Pre-Construction Conference

We recommend that a pre-construction conference be held. Representatives of the owner, civil engineer, the geotechnical consultant, and the contractor should be in attendance to discuss the project plans and schedule. Our office should be notified if the project description included herein is incorrect, or if the project characteristics are significantly changed.

10.9 Construction Observation and Testing

During construction operations, we recommend that a qualified geotechnical consultant perform observation and testing services for the project. These services should be performed to evaluate exposed subgrade conditions, including the extent and depth of overexcavation, to evaluate the suitability of the on-site materials for use as fill and to observe placement and test compaction of fill soils. If another geotechnical consultant is selected to perform observation and testing services for the project, we request that the selected consultant provide a letter to the owner, with a copy to Ninyo & Moore, indicating that they fully understand our recommendations and they are in full agreement with the recommendations contained in this report. Qualified subcontractors utilizing appropriate techniques and construction materials should perform construction of the proposed improvements.

11 LIMITATIONS

The field evaluation, laboratory testing, and geotechnical analyses presented in this geotechnical report have been conducted in general accordance with current practice and the standard of care exercised by geotechnical consultants performing similar tasks in the project area. No warranty, expressed or implied, is made regarding the conclusions, recommendations, and opinions presented in this report. There is no evaluation detailed enough to reveal every subsurface condition. Variations may exist and conditions not observed or described in this report may be encountered during construction. Uncertainties relative to subsurface conditions can be reduced through additional subsurface exploration. Additional subsurface evaluation will be performed upon request. Please also note that our evaluation was limited to assessment of the geotechnical aspects of the project, and did not include evaluation of structural issues, environmental concerns, or the presence of hazardous materials.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Ninyo & Moore should be contacted if the reader requires additional information or has questions regarding the content, interpretations presented, or completeness of this document.

This report is intended for design purposes only. It does not provide sufficient data to prepare an accurate bid by contractors. It is suggested that the bidders and their geotechnical consultant perform an independent evaluation of the subsurface conditions in the project areas. The independent evaluations may include, but not be limited to, review of other geotechnical reports prepared for the adjacent areas, site reconnaissance, and additional exploration and laboratory testing.

Our conclusions, recommendations, and opinions are based on an analysis of the observed site conditions. If geotechnical conditions different from those described in this report are encountered, our office should be notified and additional recommendations, if warranted, will be provided upon request. It should be understood that the conditions of a site could change with time as a result of natural processes or the activities of man at the subject site or nearby sites. In addition, changes to the applicable laws, regulations, codes, and standards of practice may occur due to government action or the broadening of knowledge. The findings of this report may, therefore, be invalidated over time, in part or in whole, by changes over which Ninyo & Moore has no control.

This report is intended exclusively for use by the client. Any use or reuse of the findings, conclusions, and/or recommendations of this report by parties other than the client is undertaken at said parties' sole risk.

12 REFERENCES

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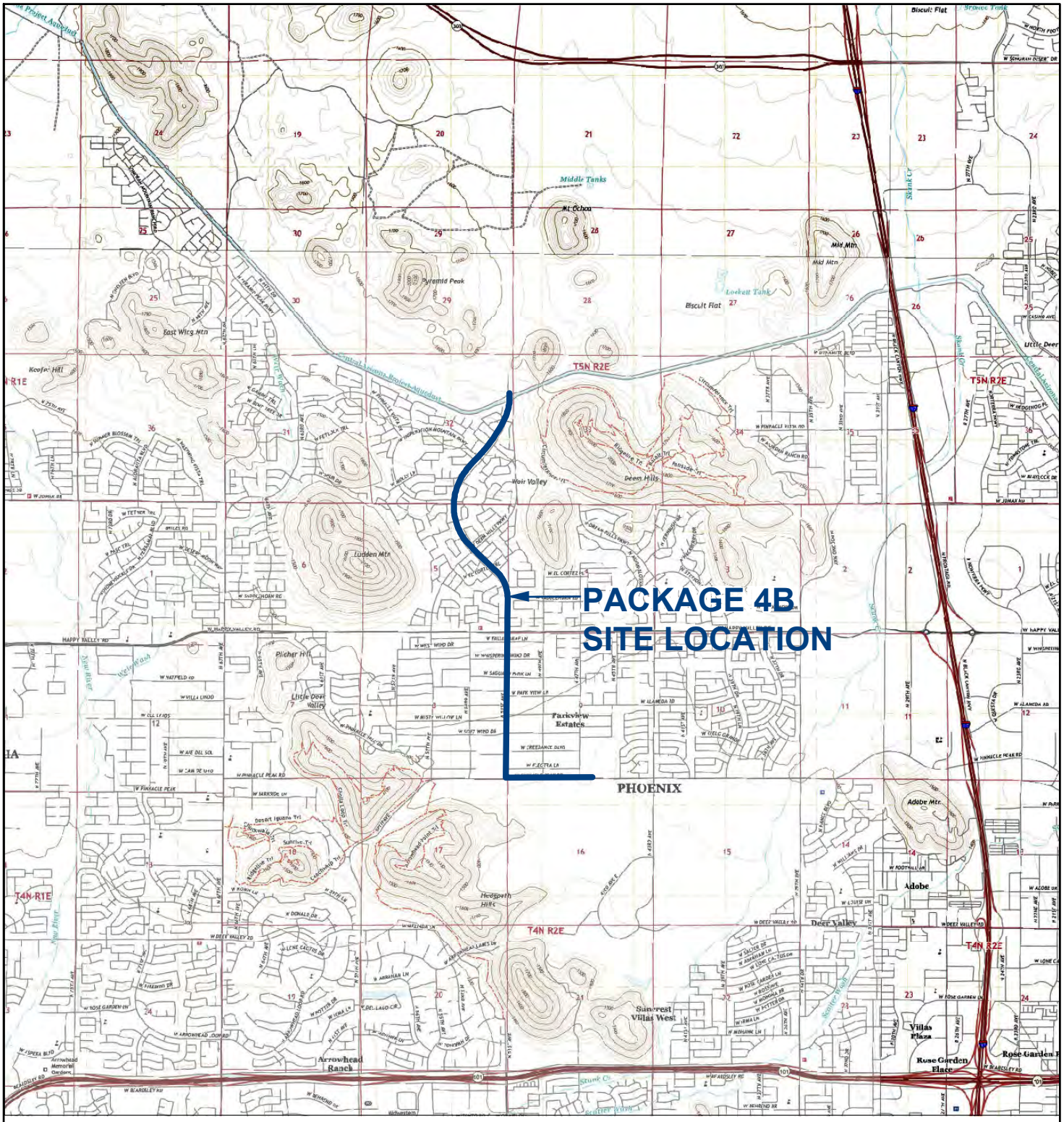
FIGURES



NOTE: DIRECTIONS, DIMENSIONS AND LOCATIONS ARE APPROXIMATE. | SOURCE: ESRI WORLD TOPO, 2021

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FIGURE 1

SITE LOCATION

NW WASTEWATER MP PACKAGE 4B
PHOENIX, ARIZONA

606692006 | 10/23

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LEGEND

ALIGNMENT

B-29.1 BORING LOCATION

NOTE: DIRECTIONS, DIMENSIONS AND LOCATIONS ARE APPROXIMATE. | SOURCE: GOOGLE EARTH, 2022

N

FEET

0 1,200 2,400

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FIGURE 2

BORING LOCATIONS

NW WASTEWATER MP PACKAGE 4B
PHOENIX, ARIZONA

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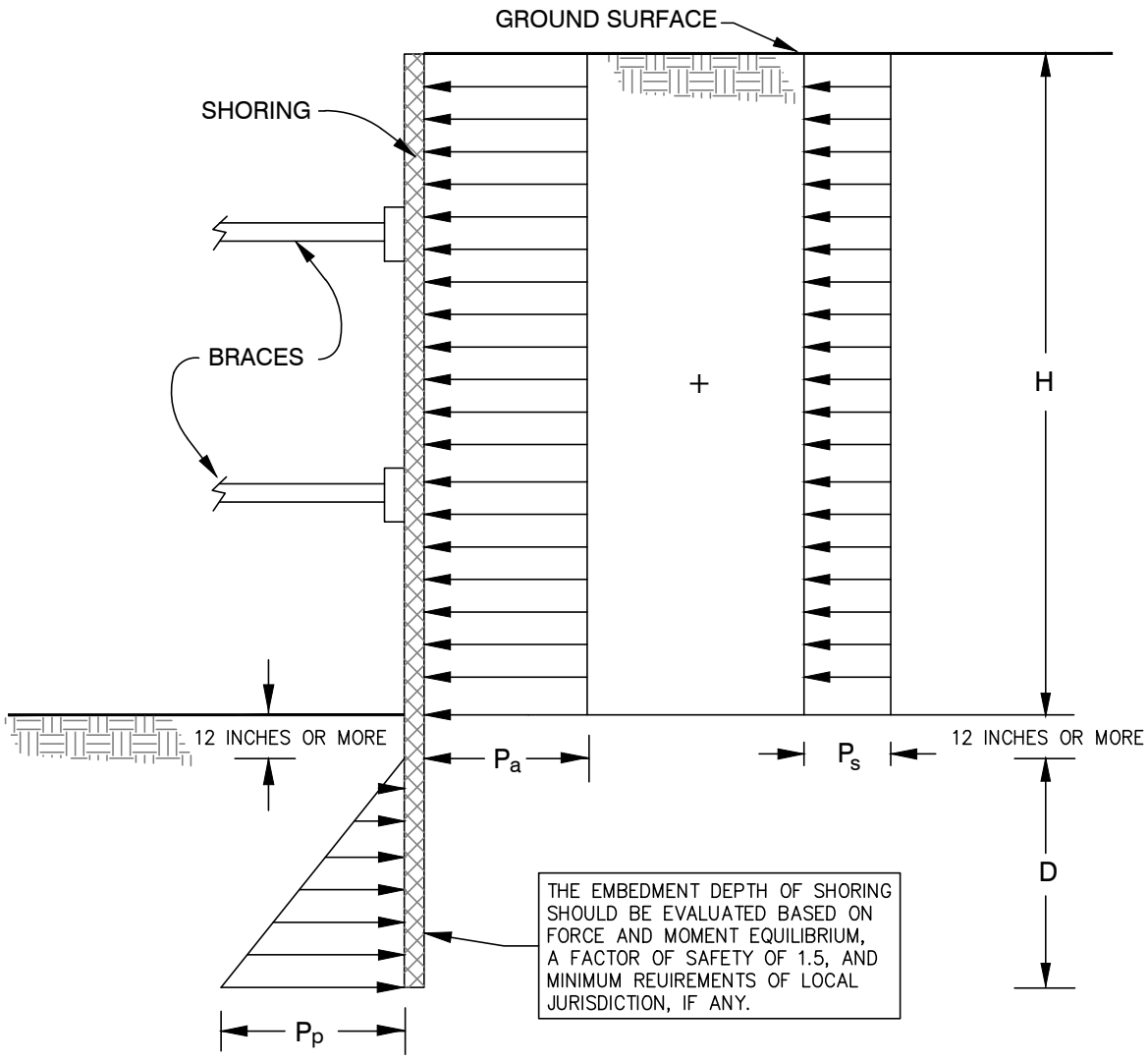

NOTES:

1. APPARENT LATERAL EARTH PRESSURE, P_a
   P_a = 24 H psf
2. CONSTRUCTION TRAFFIC INDUCED SURCHARGE PRESSURE, P_s
   P_s = 120 psf
3. PASSIVE LATERAL EARTH PRESSURE, P_p
   P_p = 390 D psf
4. ASSUMES GROUNDWATER IS NOT PRESENT
5. SURCHARGES FROM EXCAVATED SOIL OR CONSTRUCTION MATERIALS ARE NOT INCLUDED
6. H AND D ARE IN FEET

NOT TO SCALE

606692006 DETAIL FIGURES.DWG AOB

FIGURE 3

LATERAL EARTH PRESSURES FOR BRACED EXCAVATION

NW WASTEWATER MP PACKAGE 4B
PHOENIX, ARIZONA

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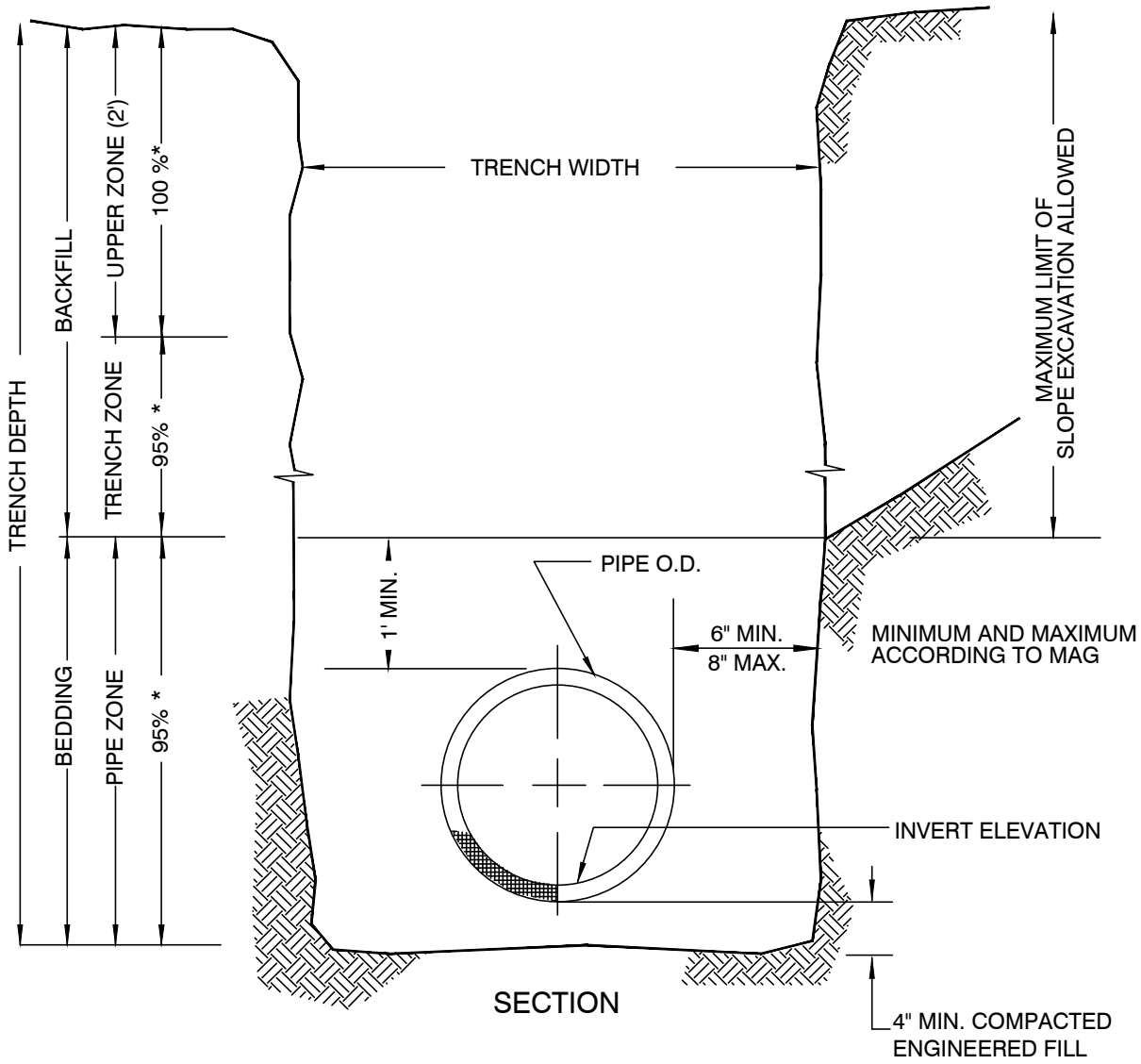

SECTION

NOTE

* Indicates minimum relative compaction (see report for details).

