Western Technologies
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# GEOTECHNICAL EVALUATION REPORT

## MADRID STORMWATER & EROSION CONTROL IMPROVEMENT

Along NM 14
Madrid, New Mexico
WT Job No. 32-223560-0

## PREPARED FOR:

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April 25, 2024

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## 1.0 PURPOSE

This report contains the results of our geotechnical evaluation for a proposed Madrid stormwater and erosion control improvement project in Madrid, New Mexico. The purpose of these services is to provide information and recommendations regarding:

- Subsurface conditions
- Foundation design parameters
- Lateral earth pressures
- Earthwork guidelines
- Drainage
- Groundwater
- Corrosivity (soil to concrete)
- Seismic considerations
- Excavation conditions
- Pavement

Results of the field exploration, field tests, and laboratory testing program are presented in the Appendices.

## 2.0 PROJECT DESCRIPTION

Based on the information provided in the request for proposal (RFP), the proposed project will consist of improvement of stormwater and erosion improvements to include road improvements, arroyo improvements and drainage structures, and general pipeline installation. We assumed that maximum wall and column loads will not exceed 3 klf and 50 kips, respectively. We anticipate no extraordinary slab-on-grade criteria, and that ground floor level will be within a few feet of existing site grade. Any off-site improvements have not been included as part of this evaluation. Should any of our information or assumptions not be correct, we should be notified.

# 3.0 SCOPE OF SERVICES

## 3.1 Field Exploration

The table below outlines WT field exploration program as outlined in the RFP.

Field Exploration Program

| Boring ID | Latitude (degrees) | Longitude (degrees) | Depth (feet) | Purpose |
|---|---|---|---|---|
| 1 | 35.407757 | -106.149751 | 21.5 | Retaining Wall |
| 2 | 35.407279 | -106.150909 | 21.5 | Retaining Wall |
| 3 | 35.400532 | -106.157710 | 11.5 | Tank |
| 4 | 35.410807 | -106.152358 | 14 | Culvert |
| 5 | 35.410619 | -106.152089 | 10 | Culvert |
| 6 | 35.408360 | -106.152897 | 16.5 | General Geotech |
| 7 | 35.407840 | -106.151183 | 16.5 | Culvert |
| 8 | 35.408017 | -106.151583 | 16.5 | Culvert |
| 9 | 35.403267 | -106.154606 | 16.5 | Culvert |
| 10 | 35.409936 | -106.152206 | 6.5 | Roadway |
| 11 | 35.407908 | -106.152702 | 2 | Roadway |
| 12 | 35.407020 | -106.151328 | 6.5 | Roadway |
| 13 | 35.406723 | -106.151494 | 6.5 | Roadway |
| 14 | 35.406602 | -106.152821 | 6.5 | Roadway |
| 15 | 35.404115 | -106.153807 | 6.5 | Roadway |
| 16 | 35.403931 | -106.154368 | 6.5 | Roadway |
| ReMi | 35.407757 | -106.149751 | 100 | Tank |

### 3.1.1 Hollow Stem Auger Boring

Nine (9) borings were drilled to depths ranging from 16.5 to 21.5 feet below the existing site grade in the proposed retaining wall, tank, and drainage conveyance structures areas. In addition, seven (7) borings were drilled to depths of about 5 feet in the proposed roadways. The specific number, locations, and depths, of our explorations were selected by the client. They were field-adjusted based on existing site features under the constraints of surface access. The borings are at the approximate locations shown on the attached Boring Location Diagram. The boring locations shown in the Boring Location Diagram and in the table above are based on

Google Earth Pro (accessed March 5, 2024) and should be considered accurate only to the degree permitted by our data sources and implied by our measuring methods.

The drilling was conducted using CME 75 and a track-mounted for less accessible areas. The drill rigs were equipped with 7" O.D. continuous flight, hollow stem augers. Disturbed but representative samples were obtained during drilling by using the Standard Penetration Test (SPT) procedure in accordance with American Society for Testing and Materials (ASTM) D1586 during the explorations. This test and sampling method consists of driving a standard 2-inch outside-diameter, split-barrel sampler to depth 18 inches into the soil with a 140-pound hammer free-falling a height of 30 inches. Disturbed bulk samples were also obtained. Marginally disturbed samples were collected by driving a 2.5-inch inside diameter, modified California brass ring sampler (ring or R) to a depth of 12 inches from a given referenced point.