Upper zone required for pavement areas only.

Diagram not drawn to scale.

606692006 DETAIL FIGURES.DWG AOB

NOT TO SCALE

FIGURE 4

PIPE BEDDING GUIDELINES

NW WASTEWATER MP PACKAGE 4B
PHOENIX, ARIZONA

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APPENDIX A

Boring Logs

APPENDIX A

BORING LOGS

Field Procedure for the Collection of Disturbed Samples
Disturbed soil samples were obtained in the field using the following methods.

Bulk Samples
Bulk samples of representative earth materials were obtained from the exploratory boring. The samples were bagged and transported to the laboratory for testing.

The Standard Penetration Test (SPT) Sampler
Disturbed drive samples of earth materials were obtained by means of a SPT sampler. The sampler is composed of a split barrel with an external diameter of 2 inches and an unlined internal diameter of 1-3/8 inches. The sampler was driven up to 18 inches into the ground with a 140-pound hammer falling freely from a height of 30 inches in general accordance with ASTM D1586. The blow counts were recorded for every 6 inches of penetration; the blow counts reported on the log are those for the last 12 inches of penetration. Soil samples were observed and removed from the sampler, bagged, sealed, and transported to the laboratory for testing.

Field Procedure for the Collection of Relatively Undisturbed Samples
Relatively undisturbed soil samples were obtained in the field using the following method.

The Modified Split-Barrel Drive Sampler
The sampler, with an external diameter of 3.0 inches, was lined with 1-inch long, thin brass rings with inside diameters of approximately 2.4 inches. The sample barrel was driven into the ground with a 140-pound hammer falling freely from a height of 30 inches in general accordance with ASTM D3550. The approximate length of the fall, the weight of the hammer or bar, and the number of blows per foot of driving are presented on the boring log as an index to the relative resistance of the materials sampled. The samples were removed from the sample barrel in the brass rings, sealed, and transported to the laboratory for testing.

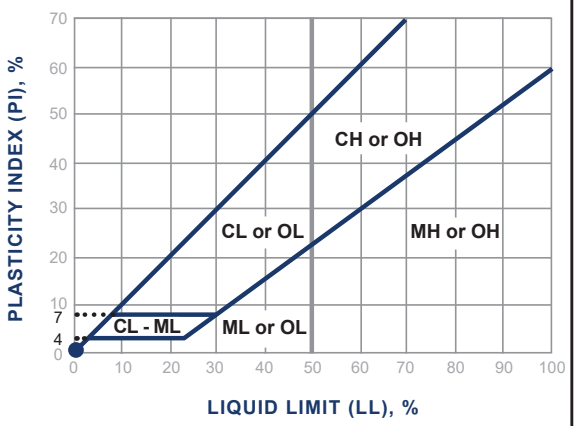
Soil Classification Chart Per ASTM D 2488

Primary Divisions			Secondary Divisions	
			Group Symbol	Group Name
COARSE-GRAINED SOILS more than 50% retained on No. 200 sieve	**GRAVEL** more than 50% of coarse fraction retained on No. 4 sieve	CLEAN GRAVEL less than 5% fines	GW	well-graded GRAVEL
			GP	poorly graded GRAVEL
		GRAVEL with DUAL CLASSIFICATIONS 5% to 12% fines	GW-GM	well-graded GRAVEL with silt
			GP-GM	poorly graded GRAVEL with silt
			GW-GC	well-graded GRAVEL with clay
			GP-GC	poorly graded GRAVEL with
		GRAVEL with FINES more than 12% fines	GM	silty GRAVEL
			GC	clayey GRAVEL
			GC-GM	silty, clayey GRAVEL
	SAND 50% or more of coarse fraction passes No. 4 sieve	CLEAN SAND less than 5% fines	SW	well-graded SAND
			SP	poorly graded SAND
		SAND with DUAL CLASSIFICATIONS 5% to 12% fines	SW-SM	well-graded SAND with silt
			SP-SM	poorly graded SAND with silt
			SW-SC	well-graded SAND with clay
			SP-SC	poorly graded SAND with clay
		SAND with FINES more than 12% fines	SM	silty SAND
			SC	clayey SAND
			SC-SM	silty, clayey SAND
FINE-GRAINED SOILS 50% or more passes No. 200 sieve	**SILT and CLAY** liquid limit less than 50%	INORGANIC	CL	lean CLAY
			ML	SILT
			CL-ML	silty CLAY
		ORGANIC	OL (PI > 4)	organic CLAY
			OL (PI < 4)	organic SILT
	SILT and CLAY liquid limit 50% or more	INORGANIC	CH	fat CLAY
			MH	elastic SILT
		ORGANIC	OH (plots on or above "A"-line)	organic CLAY
			OH (plots below "A"-line)	organic SILT
	Highly Organic Soils		PT	Peat

Grain Size

Description		Sieve Size	Grain Size	Approximate Size
Boulders		> 12"	> 12"	Larger than basketball-sized
Cobbles		3 - 12"	3 - 12"	Fist-sized to basketball-sized
Gravel	Coarse	3/4 - 3"	3/4 - 3"	Thumb-sized to fist-sized
	Fine	#4 - 3/4"	0.19 - 0.75"	Pea-sized to thumb-sized
Sand	Coarse	#10 - #4	0.079 - 0.19"	Rock-salt-sized to pea-sized
	Medium	#40 - #10	0.017 - 0.079"	Sugar-sized to rock-salt-sized
	Fine	#200 - #40	0.0029 - 0.017"	Flour-sized to sugar-sized
Fines		Passing #200	< 0.0029"	Flour-sized and smaller

Plasticity Chart



Apparent Density - Coarse-Grained Soil

Apparent Density	Spooling Cable or Cathead		Automatic Trip Hammer	
	SPT (blows/foot)	Modified Split Barrel (blows/foot)	SPT (blows/foot)	Modified Split Barrel (blows/foot)
Very Loose	≤ 4	≤ 8	≤ 3	≤ 5
Loose	5 - 10	9 - 21	4 - 7	6 - 14
Medium Dense	11 - 30	22 - 63	8 - 20	15 - 42
Dense	31 - 50	64 - 105	21 - 33	43 - 70
Very Dense	> 50	> 105	> 33	> 70

Consistency - Fine-Grained Soil

Consis-tency	Spooling Cable or Cathead		Automatic Trip Hammer	
	SPT (blows/foot)	Modified Split Barrel (blows/foot)	SPT (blows/foot)	Modified Split Barrel (blows/foot)
Very Soft	< 2	< 3	< 1	< 2
Soft	2 - 4	3 - 5	1 - 3	2 - 3
Firm	5 - 8	6 - 10	4 - 5	4 - 6
Stiff	9 - 15	11 - 20	6 - 10	7 - 13
Very Stiff	16 - 30	21 - 39	11 - 20	14 - 26
Hard	> 30	> 39	> 20	> 26

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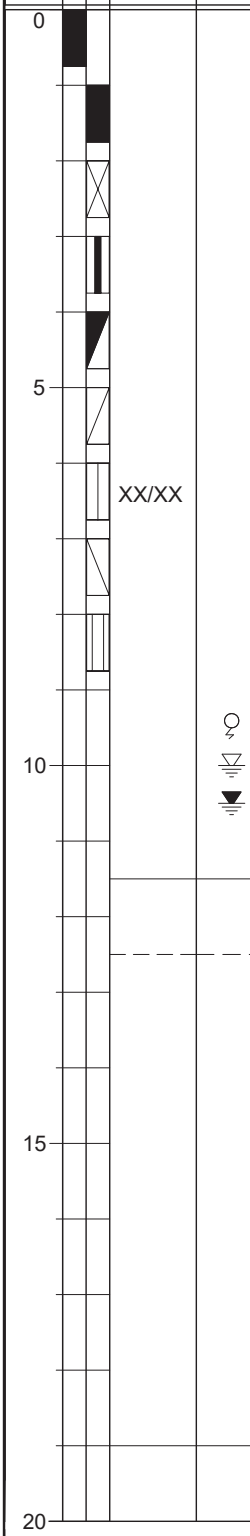
USCS METHOD OF SOIL CLASSIFICATION

BORING LOG EXPLANATION SHEET



Bulk sample.

Modified split-barrel drive sampler.

No recovery with modified split-barrel drive sampler.

Sample retained by others.

Standard Penetration Test (SPT).

No recovery with a SPT.

Shelby tube sample. Distance pushed in inches/length of sample recovered in inches.

No recovery with Shelby tube sampler.

Continuous Push Sample.

Seepage.

Groundwater encountered during drilling.

Groundwater measured after drilling.

SM

MAJOR MATERIAL TYPE (SOIL):

Solid line denotes unit change.

CL

Dashed line denotes material change.

Attitudes: Strike/Dip
b: Bedding
c: Contact
j: Joint
f: Fracture
F: Fault
cs: Clay Seam
s: Shear
bss: Basal Slide Surface
sf: Shear Fracture
sz: Shear Zone
sbs: Shear Bedding Surface

The total depth line is a solid line that is drawn at the bottom of the boring.

DATE DRILLED 8/5/22 BORING NO. B-1

GROUND ELEVATION 1,375' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0						SC	FILL: Light brown, dry, very dense, clayey SAND; few fine to coarse gravel.
		50/4"					
		28	3.7	114.9			Medium dense.
5							PVC pipe pieces.
		33				CL	ALLUVIUM: Brown, dry, hard, sandy lean CLAY; few gravel.
		44					
10							Total Depth = 10 feet. Groundwater not encountered during drilling. Backfilled on 8/5/22 shortly after completion of drilling. Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
15							
20							

DATE DRILLED 7/24/23 BORING NO. B-1.1

GROUND ELEVATION 1,373' ± (MSL) SHEET 1 OF 2

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0		46	6.8	100.5		SC	FILL: Brown, dry, dense, clayey SAND; scattered caliche filaments; few gravel.
5		70				SC	ALLUVIUM: Brown, dry, very dense, clayey SAND; scattered nodules; few gravel.
		50/5"					
10		46					
		50/5"	8.0			SM	Brown, dry, very dense, silty SAND; scattered caliche nodules; few to little gravel.
15							
		50/3"					
20							

FIGURE A- 2

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NW WASTEWATER MP PACKAGE 4B
PHOENIX, ARIZONA

606692006 | 10/23

DATE DRILLED 7/24/23 BORING NO. B-1.1

GROUND ELEVATION 1,373' ± (MSL) SHEET 2 OF 2

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
20							SM	ALLUVIUM: (Continued) Brown, dry, very dense, silty SAND; scattered caliche nodules; few gravel.
		■	50/5"					
								Total Depth = 23.9 feet. Groundwater not encountered during drilling. Backfilled on 7/24/23 shortly after completion of drilling. Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
25								
30								
35								
40								

DATE DRILLED 8/5/22 BORING NO. B-2

GROUND ELEVATION 1,373' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							ASPHALT CONCRETE: Approximately 7 inches thick.
							AGGREGATE FILL: Approximately 4 inches thick.
		32				CL	ALLUVIUM: Brown, dry, hard, sandy lean CLAY; scattered caliche nodules.
		36					Few gravel.
5		50/5"	9.0	87.9		CH	Brown, dry, hard, sandy fat CLAY; scattered caliche nodules.
		50/4"					
10							Total Depth = 9.3 feet. Groundwater not encountered during drilling. Backfilled and asphalt concrete patched on 8/5/22 shortly after completion of drilling. Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
15							
20							

DATE DRILLED 7/25/23 BORING NO. B-2.1

GROUND ELEVATION 1,374' ± (MSL) SHEET 1 OF 2

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							ASPHALT CONCRETE: Approximately 8 inches thick.
							AGGREGATE FILL: Approximately 6 inches thick.
		20				SC	FILL: Brown, dry, dense, clayey SAND; scattered caliche nodules.
		36	6.3	103.8			Medium dense.
5						SC	ALLUVIUM: Brown, dry, very dense, clayey SAND; scattered caliche nodules.
		48					
		50/5"	13.5	89.4			
10							
						CL	Brown, dry, hard, sandy lean CLAY; scattered caliche nodules; few to little gravel.
		47					
15							
		50/5"	14.8	91.6			
20							

FIGURE A- 5

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DATE DRILLED 7/25/23 BORING NO. B-2.1

GROUND ELEVATION 1,374' ± (MSL) SHEET 2 OF 2

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
20						CL	ALLUVIUM: (Continued) Brown, dry, hard, sandy lean CLAY; scattered caliche nodules.
		54					
25							Total Depth = 25 feet. Groundwater not encountered during drilling. Backfilled and asphalt concrete patched on 7/25/23 shortly after completion of drilling. Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
30							
35							
40							

DATE DRILLED 8/5/22 BORING NO. B-3

GROUND ELEVATION 1,375' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							ASPHALT CONCRETE: Approximately 6 inches thick.
							AGGREGATE FILL: Approximately 5 inches thick.
		55				CH	ALLUVIUM: Brown, dry, hard, sandy fat CLAY; scattered caliche nodules.
5		87/11"	7.3	99.8			
		95/11"					Highly cemented.
		50/1"					
10							Total Depth = 9.1 feet. Groundwater not encountered during drilling. Backfilled and asphalt concrete patched on 8/5/22 shortly after completion of drilling. Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
15							
20							

DATE DRILLED 7/25/23 BORING NO. B-3.1

GROUND ELEVATION 1,376' ± (MSL) SHEET 1 OF 2

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							ASPHALT CONCRETE: Approximately 8 inches thick.
							AGGREGATE FILL: Approximately 5 inches thick.
		35	10.5	97.1		SC	FILL: Brown, dry, medium dense, clayey SAND; scattered caliche nodules.
		45					Very dense.
5		50/5"	12.3			SC	ALLUVIUM: Brown, dry, very dense, clayey SAND; scattered caliche nodules.
		50/5"					
10							
		50/2"	9.0			SM	Brown, dry, very dense, silty SAND; scattered caliche nodules; trace gravel.
15		74/10"					
20							

FIGURE A- 8

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DATE DRILLED 7/25/23 BORING NO. B-3.1

GROUND ELEVATION 1,376' ± (MSL) SHEET 2 OF 2

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
20								Total Depth = 19.8 feet. Groundwater not encountered during drilling. Backfilled and asphalt concrete patched on 7/25/23 shortly after completion of drilling. Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
25								
30								
35								
40								

DATE DRILLED 8/5/22 BORING NO. B-4

GROUND ELEVATION 1,377' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							ASPHALT CONCRETE: Approximately 6 inches thick.
							AGGREGATE FILL: Approximately 6 inches thick.
		30	6.7	106.3		CL	ALLUVIUM: Brown, dry, hard, sandy lean CLAY; scattered caliche nodules.
		37					
5		38					
		50/5"				CH	Brown, dry, hard, sandy fat CLAY; scattered caliche nodules.
10							Total Depth = 9.4 feet. Groundwater not encountered during drilling. Backfilled and asphalt concrete patched on 8/5/22 shortly after completion of drilling. Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
15							
20							

DATE DRILLED 8/5/22 BORING NO. B-5

GROUND ELEVATION 1,379' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							ASPHALT CONCRETE: Approximately 6 inches thick.
							AGGREGATE FILL: Approximately 6 inches thick.
		12				CL	ALLUVIUM: Light brown, dry, very stiff, sandy lean CLAY; scattered caliche nodules.
		23					
5		35					Hard.
		89/11"	19.4	89.0			
10							Total Depth = 9.9 feet. Groundwater not encountered during drilling. Backfilled and asphalt concrete patched on 8/5/22 shortly after completion of drilling. Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
15							
20							

DATE DRILLED 7/25/23 BORING NO. B-5.1

GROUND ELEVATION 1,381' ± (MSL) SHEET 1 OF 2

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0	Driven	49	4.2	112.3		CL	FILL: Brown, dry, hard, sandy lean CLAY; few gravel.
	Driven	18					Very stiff; scattered caliche nodules.
5	Driven	41				SC	ALLUVIUM: Brown, dry, medium dense, clayey SAND; scattered caliche nodules.
	Driven	68					Very dense.
10							
	Driven	50/5"	8.3			SM	Brown, dry, very dense, silty SAND; scattered caliche nodules; few to little gravel.
15							
	Driven	50/3"					
20							

FIGURE A- 12

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DATE DRILLED 7/25/23 BORING NO. B-5.1

GROUND ELEVATION 1,381' ± (MSL) SHEET 2 OF 2

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
20							SM	ALLUVIUM: (Continued) Brown, dry, very dense, silty SAND; scattered caliche nodules.
		■	50/8"					
25								Total Depth = 23.8 feet. Groundwater not encountered during drilling. Backfilled on 7/25/23 shortly after completion of drilling. Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
30								
35								
40								

DATE DRILLED 8/5/22 & 7/25/23 BORING NO. B-6

GROUND ELEVATION 1,382' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							ASPHALT CONCRETE: Approximately 5 inches thick.
							AGGREGATE FILL: Approximately 5 inches thick.
						CL	ALLUVIUM: Brown, dry, hard, sandy lean CLAY; few fine gravel; scattered caliche nodules.
		37	7.9	112.8			
		25					
5							
		89/11"					
		49					
10						SC	Brown, dry, very dense, clayey SAND; few gravel; scattered caliche nodules.
		43					
15							Total Depth = 15 feet. Groundwater not encountered during drilling. Backfilled and asphalt concrete patched on 7/25/23 shortly after completion of drilling. Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
20							

DATE DRILLED 8/5/22 BORING NO. B-7

GROUND ELEVATION 1,386' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							ASPHALT CONCRETE: Approximately 5 inches thick.
							AGGREGATE FILL: Approximately 4 inches thick.
		27				CL	ALLUVIUM: Brown, dry, hard, sandy lean CLAY; scattered caliche nodules; few gravel; trace silt.
5		18					
		33					Few to little gravel.
		68/11"	14.7	108.3			
10							Total Depth = 9.9 feet. Groundwater not encountered during drilling. Backfilled and asphalt concrete patched on 8/5/22 shortly after completion of drilling. Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
15							
20							

FIGURE A- 15

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DATE DRILLED 8/5/22 BORING NO. B-8

GROUND ELEVATION 1,391' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							ASPHALT CONCRETE: Approximately 6 inches thick.
							AGGREGATE FILL: Approximately 5 inches thick.
		50	10.3	106.8		CH	ALLUVIUM: Brown, dry, hard, sandy fat CLAY; few gravel; scattered caliche nodules.
5		50/5"					
		55					
10							Total Depth = 10 feet. Groundwater not encountered during drilling. Backfilled and asphalt concrete patched on 8/5/22 shortly after completion of drilling. Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
15							
20							

DATE DRILLED 8/5/22 & 7/25/23 BORING NO. B-9

GROUND ELEVATION 1,396' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							ASPHALT CONCRETE: Approximately 6 inches thick.
							AGGREGATE FILL: Approximately 4 inches thick.
						CL	ALLUVIUM: Brown, dry, very stiff, sandy lean CLAY; few gravel; scattered caliche nodules.
		19					
		35	7.5	110.2			Hard.
5							
						SC	Brown, dry, very dense, clayey SAND; scattered caliche nodules.
		80/11"					
		50/3"					Little gravel.
10							
		50/5"	7.9				Few gravel.
							Total Depth = 13.9 feet.
							Groundwater not encountered during drilling.
							Backfilled and asphalt concrete patched on 7/25/23 shortly after completion of drilling.
15							
							Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.
							The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
20							

DATE DRILLED 8/5/22 BORING NO. B-10

GROUND ELEVATION 1,401' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							ASPHALT CONCRETE: Approximately 7 inches thick.
							AGGREGATE FILL: Approximately 7 inches thick.
		55				CL	ALLUVIUM: Brown, dry, hard, sandy lean CLAY; scattered caliche nodules.
		47					
5							
		77/11"	7.9	100.1		SC	Brown, dry, very dense, clayey SAND; scattered caliche nodules.
		65					
10							Total Depth = 10 feet. Groundwater not encountered during drilling. Backfilled and asphalt concrete patched on 8/5/22 shortly after completion of drilling. Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
15							
20							

FIGURE A- 18

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DATE DRILLED 7/29/22 BORING NO. B-11

GROUND ELEVATION 1,406' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							ASPHALT CONCRETE: Approximately 5 inches thick.
							AGGREGATE FILL: Approximately 6 inches thick.
		15				CL	ALLUVIUM: Brown, dry, very stiff, sandy lean CLAY with gravel.
		59	12.5	98.4		SC	Brown, dry, dense, clayey SAND; scattered caliche nodules.
5		50/4"					Very dense.
		50/5"					
10							Total Depth = 9.4 feet. Groundwater not encountered during drilling. Backfilled and asphalt concrete patched on 7/29/22 shortly after completion of drilling. Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
15							
20							

FIGURE A- 19

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DATE DRILLED 7/29/22 BORING NO. B-12

GROUND ELEVATION 1,412' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0						CL	ALLUVIUM: Brown, dry, hard, sandy lean CLAY; few gravel.
	Driven	34	14.0	105.8			
	Driven	29					Scattered caliche nodules.
5	Driven	50/3"					
	Driven	50/3"					
10							Total Depth = 10 feet. Groundwater not encountered during drilling. Backfilled on 7/29/22 shortly after completion of drilling. Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
15							
20							

FIGURE A- 20

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DATE DRILLED 7/29/22 & 7/24/23 BORING NO. B-13

GROUND ELEVATION 1,419' ± (MSL) SHEET 1 OF 2

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0						CL	ALLUVIUM: Brown, dry, very stiff, sandy lean CLAY; few gravel.
		17					
		77	7.2	100.2		SC	Brown, dry, very dense, clayey SAND; scattered caliche nodules.
5		43					
		50/2"					
10							
		50/4"	14.2	101.2			
15							
		48					
20							

FIGURE A- 21

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DATE DRILLED 7/29/22 & 7/24/23 BORING NO. B-13

GROUND ELEVATION 1,419' ± (MSL) SHEET 2 OF 2

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
20								Total Depth = 20 feet. Groundwater not encountered during drilling. Backfilled on 7/24/23 shortly after completion of drilling. Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
25								
30								
35								
40								

DATE DRILLED 7/28/22 BORING NO. B-14

GROUND ELEVATION 1,424' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							ASPHALT CONCRETE: Approximately 7 inches thick.
							AGGREGATE FILL: Approximately 6 inches thick.
		81/11"				SC	ALLUVIUM: Brown, dry, very dense, clayey SAND; few gravel; scattered caliche nodules.
5		59					
		50/5"	6.1	101.1			
		50/4"					
10							Total Depth = 8.8 feet. Groundwater not encountered during drilling. Backfilled and asphalt concrete patched on 7/28/22 shortly after completion of drilling. Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
15							
20							

DATE DRILLED 7/28/22 BORING NO. B-15

GROUND ELEVATION 1,433' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							ASPHALT CONCRETE: Approximately 7 inches thick.
							AGGREGATE FILL: Approximately 6 inches thick.
		15				SM	ALLUVIUM: Brown, dry, medium dense, silty SAND; few gravel.
		32	5.7	100.8		SC	Brown, dry, dense, clayey SAND; scattered caliche nodules.
5		30					
		53				CH	Brown, dry, hard, sandy fat CLAY; scattered caliche nodules.
10							Total Depth = 10 feet. Groundwater not encountered during drilling. Backfilled and asphalt concrete patched on 7/28/22 shortly after completion of drilling.
15							Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
20							

FIGURE A- 24

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DATE DRILLED 7/29/22 & 7/24/23 BORING NO. B-16

GROUND ELEVATION 1,439' ± (MSL) SHEET 1 OF 2

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							ASPHALT CONCRETE: Approximately 6 inches thick.
							AGGREGATE FILL: Approximately 6 inches thick.
		40				SC	ALLUVIUM: Brown, dry, medium dense, clayey SAND; few gravel; scattered caliche nodules.
5		57					Very dense.
		50/3"	7.5	88.9		CH	Brown, dry, hard, sandy fat CLAY; scattered caliche nodules.
10		79					
		88/11"				SC	Brown, dry, very dense, clayey SAND with gravel; trace caliche nodules.
15							
		50/4"	5.0	104.4			
20							

FIGURE A- 25

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DATE DRILLED 7/29/22 & 7/24/23 BORING NO. B-16

GROUND ELEVATION 1,439' ± (MSL) SHEET 2 OF 2

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
20							SC	ALLUVIUM: (Continued) Brown, dry, very dense, clayey SAND with gravel; scattered caliche nodules.
			95/11"					
25								Total Depth = 24.9 feet. Groundwater not encountered during drilling. Backfilled and asphalt concrete patched on 7/24/23 shortly after completion of drilling. Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
30								
35								
40								

DATE DRILLED 7/29/22 BORING NO. B-17

GROUND ELEVATION 1,441' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							ASPHALT CONCRETE: Approximately 5 inches thick.
							AGGREGATE FILL: Approximately 6 inches thick.
		27				SM	ALLUVIUM: Brown, dry, dense, silty SAND; few gravel.
		73	8.2	90.3		SC	Brown, dry, very dense, clayey SAND; scattered caliche nodules.
5		50/5"					
		50/2"					No recovery.
							Total Depth = 8.7 feet.
							Groundwater not encountered during drilling.
							Backfilled and asphalt concrete patched on 7/29/22 shortly after completion of drilling.
10							Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.
							The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
15							
20							

DATE DRILLED 7/29/22 & 7/24/23 BORING NO. B-18

GROUND ELEVATION 1,446 ± (MSL) SHEET 1 OF 2

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							ASPHALT CONCRETE: Approximately 6 inches thick.
							AGGREGATE FILL: Approximately 7 inches thick.
		33	5.0	111.1		SC	ALLUVIUM: Brown, dry, medium dense, clayey SAND; few gravel; scattered caliche nodules.
		18					Increased caliche.
5		50/3"					
		50/4"					
10							
		68					
15							
		50/5"	12.7	111.6			
20							

FIGURE A- 28

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DATE DRILLED 7/29/22 & 7/24/23 BORING NO. B-18

GROUND ELEVATION 1,446 ± (MSL) SHEET 2 OF 2

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
20								
			79					
25								Total Depth = 25 feet. Groundwater not encountered during drilling. Backfilled and asphalt concrete patched on 7/24/23 shortly after completion of drilling. Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
30								
35								
40								

DATE DRILLED 7/29/22 BORING NO. B-19

GROUND ELEVATION 1,452' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							ASPHALT CONCRETE: Approximately 6 inches thick.
							AGGREGATE FILL: Approximately 7 inches thick.
		13				SM	ALLUVIUM: Brown, dry, medium dense, silty SAND; few gravel.
		50/5"				SC	Brown, dry, very dense, clayey SAND; scattered caliche nodules.
5		50/5"					
		50/3"	7.4	91.8		CH	Brown, dry, hard, sandy fat CLAY; scattered caliche nodules.
10							Total Depth = 9.3 feet. Groundwater not encountered during drilling. Backfilled and asphalt concrete patched on 7/29/22 shortly after completion of drilling.
15							Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
20							

DATE DRILLED 7/29/22 BORING NO. B-20

GROUND ELEVATION 1,456' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							ASPHALT CONCRETE: Approximately 7 inches thick.
							AGGREGATE FILL: Approximately 6 inches thick.
		34	9.2	100.4		SM	ALLUVIUM: Brown, dry, medium dense, silty SAND; few gravel.
5		49				SC	Brown, dry, very dense, clayey SAND; scattered caliche nodules.
		68/10"					
		50/5"					
10							Total Depth = 8.9 feet. Groundwater not encountered during drilling. Backfilled and asphalt concrete patched on 7/29/22 shortly after completion of drilling. Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
15							
20							

FIGURE A- 31

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DATE DRILLED 7/29/22 BORING NO. B-21

GROUND ELEVATION 1,462' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							ASPHALT CONCRETE: Approximately 6 inches thick.
							AGGREGATE FILL: Approximately 6 inches thick.
		28				SM	ALLUVIUM: Brown, dry, dense, silty SAND; few gravel.
		32	4.3	108.7		SC	Brown, dry, medium dense, clayey SAND.
5		37					Very dense; scattered caliche nodules.
		50/5"					
							Total Depth = 8.9 feet. Groundwater not encountered during drilling. Backfilled and asphalt concrete patched on 7/29/22 shortly after completion of drilling.
10							Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
15							
20							

DATE DRILLED 7/18/23 BORING NO. B-21.1

GROUND ELEVATION 1,458' ± (MSL) SHEET 1 OF 2

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0						SC	FILL: Brown, dry, medium dense, clayey SAND; few gravel; scattered caliche nodules.
	Driven	35	10.8	102.2			
	Driven	27					Dense.
5						SC	ALLUVIUM: Brown, dry, medium dense, clayey SAND; few gravel; scattered caliche filaments.
	Driven	17					
	Driven	50/5"					Very dense; scattered caliche nodules.
10							
	Driven	50/5"	8.2				
15							
	Driven	50/3"					
20							

FIGURE A- 33

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DATE DRILLED 7/18/23 BORING NO. B-21.1

GROUND ELEVATION 1,458' ± (MSL) SHEET 2 OF 2

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
20							SC	ALLUVIUM: (Continued) Brown, dry, very dense, clayey SAND; scattered caliche nodules; few gravel.
			68					
25								Total Depth = 25 feet. Groundwater not encountered during drilling. Backfilled on 7/24/23 shortly after completion of drilling. Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
30								
35								
40								

DATE DRILLED 7/28/22 BORING NO. B-22

GROUND ELEVATION 1,468' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0								ASPHALT CONCRETE: Approximately 6 inches thick.
								AGGREGATE FILL: Approximately 6 inches thick.
		■	30	3.8	113.4		SM	FILL: Brown, dry, medium dense, silty SAND.
		■	7					
5								@ 5 feet: Unmarked waterline; boring terminated.
								Total Depth = 5 feet. Groundwater not encountered during drilling. Backfilled and asphalt concrete patched on 7/28/22 shortly after completion of drilling.
								Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.
								The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
10								
15								
20								

DATE DRILLED 7/28/22 BORING NO. B-23

GROUND ELEVATION 1,477' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							ASPHALT CONCRETE: Approximately 6 inches thick.
							AGGREGATE FILL: Approximately 6 inches thick.
		34				SM	ALLUVIUM: Brown, dry, very dense, silty SAND; few gravel; scattered caliche nodules.
		49	7.2	105.3			Dense.
5		15					Medium dense.
		50/5"					Very dense.
							Total Depth = 9.3 feet. Groundwater not encountered during drilling. Backfilled and asphalt concrete patched on 7/28/22 shortly after completion of drilling. Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
10							
15							
20							

DATE DRILLED 7/28/22 & 7/21/23 BORING NO. B-24

GROUND ELEVATION 1,490' ± (MSL) SHEET 1 OF 2

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							ASPHALT CONCRETE: Approximately 5 inches thick.
							AGGREGATE FILL: Approximately 6 inches thick.
		35				SM	ALLUVIUM: Brown, dry, medium dense, silty SAND; few gravel; scattered caliche nodules.
5		28					Dense.
		50/5"	6.9	94.1			Very dense.
10		51					
		50/2"				SC	Brown, dry, very dense, clayey SAND; scattered caliche nodules.
15							
		50/5"	5.2	104.3		SM	Brown, dry, very dense, silty SAND; scattered caliche nodules; few gravel.
20							

FIGURE A- 37

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DATE DRILLED 7/28/22 & 7/21/23 BORING NO. B-24

GROUND ELEVATION 1,490' ± (MSL) SHEET 2 OF 2

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
20							SM	ALLUVIUM: (Continued) Brown, dry, very dense, silty SAND; scattered caliche nodules.
			50/5"					
25								Total Depth = 24.4 feet. Groundwater not encountered during drilling. Backfilled and asphalt concrete patched on 7/21/23 shortly after completion of drilling. Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
30								
35								
40								

DATE DRILLED 7/28/22 & 7/21/23 BORING NO. B-25

GROUND ELEVATION 1,498' ± (MSL) SHEET 1 OF 2

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							ASPHALT CONCRETE: Approximately 5 inches thick.
							AGGREGATE FILL: Approximately 5 inches thick.
		25				SM	FILL: Brown, dry, dense, silty SAND; few gravel; scattered caliche nodules.
		6	7.7	92.7			Loose.
5		50/5"				SC	ALLUVIUM: Brown, dry, very dense, clayey SAND; scattered caliche nodules.
		50/5"					
10							
		50/5"	6.7	106.5			Few gravel.
15							
		50/4"					
20							Total Depth = 19.3 feet. Groundwater not encountered during drilling.