The number of blows (split-barrel and ring) for each 6-inch interval were recorded and the number of blows required to drive the sampler the final 12 inches was taken as the Standard Penetration Resistance ("N") or blow count. If a total of 50 blows was recorded within one 6-inch interval, the blow count was recorded as the number of blows for the corresponding number of inches of penetration. The resistance, or N-value, provides a measure of the relative density of granular soils or the relative consistency of cohesive soils; these values are reported on the attached boring logs.

A field log was prepared for each boring. These logs contain visual classifications of the materials encountered during drilling as well as interpolation of the subsurface conditions between samples. Final logs, included in Appendix A, represent our interpretation of the field logs and may include modifications based on laboratory observations and tests of the field samples. The final logs describe the materials encountered, their thickness, and the locations where samples were obtained.

#### 3.1.2 Refraction Microtremor (ReMi)

A refraction micro-tremor (ReMi) survey was performed to estimate the average shear wave velocity profile at the site for assessment of the seismic site classification in accordance with the 2021 IBC. The survey was conducted at the tank area. Location of the ReMi survey line is depicted on the attached Boring Location Diagram. The results of the survey are also discussed in Section 6.5 **Seismic Considerations** of this report.

### 3.2 Laboratory Analyses

Laboratory analyses were performed on representative soil samples to aid in material classification and to estimate pertinent engineering properties of the on-site soils for preparation of this report. Testing was performed in general accordance with applicable standard test methods. The following tests were performed and the results are presented in Appendix B.

- Field moisture content
- In-situ soil density
- Expansion Potential
- Compression
- CBR
- Gradation
- Liquid Limit and Plasticity Index
- Water Soluble Sulfate Content
- Water Soluble Chloride Content
- pH & minimum resistivity

### 3.3 Analyses and Report

This geotechnical engineering report includes a description of the project, a discussion of the field and laboratory testing programs, a discussion of the subsurface conditions, and design recommendations as appropriate to its purpose. The scope of services for this project does not include, either specifically or by implication, any environmental assessment of the site, discovery of underground storage tanks or other underground structures, or identification of contaminated or hazardous materials or conditions. If there is concern about the potential for such contamination, other studies should be undertaken. We are available to discuss the scope of such studies with you.

## 4.0 SITE CONDITIONS

### 4.1 Surface

At the time of our exploration, the site was a residential. The ground surface was hilly and contained a sparse to moderate growth of grasses, shrubs, and trees. Site drainage was relatively poor, and the residential roadways were in poor condition. With the exception of NM 14, all roadways within the project site were unpaved with no gravel surfacing. Photographs of the site at the time of our exploration are provided below.

### 4.2 Subsurface

As presented on the Boring Logs, surface soils to depths of 15 feet consist of loose to very dense Silty SAND with Gravel and Cobbles, very stiff to hard Fat CLAY and COAL fragments. Near surface soils are of nil to high plasticity. The materials underlying the surface soils and extending to the full depth of exploration consisted of medium dense to very dense Poorly-graded SAND, very stiff to hard Lean CLAY, COAL and SHALE fragments. Auger refusal occurred at 2 to 14 feet below existing site grade. Groundwater was not encountered in any boring at the time of exploration. A detailed description of the soils encountered can be found on the boring logs in Appendix A.

## 5.0 GEOTECHNICAL PROPERTIES & ANALYSIS

### 5.1 Laboratory Tests

Laboratory test results (see Appendix B) indicate that on-site subsoils near shallow foundation level exhibit low to moderately high compressibility at existing water contents. The moderately high compressible soils are in Borings 4, 5, 7 and 9 as shown Plate B-1 & B-2. Low to high levels of additional compression occurs when the water content is increased. Moderately high to high compressible soils are present in Borings 7, and 9. It should be noted that selected borings and samples were tested. It is possible that untested samples may exhibit comparable compressibility characteristics.

Near-surface soils are of nil to high plasticity. These soils exhibit low to high expansion potential when recompacted, confined by loads approximating floor loads and saturated. Highly expansive soils were recorded in Boring 1, which consisted of Fat CLAY. CLAY or clayey soils are also present in other borings and may exhibit similar expansive potential when saturated. Slabs-on-grade supported on recompacted on-site soils will have a low to high potential for heaving if the water content of the soil increases.

CBR tests were performed on representative samples from Borings 10, 11, 12, 13, 14, 15 and 16 to determine the bearing capacity of the on-sites for support of pavement. The test was performed in accordance with ASTM D1883. The test results are presented in Appendix B.