FIGURE A- 39

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DATE DRILLED 7/28/22 & 7/21/23 BORING NO. B-25

GROUND ELEVATION 1,498' ± (MSL) SHEET 2 OF 2

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
20								Backfilled and asphalt concrete patched on 7/21/23 shortly after completion of drilling.
								Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.
								The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
25								
30								
35								
40								

DATE DRILLED 7/28/22 & 7/21/23 BORING NO. B-26

GROUND ELEVATION 1,511' ± (MSL) SHEET 1 OF 2

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							ASPHALT CONCRETE: Approximately 7 inches thick.
							AGGREGATE FILL: Approximately 4 inches thick.
		50/5"	7.0	87.6		SC	ALLUVIUM: Brown, dry, very dense, clayey SAND; few gravel; scattered caliche nodules.
		50/5"					
5		50/5"					
		50/5"					
10							
		50/5"					
15							
		81/9"	4.8	105.8			
20							

FIGURE A- 41

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GROUND ELEVATION 1,511' ± (MSL) SHEET 2 OF 2

METHOD OF DRILLING CME-75, 8" Diameter Hollow-Stem Auger (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
20						SC	ALLUVIUM: (Continued) Brown, dry, very dense, clayey SAND; few gravel.
		80/8"					
25							
		50/1"					No recovery.
							Total Depth = 28.6 feet. Groundwater not encountered during drilling. Backfilled and asphalt concrete patched on 7/21/23 shortly after completion of drilling.
30							Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
35							
40							

DATE DRILLED 7/28/22 & 7/20/23 BORING NO. B-27

GROUND ELEVATION 1,517' ± (MSL) SHEET 1 OF 2

METHOD OF DRILLING CME-75, 8" Diameter Tubex (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							ASPHALT CONCRETE: Approximately 7 inches thick.
							AGGREGATE FILL: Approximately 4 inches thick.
		50/4"				SM	ALLUVIUM: Brown, dry, very dense, silty SAND; few gravel.
		50/5"	6.3	98.9			
5		86/11"					
		50/5"					
10							
		50/2"					No recovery.
15							
		58				SC	Brown, dry, very dense, clayey SAND; few gravel; scattered caliche nodules.
20							

FIGURE A- 43

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DATE DRILLED 7/28/22 & 7/20/23 BORING NO. B-27

GROUND ELEVATION 1,517' ± (MSL) SHEET 2 OF 2

METHOD OF DRILLING CME-75, 8" Diameter Tubex (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
20						SC	ALLUVIUM: (Continued) Brown, dry, very dense, clayey SAND; few gravel; scattered caliche nodules.
	Driven	50/1"					
25							
	Driven	50/5"					
30							
	Driven	50/5"					Few to little gravel.
35							Total Depth = 34.4 feet. Groundwater not encountered during drilling. Backfilled and asphalt concrete patched on 7/20/23 shortly after completion of drilling. Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
40							

DATE DRILLED 7/28/22 & 7/20/23 BORING NO. B-28

GROUND ELEVATION 1,528' ± (MSL) SHEET 1 OF 3

METHOD OF DRILLING CME-75, 8" Diameter Tubex (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0							ASPHALT CONCRETE: Approximately 5 inches thick.
							AGGREGATE FILL: Approximately 4 inches thick.
		50/5"				SC	FILL: Brown, dry, very dense, clayey SAND; few gravel.
		85/11"				SM	ALLUVIUM: Brown, dry, very dense, silty SAND; few gravel.
5		50/5"	7.0	99.9			
		89/11"					Scattered caliche nodules.
10							
		41					
15							
		50/5"					
20							

FIGURE A- 45

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GROUND ELEVATION 1,528' ± (MSL) SHEET 2 OF 3

METHOD OF DRILLING CME-75, 8" Diameter Tubex (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
20						SM	ALLUVIUM: (Continued) Brown, dry, very dense, silty SAND; few fine to coarse gravel.
		50/5"					
25							
		50/5"					
30							
		50/5"					
35							
		50/2"					
40							

FIGURE A- 46

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NW WASTEWATER MP PACKAGE 4B
PHOENIX, ARIZONA
606692006 | 10/23

DATE DRILLED 7/28/22 & 7/20/23 BORING NO. B-28

GROUND ELEVATION 1,528' ± (MSL) SHEET 3 OF 3

METHOD OF DRILLING CME-75, 8" Diameter Tubex (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
40						SC	Light brown, dry, very dense, clayey SAND; few gravel.
		50/5"					Scattered caliche nodules.
45							
		50/1"					Total Depth = 48.6 feet. Groundwater not encountered during drilling. Backfilled and asphalt concrete patched on 7/20/23 shortly after completion of drilling. Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
50							
55							
60							

DATE DRILLED 7/18/23 BORING NO. B-29.1

GROUND ELEVATION 1,535' ± (MSL) SHEET 1 OF 4

METHOD OF DRILLING CME-75, 8" Diameter Tubex (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0						SC	ALLUVIUM: Light brown, dry, very dense, clayey SAND; few gravel; scattered caliche nodules.
	Driven	50/5"	6.2	101.1			
	Driven	25					Dense.
5							
	Driven	29					
10							
						SM	Brown, dry, very dense, silty SAND; scattered caliche nodules; few gravel.
	Driven	63	2.8	117.5			
15							
	Driven	50/3"					No recovery.
20							

FIGURE A- 48

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DATE DRILLED 7/18/23 BORING NO. B-29.1

GROUND ELEVATION 1,535' ± (MSL) SHEET 2 OF 4

METHOD OF DRILLING CME-75, 8" Diameter Tubex (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
20						SM	ALLUVIUM: (Continued) Light brown, dry, dense, silty SAND; few gravel
		50/2"				GM	Light brown, dry, very dense, silty GRAVEL; cobble and possible boulders.
25							
		50/3"					
30							
		50/2"					
35							
		50/1"					
40							

FIGURE A- 49

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DATE DRILLED 7/18/23 BORING NO. B-29.1

GROUND ELEVATION 1,535' ± (MSL) SHEET 3 OF 4

METHOD OF DRILLING CME-75, 8" Diameter Tubex (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
40						GM	ALLUVIUM: (Continued) Light brown/gray, dry, very dense, silty GRAVEL.
		50/1"					
45							
		50/1"					
50							
55							
		50/1"					Total Depth = 58.6 feet. Groundwater not encountered during drilling. Backfilled on 7/18/23 shortly after completion of drilling.
60							

FIGURE A- 50

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DATE DRILLED 7/18/23 BORING NO. B-29.1

GROUND ELEVATION 1,535' ± (MSL) SHEET 4 OF 4

METHOD OF DRILLING CME-75, 8" Diameter Tubex (Resilient)

DRIVE WEIGHT 140 lbs. (Automatic Trip Hammer) DROP 30"

SAMPLED BY LPS LOGGED BY LPS REVIEWED BY SDN

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
60								Notes: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
65								
70								
75								
80								

APPENDIX B

Laboratory Testing

APPENDIX B

LABORATORY TESTING

Classification
Soils were visually and texturally classified in accordance with the Unified Soil Classification System (USCS) in general accordance with ASTM D2488. Soil classifications are indicated on the log of the exploratory boring in Appendix A.

In-Place Moisture and Density Tests
The moisture content and dry density of relatively undisturbed samples obtained from the exploratory boring were evaluated in general accordance with ASTM D2937. The test results are presented on the log of the exploratory boring in Appendix A.

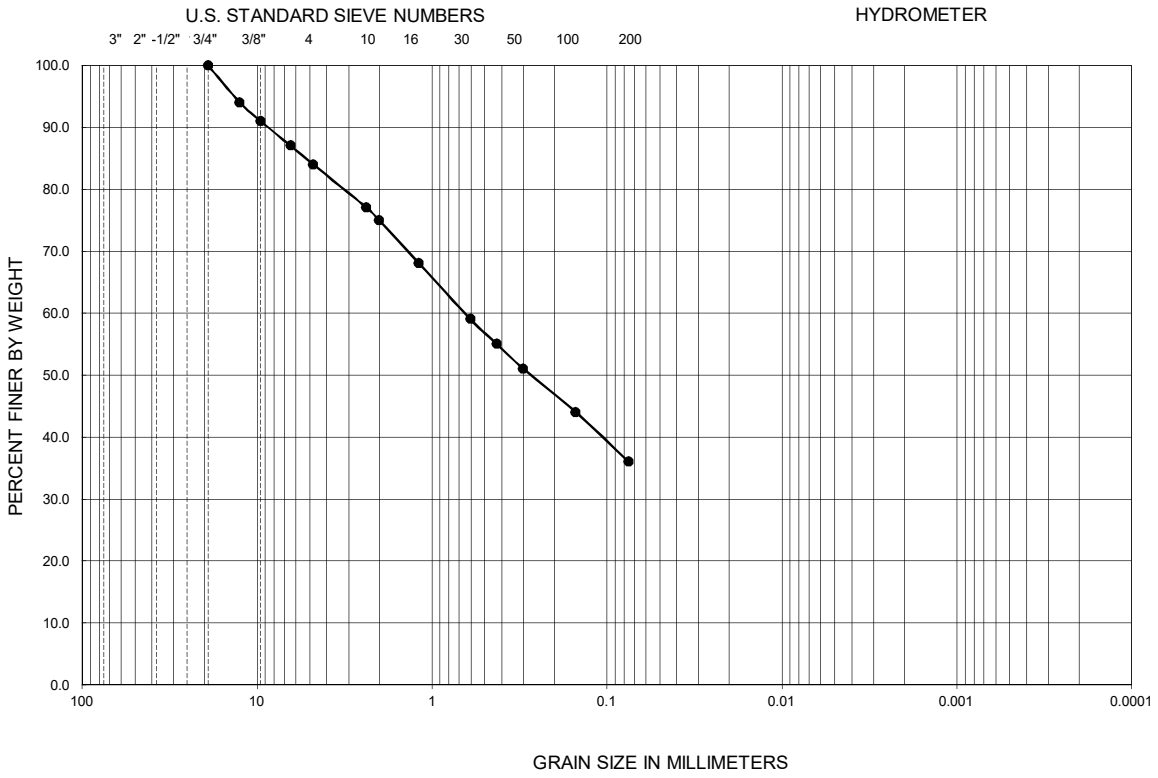
Gradation Analysis
Gradation analysis tests were performed on selected representative soil samples in general accordance with ASTM D422. The grain-size distribution curves are shown on Figures B-1 through B-17. These test results were utilized in evaluating the soil classifications in accordance with the USCS.

Atterberg Limits
Atterberg Limits Tests were performed on selected representative fine-grained soil samples to evaluate the liquid limit, plastic limit, and plasticity index in general accordance with ASTM D4318. These test results were utilized to evaluate the soil classification in accordance with the USCS. The test results and classifications are shown on Figures B-18 through B-20.

Consolidation Tests
Consolidation test was performed on a selected relatively undisturbed soil sample in general accordance with ASTM D4546. The sample was inundated during testing to represent adverse field conditions. The percent of consolidation for each load cycle was recorded as a ratio of the amount of vertical compression to the original height of the sample. The results of the tests are summarized on Figure B-21.

Soil Corrosivity Tests
Soil pH and minimum resistivity tests were performed on a representative sample in general accordance with Arizona test method, ARIZ 236c. The chloride content of the selected sample was evaluated in general accordance with ARIZ 736. The sulfate content of the selected sample was evaluated in general accordance with ARIZ 733. The test results are shown on Figures B-22 and B-23.

GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	SILT	CLAY



Symbol	Sample Location	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D_{10}	D_{30}	D_{60}	C_u	C_c	Passing No. 200 (percent)	USCS
●	B-1	1.0-2.3	31	18	13	--	--	0.63	--	--	36.0	SC

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FIGURE B-1

GRADATION TEST RESULTS

NW WASTEWATER MP PACKAGE 4B

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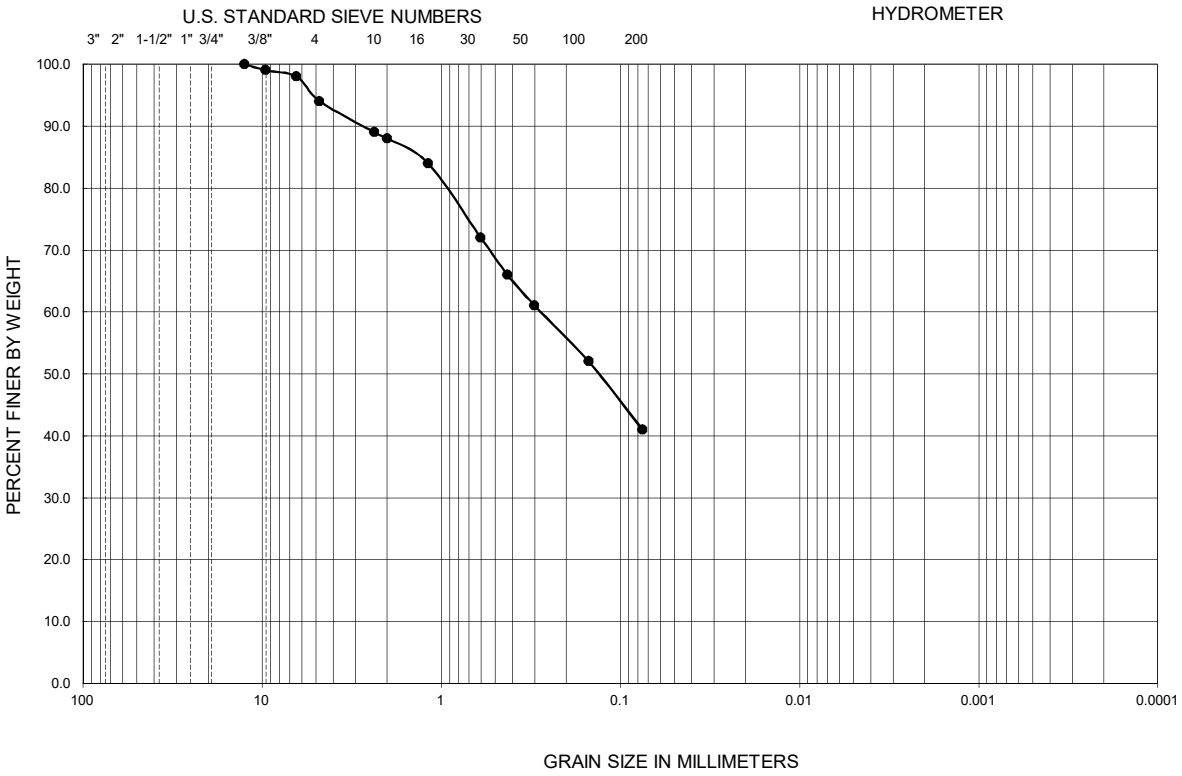
GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	SILT	CLAY



Symbol	Sample Location	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D_{10}	D_{30}	D_{60}	C_u	C_c	Passing No. 200 (percent)	USCS
●	B-1.1	13.5-13.9	47	28	19	--	--	0.28	--	--	41.0	SM

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FIGURE B-2

GRADATION TEST RESULTS

NW WASTEWATER MP PACKAGE 4B

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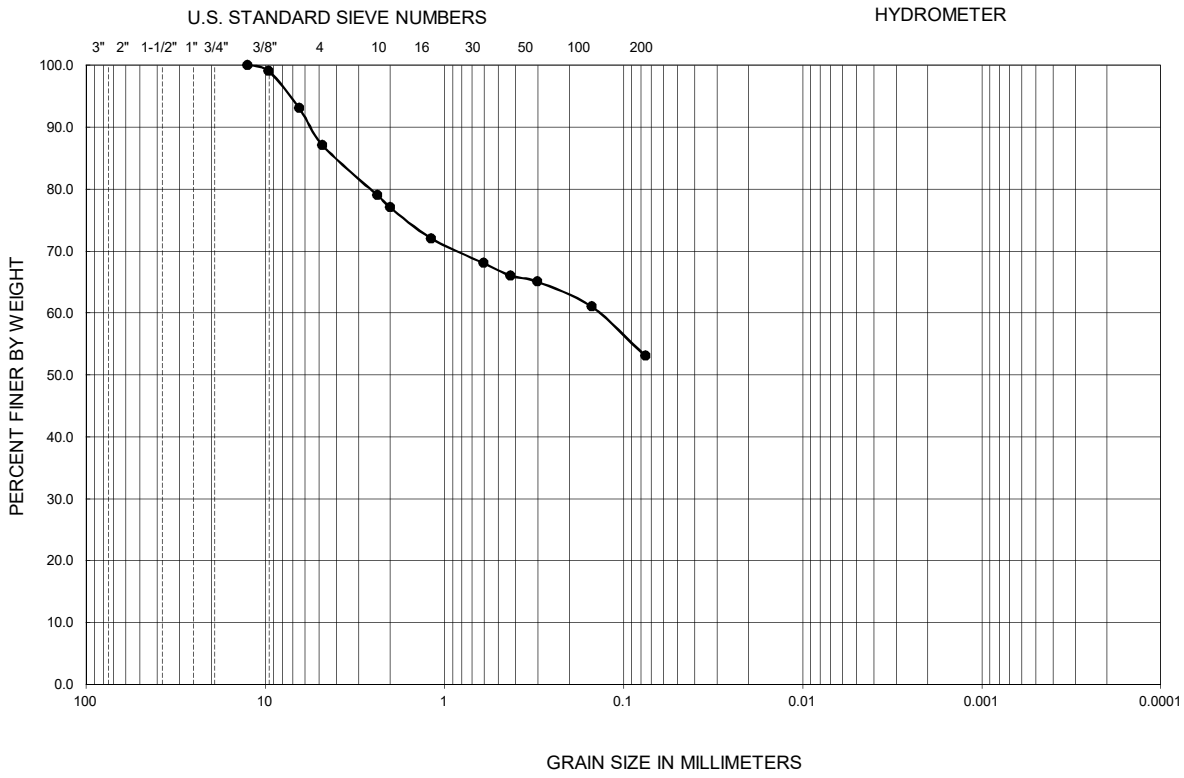
GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	SILT	CLAY



Symbol	Sample Location	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D_{10}	D_{30}	D_{60}	C_u	C_c	Passing No. 200 (percent)	USCS
●	B-2.1	13.5-13.9	36	24	12	--	--	0.14	--	--	53.0	CL

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FIGURE B-3

GRADATION TEST RESULTS

NW WASTEWATER MP PACKAGE 4B

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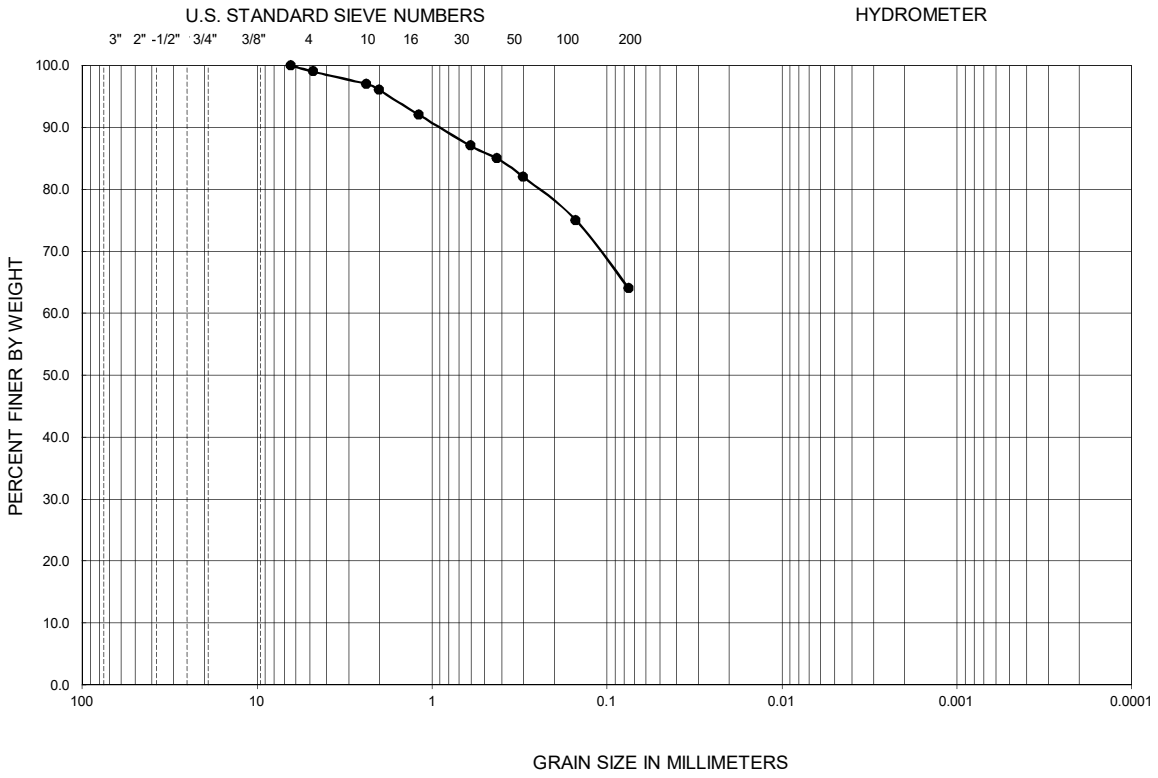
GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	SILT	CLAY



Symbol	Sample Location	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D_{10}	D_{30}	D_{60}	C_u	C_c	Passing No. 200 (percent)	USCS
●	B-3	6.0-7.4	58	30	28	--	--	--	--	--	64.0	CH

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FIGURE B-4

GRADATION TEST RESULTS

NW WASTEWATER MP PACKAGE 4B

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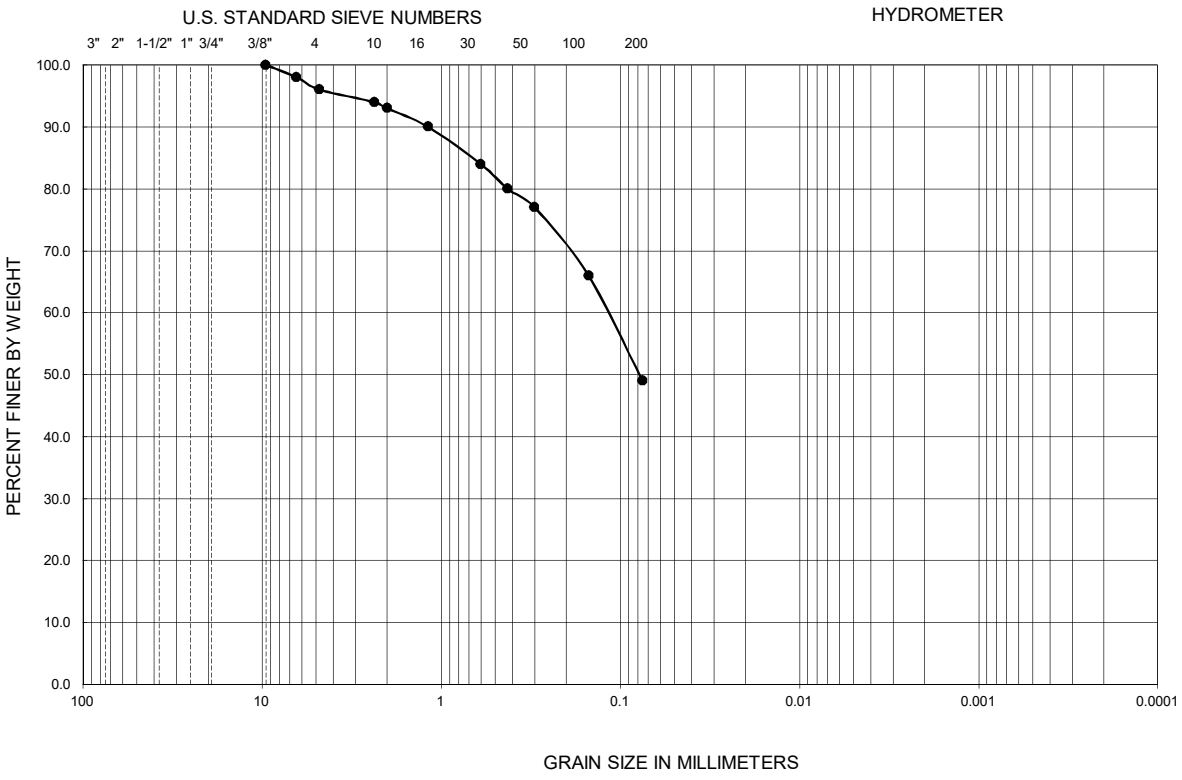
GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	SILT	CLAY



Symbol	Sample Location	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D_{10}	D_{30}	D_{60}	C_u	C_c	Passing No. 200 (percent)	USCS
●	B-3.1	13.5-14.2	49	30	19	--	--	0.12	--	--	49.0	SM

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FIGURE B-5

GRADATION TEST RESULTS

NW WASTEWATER MP PACKAGE 4B

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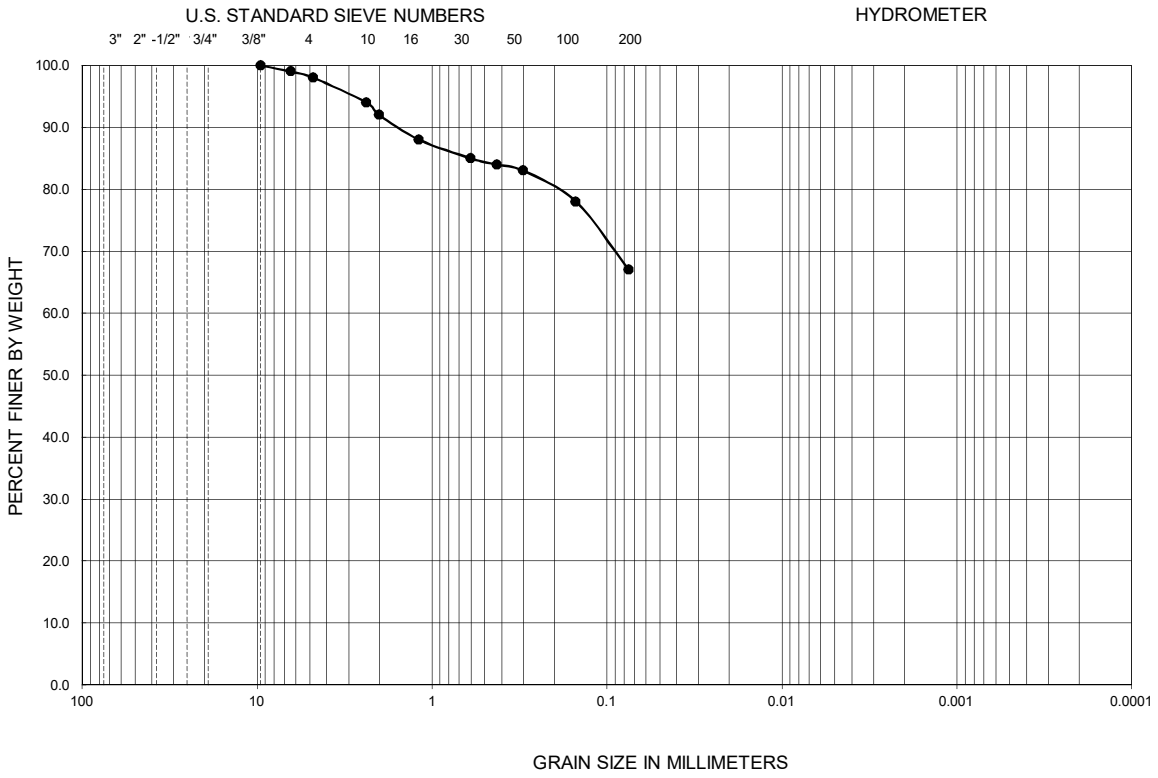
GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	SILT	CLAY



Symbol	Sample Location	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D_{10}	D_{30}	D_{60}	C_u	C_c	Passing No. 200 (percent)	USCS
●	B-5	1.0-2.5	41	21	20	--	--	--	--	--	67.0	CL

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FIGURE B-6

GRADATION TEST RESULTS

NW WASTEWATER MP PACKAGE 4B

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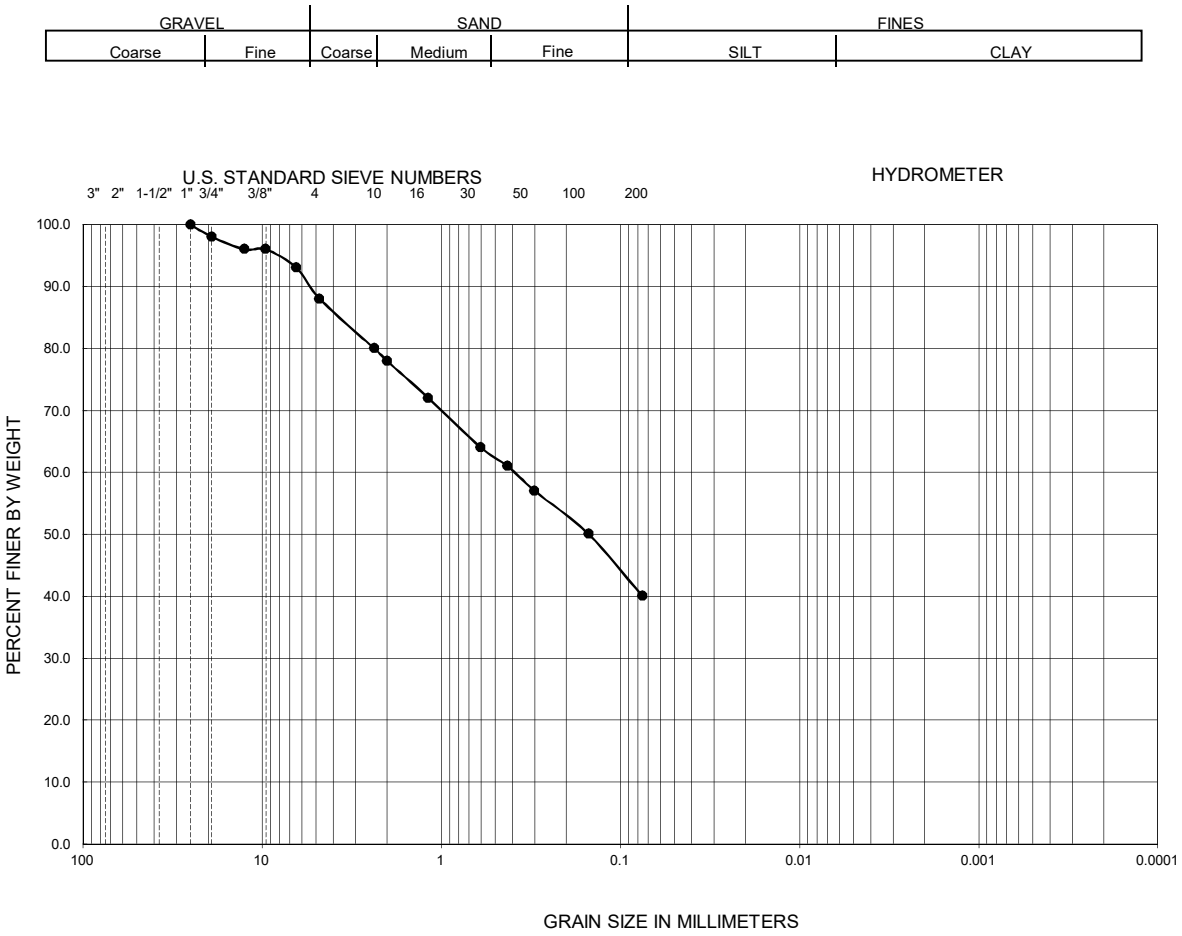

Symbol	Sample Location	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D_{10}	D_{30}	D_{60}	C_u	C_c	Passing No. 200 (percent)	USCS
●	B-5.1	13.5-14.4	48	30	18	--	--	0.40	--	--	40.0	SM

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FIGURE B-7

GRADATION TEST RESULTS

NW WASTEWATER MP PACKAGE 4B

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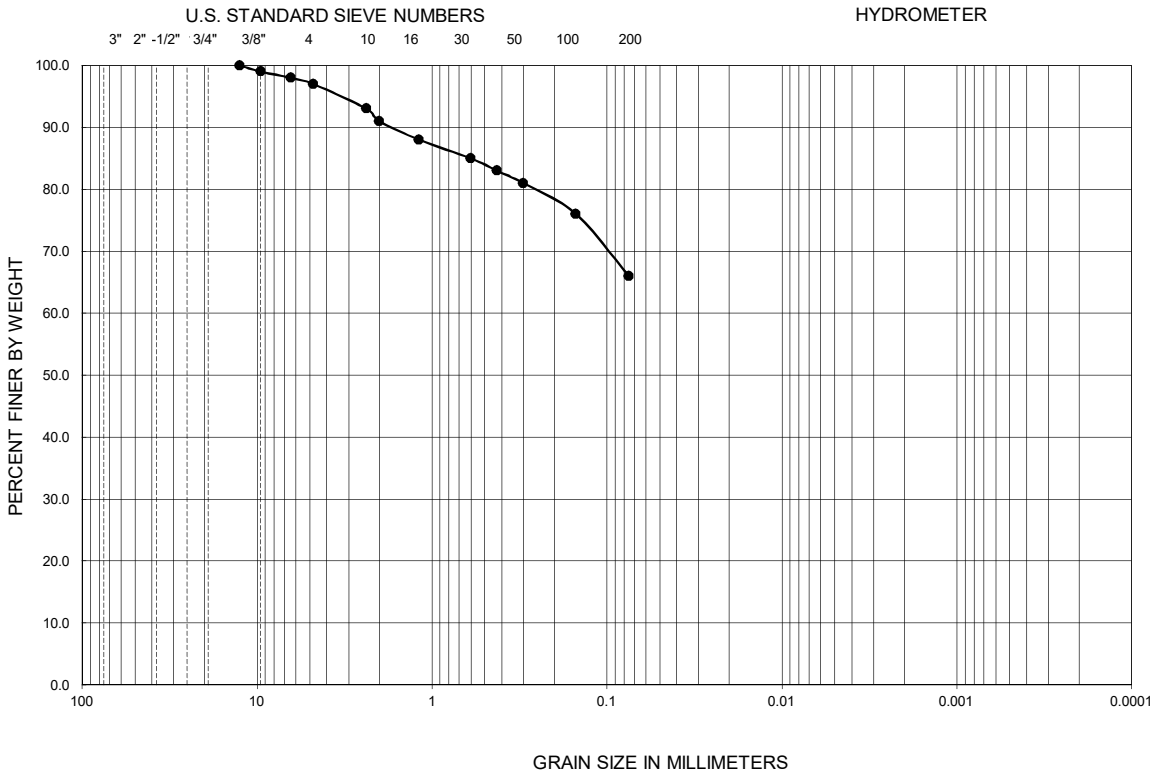
GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	SILT	CLAY



Symbol	Sample Location	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D_{10}	D_{30}	D_{60}	C_u	C_c	Passing No. 200 (percent)	USCS
●	B-7	3.5-5.0	42	22	20	--	--	--	--	--	66.0	CL

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FIGURE B-8

GRADATION TEST RESULTS

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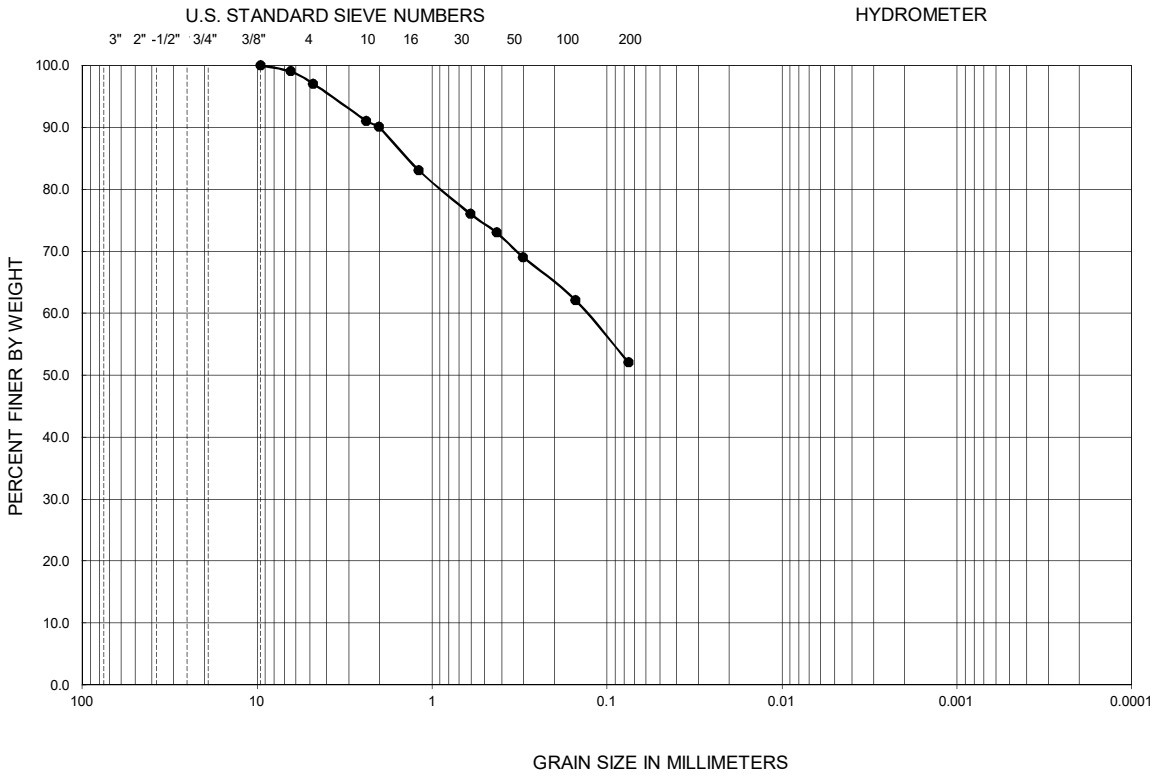
GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	SILT	CLAY



Symbol	Sample Location	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D_{10}	D_{30}	D_{60}	C_u	C_c	Passing No. 200 (percent)	USCS
●	B-12	3.5-5.0	46	25	21	--	--	0.13	--	--	52.0	CL

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FIGURE B-9

GRADATION TEST RESULTS

NW WASTEWATER MP PACKAGE 4B

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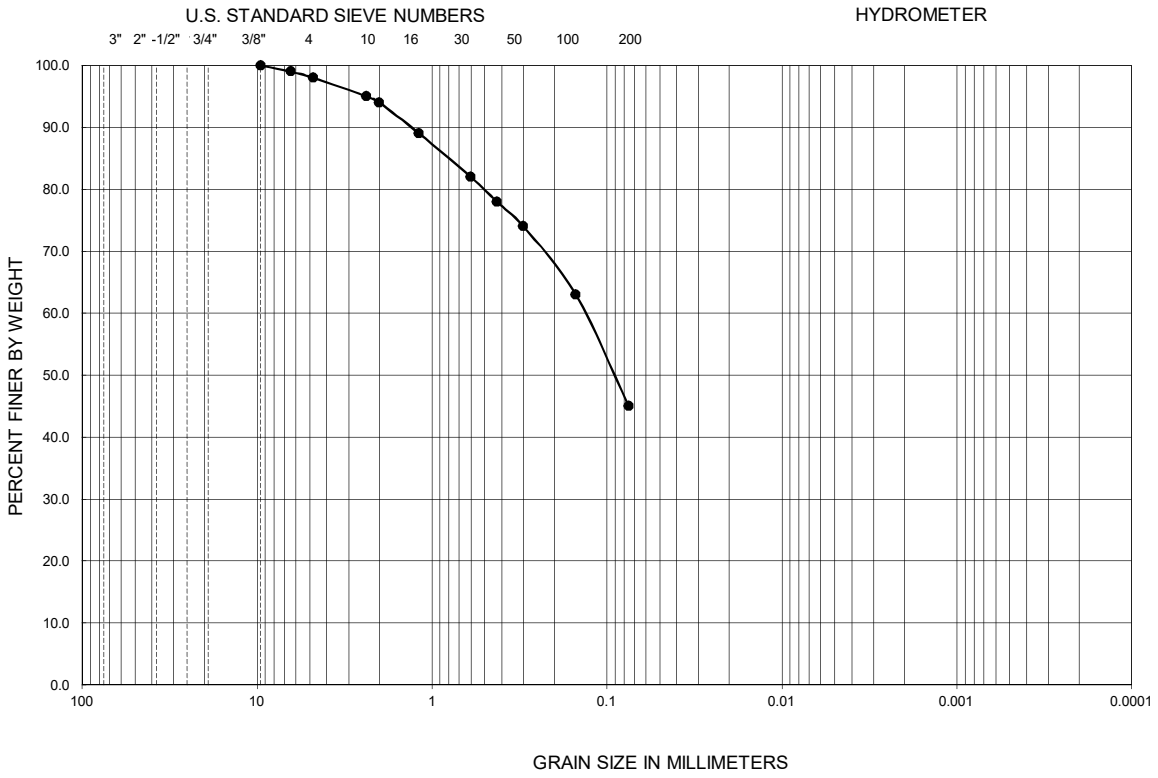
GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	SILT	CLAY



Symbol	Sample Location	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D_{10}	D_{30}	D_{60}	C_u	C_c	Passing No. 200 (percent)	USCS
●	B-13	6.0-7.5	33	23	10	--	--	0.13	--	--	45.0	SC

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FIGURE B-10

GRADATION TEST RESULTS

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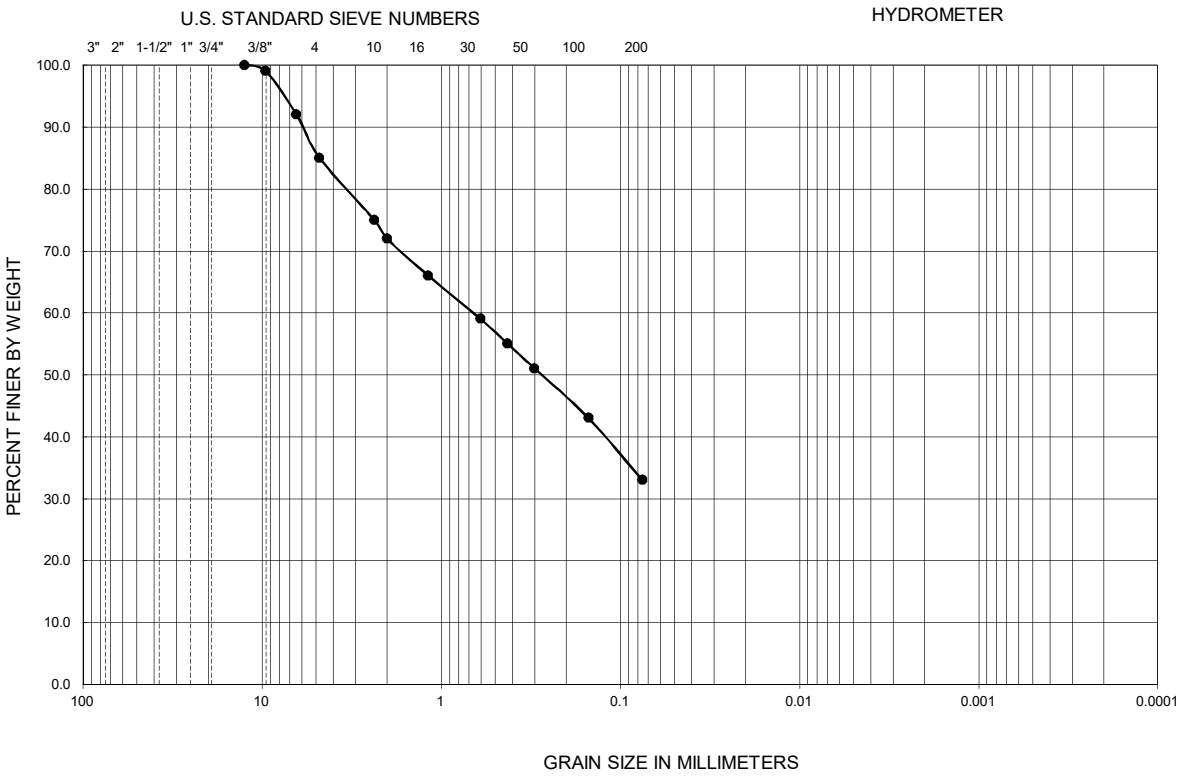
GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	SILT	CLAY



Symbol	Sample Location	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D_{10}	D_{30}	D_{60}	C_u	C_c	Passing No. 200 (percent)	USCS
●	B-16	18.5-19.3	37	23	14	--	--	0.65	--	--	33.0	SC

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FIGURE B-11

GRADATION TEST RESULTS

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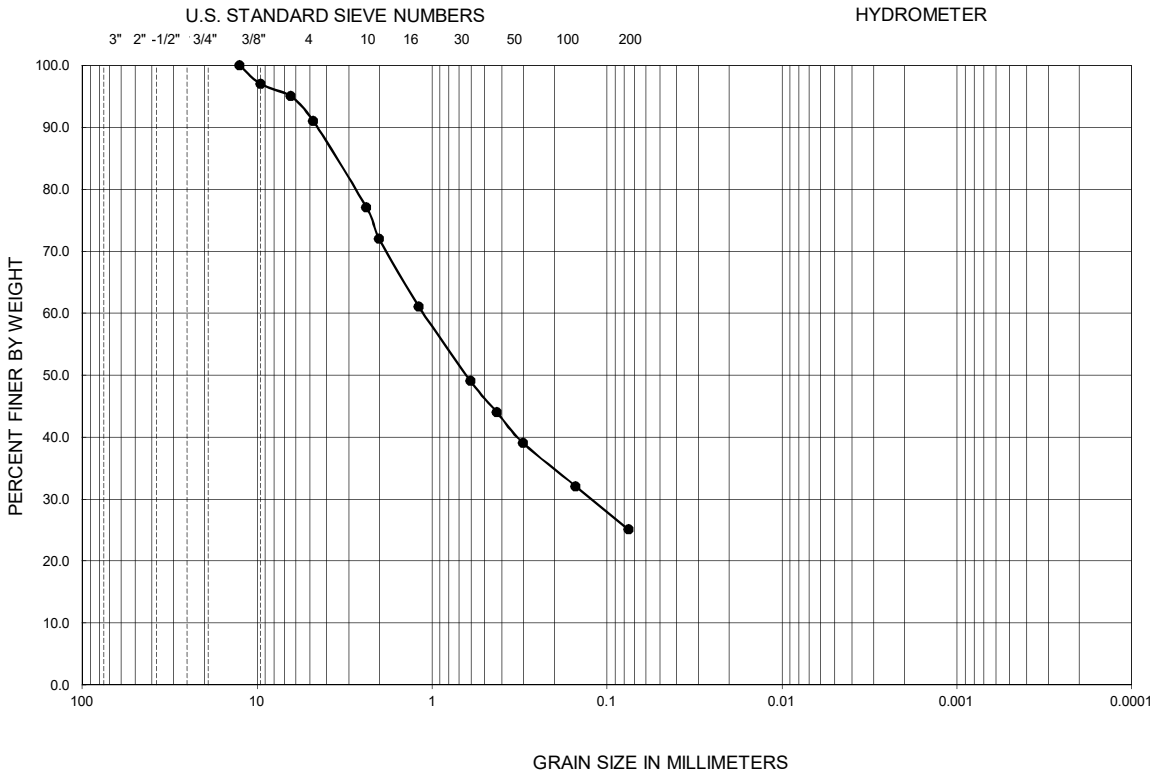
GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	SILT	CLAY



Symbol	Sample Location	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D_{10}	D_{30}	D_{60}	C_u	C_c	Passing No. 200 (percent)	USCS
●	B-21	1.0-2.5	--	--	NP	--	0.122	1.13	--	--	25.0	SM

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FIGURE B-12

GRADATION TEST RESULTS

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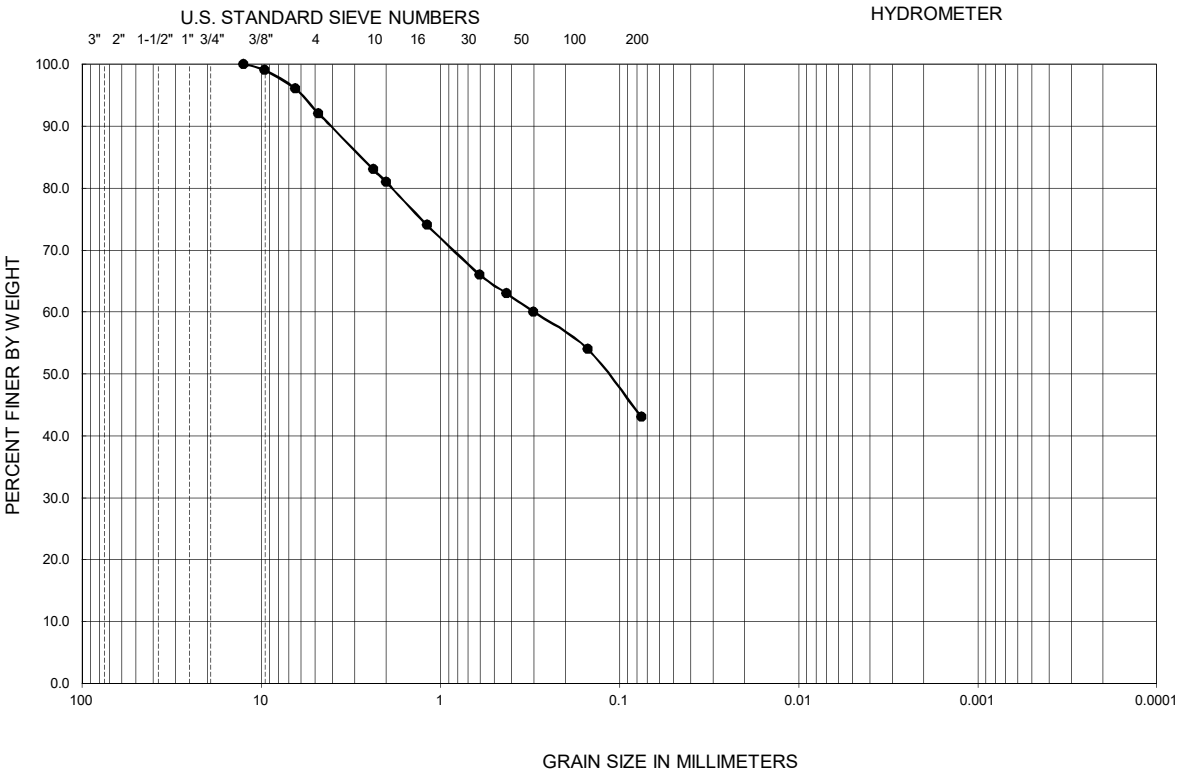
GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	SILT	CLAY



Symbol	Sample Location	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D_{10}	D_{30}	D_{60}	C_u	C_c	Passing No. 200 (percent)	USCS
●	B-24	18.5-19.4	35	25	10	--	--	0.31	--	--	43.0	SM

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FIGURE B-13

GRADATION TEST RESULTS

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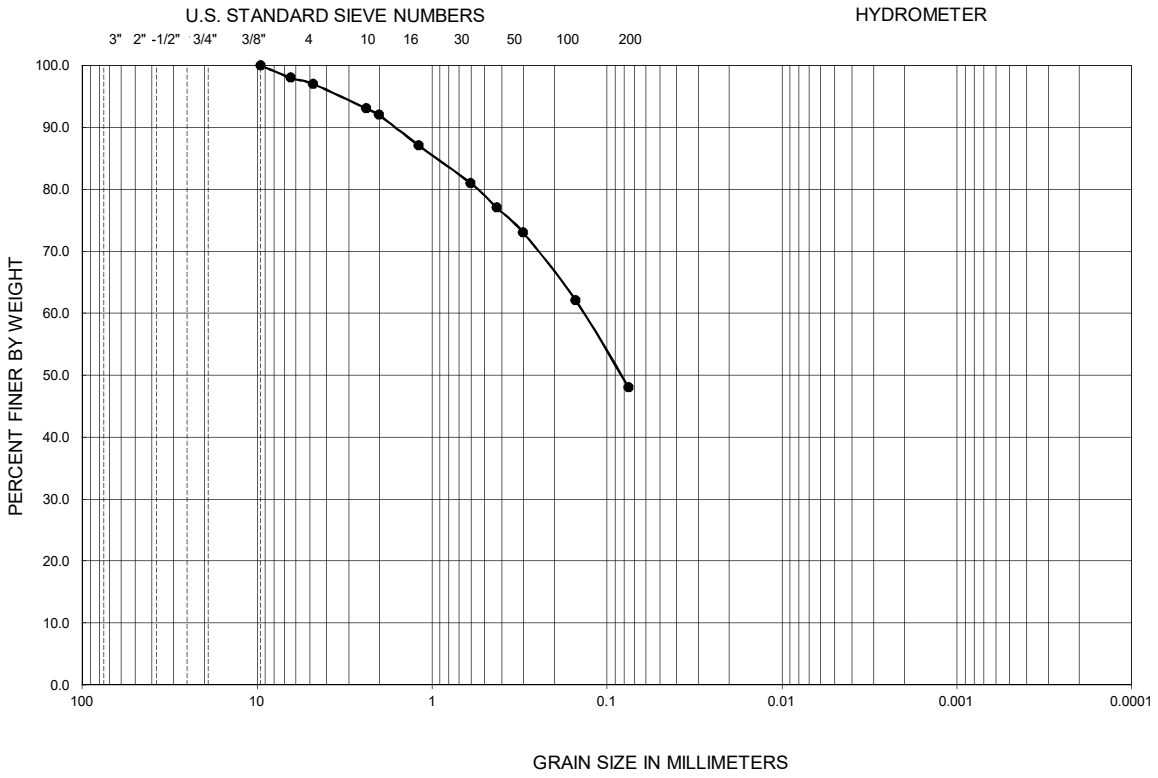
GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	SILT	CLAY



Symbol	Sample Location	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D_{10}	D_{30}	D_{60}	C_u	C_c	Passing No. 200 (percent)	USCS
●	B-28	3.5-4.9	32	28	4	--	--	0.14	--	--	48.0	SM

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FIGURE B-14

GRADATION TEST RESULTS

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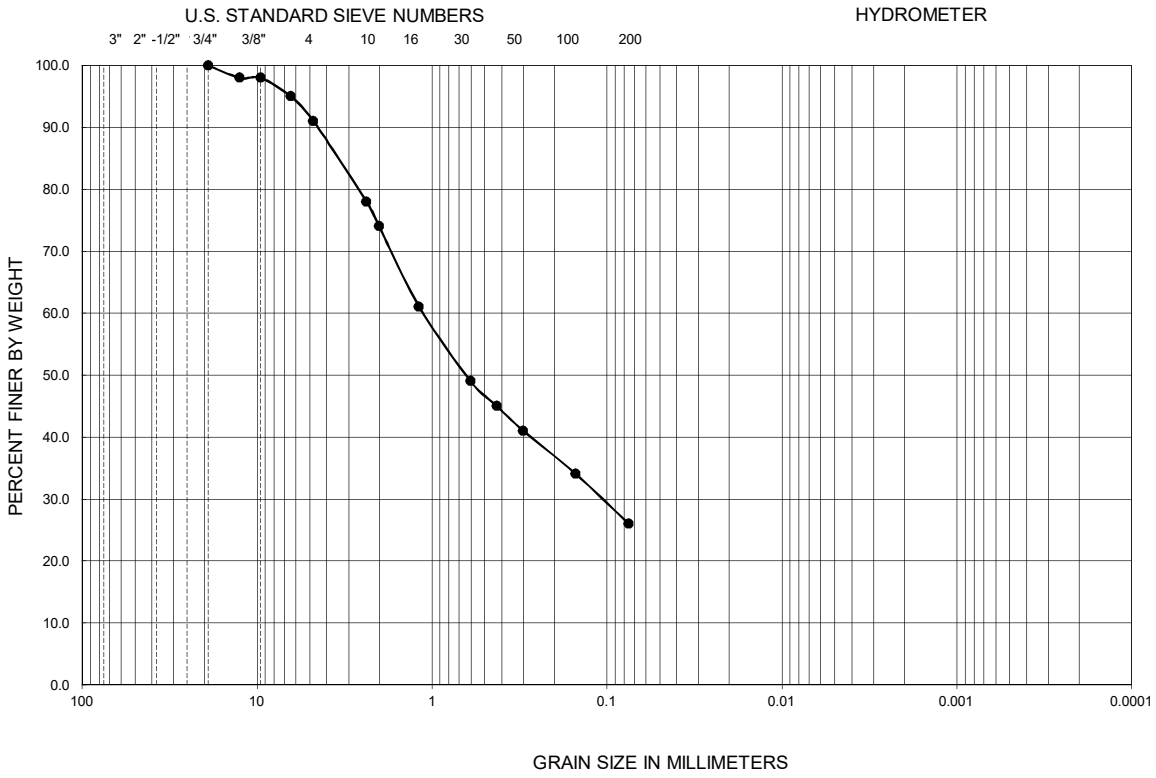
GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	SILT	CLAY



Symbol	Sample Location	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D_{10}	D_{30}	D_{60}	C_u	C_c	Passing No. 200 (percent)	USCS
●	B-28	8.5-9.9	--	--	NP	--	0.105	1.13	--	--	26.0	SM

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FIGURE B-15

GRADATION TEST RESULTS

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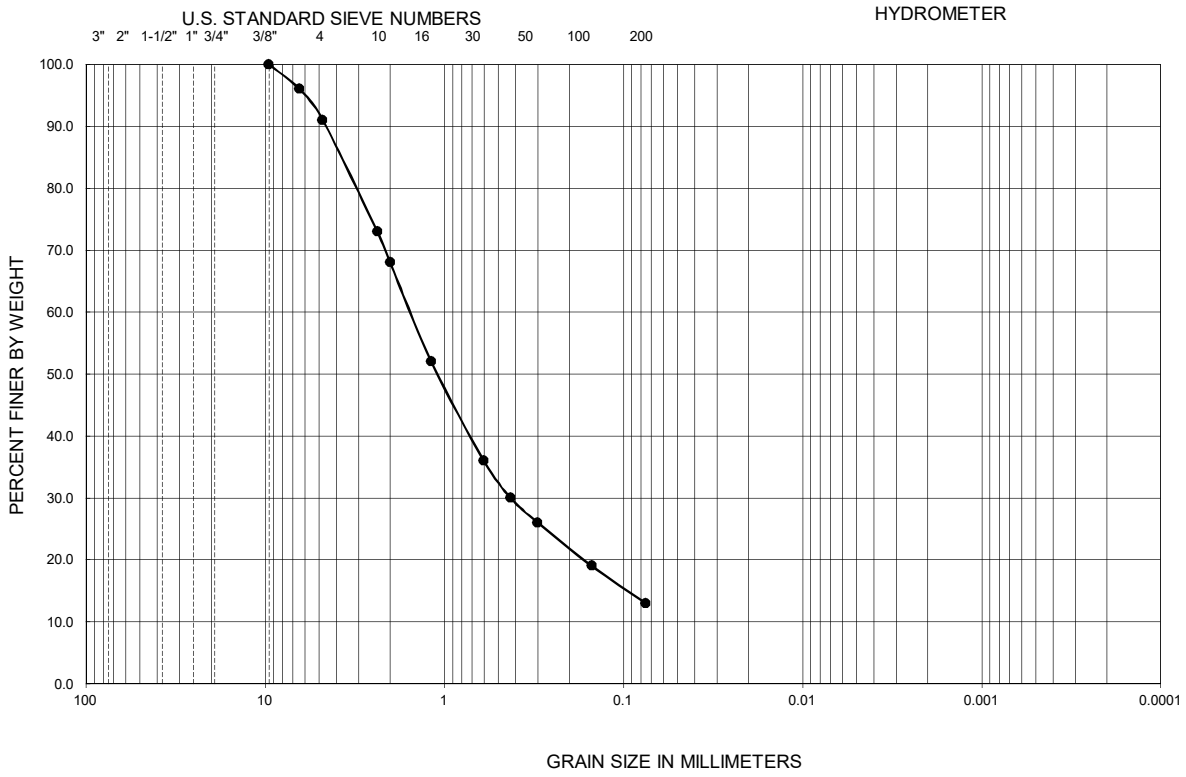
GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	SILT	CLAY



Symbol	Sample Location	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D_{10}	D_{30}	D_{60}	C_u	C_c	Passing No. 200 (percent)	USCS
●	B-28	33.0-35.0	--	--	NP	--	0.432	1.55	--	--	13.0	SM

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FIGURE B-16

GRADATION TEST RESULTS

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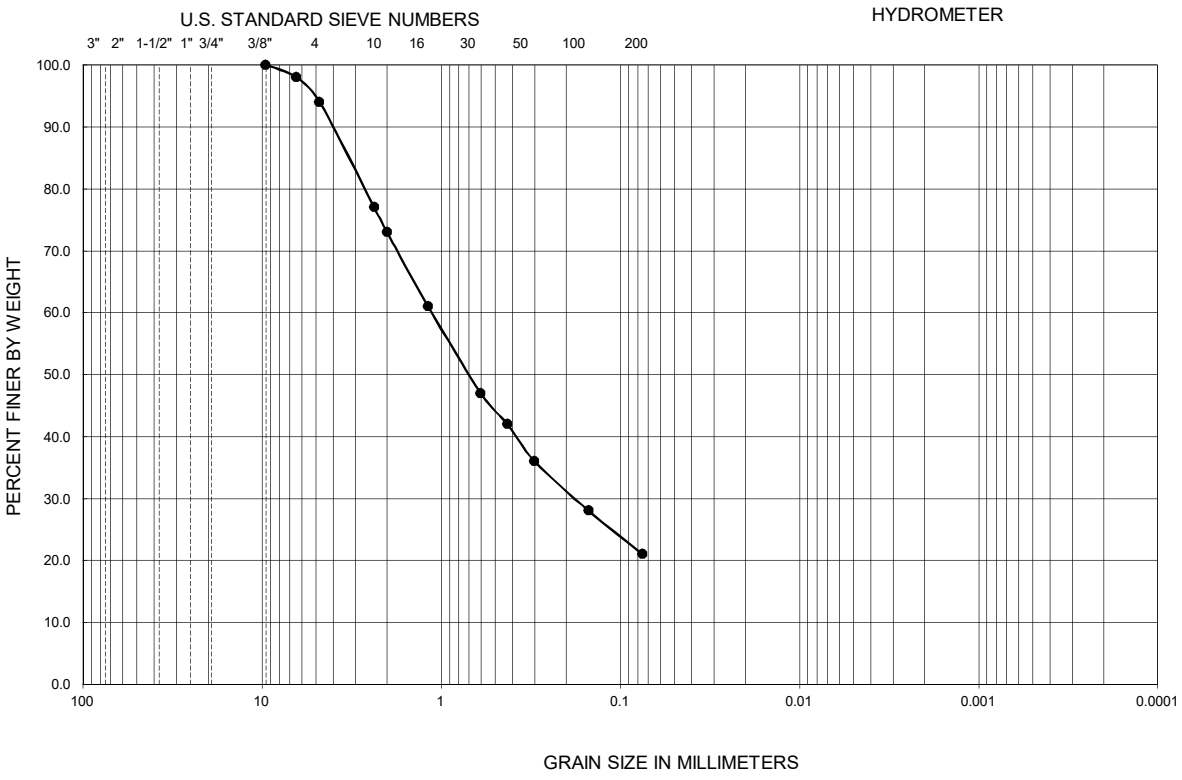
GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	SILT	CLAY



Symbol	Sample Location	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D_{10}	D_{30}	D_{60}	C_u	C_c	Passing No. 200 (percent)	USCS
●	B-29.1	13.5-15.0	--	--	NP	--	0.179	1.13	--	--	21.0	SM

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FIGURE B-17

GRADATION TEST RESULTS

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SYMBOL	LOCATION	DEPTH (ft)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	USCS CLASSIFICATION (Fraction Finer Than No. 40 Sieve)	USCS
●	B-1	1.0-2.3	31	18	13	CL	SC
■	B-1.1	13.5-13.9	47	28	19	ML	SM
◆	B-2.1	3.5-5.0	36	24	12	CL	CL
○	B-3	6.0-7.4	58	20	28	CH	CH
□	B-3.1	13.5-14.2	49	30	19	ML	SM
Δ	B-5	1.0-2.5	41	21	20	CL	CL
X	B-5.1	13.5-14.4	48	30	18	ML	SM
+	B-7	3.5-5.0	42	22	20	CL	CL

NP - INDICATES NON-PLASTIC

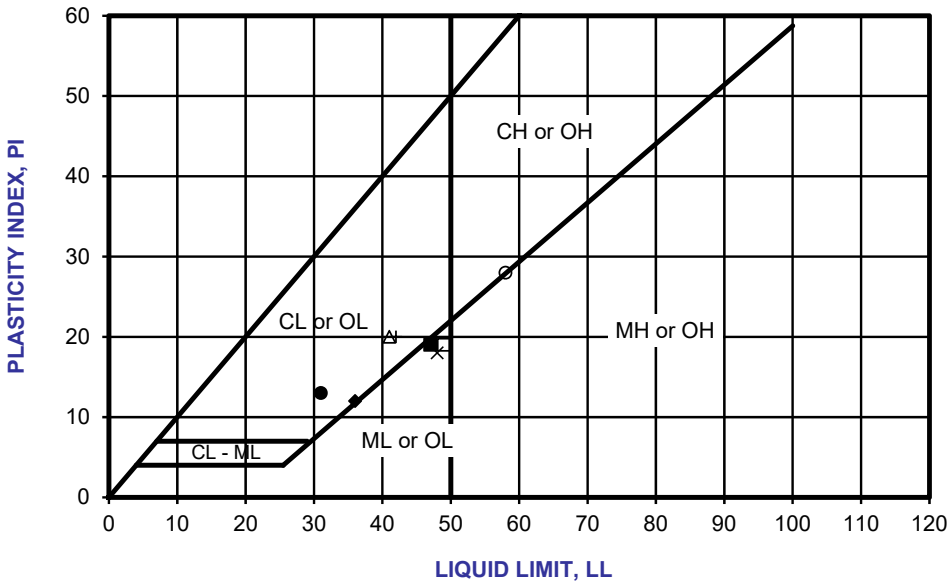

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FIGURE B-18

ATTERBERG TEST RESULTS

NW WASTEWATER MP PACKAGE 4B

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SYMBOL	LOCATION	DEPTH (ft)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	USCS CLASSIFICATION (Fraction Finer Than No. 40 Sieve)	USCS
●	B-12	3.5-5.0	46	25	21	CL	CL
■	B-13	6.0-7.5	33	23	10	CL	SC
◆	B-16	18.5-19.3	37	23	14	CL	SC
○	B-21	1.0-2.5	--	--	NP	ML	SM
□	B-24	18.5-19.4	35	25	10	ML	SM
△	B-28	3.5-4.9	32	28	4	ML	SM
X	B-28	8.5-9.9	--	--	NP	ML	SM
+	B-28	33.0-35.0	--	--	NP	ML	SM

NP - INDICATES NON-PLASTIC

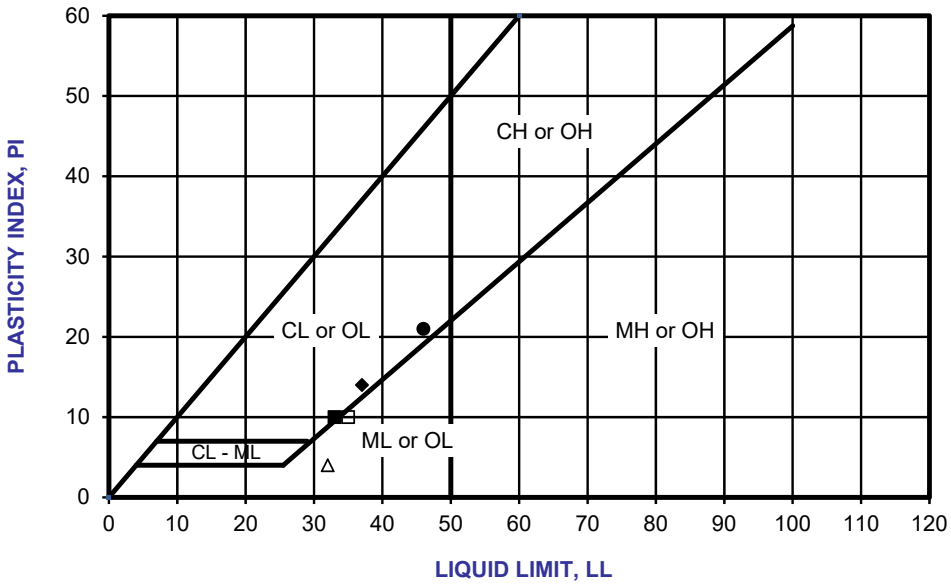

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FIGURE B-19

ATTERBERG TEST RESULTS

NW WASTEWATER MP PACKAGE 4B

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SYMBOL	LOCATION	DEPTH (ft)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	USCS CLASSIFICATION (Fraction Finer Than No. 40 Sieve)	USCS
●	B-29.1	13.5-15.0	--	--	NP	ML	SM

NP - INDICATES NON-PLASTIC

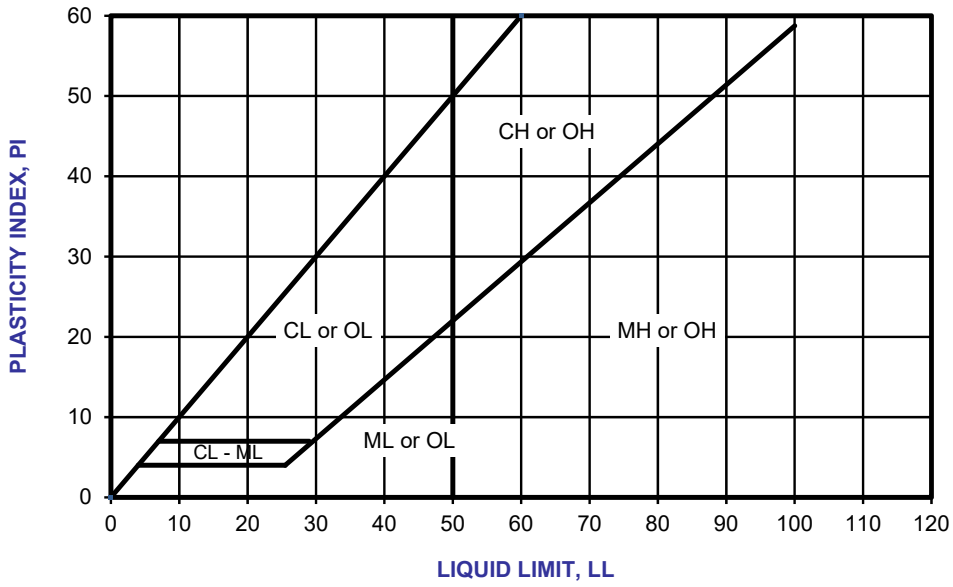

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FIGURE B-20

ATTERBERG TEST RESULTS

NW WASTEWATER MP PACKAGE 4B

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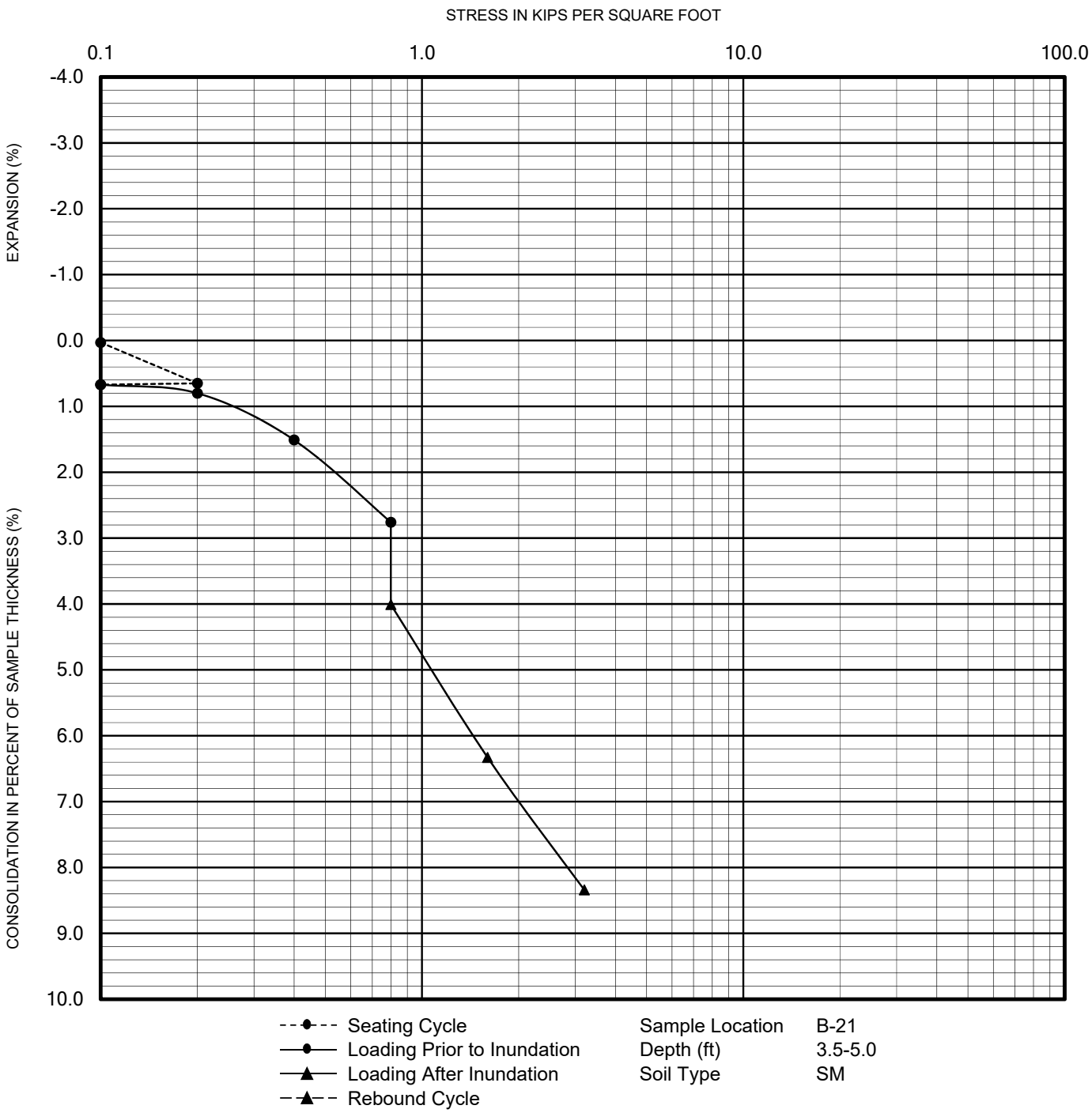

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 2435

FIGURE B-21

CONSOLIDATION TEST RESULTS

NW WASTEWATER MP PACKAGE 4B

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SAMPLE LOCATION	SAMPLE DEPTH (ft)	pH [1]	RESISTIVITY [1] (Ohm-cm)	SULFATE CONTENT [2] (ppm)	(%)	CHLORIDE CONTENT [3] (ppm)
B-1.1	15.0-20.0	8.2	1,608	4	0.0004	16
B-2	5.0-9.3	7.4	804	97	0.0097	92
B-5	1.0-5.0	7.0	1,347	15	0.0015	8
B-5.1	15.0-20.0	9.6	938	3	0.0003	97
B-8	0.9-5.0	7.6	1,762	5	0.0005	3
B-11	0.9-5.0	7.6	2,506	5	0.0005	3
B-14	0.5-8.8	7.9	1,655	4	0.0004	20
B-17	0.9-5.0	7.3	1,642	4	0.0004	3

[1] PERFORMED IN GENERAL ACCORDANCE WITH ARIZONA TEST METHOD 236c
[2] PERFORMED IN GENERAL ACCORDANCE WITH ARIZONA TEST METHOD 733
[3] PERFORMED IN GENERAL ACCORDANCE WITH ARIZONA TEST METHOD 736

SAMPLE LOCATION	SAMPLE DEPTH (ft)	pH [1]	RESISTIVITY [1] (Ohm-cm)	SULFATE CONTENT [2] (ppm)	(%)	CHLORIDE CONTENT [3] (ppm)
B-20	1.1-5.0	7.5	2,432	6	0.0006	3
B-21.1	15.0-20.0	9.8	1,407	3	0.0003	102
B-23	1.0-5.0	7.7	1,333	17	0.0017	49
B-28	2.0-6.0	7.3	1,374	68	0.0068	9
B-29.1	15.0-20.0	8.0	1,876	3	0.0003	10

[1] PERFORMED IN GENERAL ACCORDANCE WITH ARIZONA TEST METHOD 236e
[2] PERFORMED IN GENERAL ACCORDANCE WITH ARIZONA TEST METHOD 733b
[3] PERFORMED IN GENERAL ACCORDANCE WITH ARIZONA TEST METHOD 736b

3202 East Harbour Drive | Phoenix, Arizona 85034 | p. 602.243.1600

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