Chemical tests were performed on representative samples in Borings 3 and 5 to determine the amount of water-soluble sulfates and chlorides. The test results indicate that the soils in the area of Boring 3 are classify as negligibly corrosive and samples in the vicinity of Boring 5 are classified as severely corrosive to concrete according to Table 19.3.1.1 of ACI 318-19.

Minimum electrical resistivity and hydrogen ion concentration (pH) were performed on representative samples to aid in assessing, by others, the potential for corrosion of buried metals. The test results are presented in Appendix B.

### 5.2 Field Tests

The boring logs included in this report are indicators of subsurface conditions only at the specific location and date noted. Variations from the field conditions represented by the borings may become evident during construction. If variations appear, we should be contacted to re-evaluate our recommendations.

## 6.0 RECOMMENDATIONS

### 6.1 General

Recommendations contained in this report are based on our understanding of the project criteria described in Section 2.0 and the assumption that the soil and subsurface conditions are those disclosed by the explorations. Others may change the plans, final elevations, number and type of structures, foundation loads, and floor levels during design or construction. Substantially different subsurface conditions from those described herein may be encountered or become known. Any changes in the project criteria or subsurface conditions shall be brought to our attention in writing. This report does not encompass the effects, if any, of underlying geologic hazards or regional groundwater withdrawal and expresses no opinion regarding their effects on surface movements at the project site.

### 6.2 Design Considerations

The borings indicate the presence of clay soils on the site. The clay soils may expand or swell with an increase in moisture content. Slabs-on-grade and related improvements situated on expansive clay soils could be subject to relatively large movements if the foundation soils experience an increase or decrease in moisture content. In addition, densification of the soil by the passage of construction equipment may increase the expansion potential of the on-site clayey soil. As expansive soils are encountered during earthwork operations, selective placement procedures should be implemented. Moderately to highly expansive soils should not be used as fill in the structure areas within 36 inches of the final subgrade. It should be understood that if moisture penetrates expansive soils, there could be some heave and resultant cracking/distress of the proposed structures and related improvements. Conversely, as expansive soils dry, shrinkage and resultant cracking/distress of the proposed structures and related improvements may occur.

### 6.3 Retaining Wall and Drainage Structures Foundations

Conventional spread-type foundation can be used to support the proposed structures. We recommend that the spread foundations bear upon engineered fill for support of anticipated loads. The depth and lateral extent of the engineered fills are presented in the **EARTHWORK** section of this report. Footings should bear a minimum of 24 inches below finished grade, which is the lowest adjacent grade for perimeter footings and floor level for interior footings. Recommended minimum widths of column, wood-frame and/or masonry wall footings are 24 and 16 inches, respectively.

Alternative footing depths and allowable bearing capacities are presented in the table below:

| Footing Depth Below Finished Grade[4] (ft) | Allowable Bearing Capacity[5] (psf) |
|---|---|
| 2.0[6] | 3,000 |
| 3.0 | 4,000 |

We anticipate that total and differential settlement of the proposed structures, supported as recommended, should be less than 1 inch and ½ inch, respectively. Additional foundation movements could occur if water from any source infiltrates the foundation soils. Therefore, proper drainage should be provided in the final design and during construction.

[4] Finished grade is the lowest adjacent grade for perimeter footings and floor level for interior footings.

[5] Allowable bearing capacities assume fulfillment of **EARTHWORK** recommendations. Pounds per square foot (psf). Allowable Bearing Capacities also assume a minimum factor of safety equal to 3.

[6] Minimum depth for frost protection of exterior footings or footings in unheated spaces.

The uplift resistance of spread footings supporting the structures may be calculated using the cone method. The equation for determining the ultimate uplift capacity as a function of footing width, footing depth, and soil weight is presented below:

$$T = \gamma D2\ (0.6W + 0.6L + 0.4D + \frac{W\ L}{D})$$

Where: T = ultimate uplift capacity (lbs.)
D = depth of footing below final grade (ft.)
L = length of footing (ft.)
W = width of footing (ft.)
$\gamma$ = unit weight of soil (pcf)*

*a unit weight of 100 pcf is recommended for the soils at this site

The design uplift resistance should be calculated by dividing the ultimate uplift capacity obtained from the equation above by a factor of safety. A factor of safety of at least 1.5 is recommended for live uplift loads.

All footings, stem walls and masonry walls should be reinforced to reduce the potential for distress caused by differential foundation movements. The use of joints at openings or other discontinuities in masonry walls is recommended.

We recommend that the geotechnical engineer or his representative observe the footing excavations before reinforcing steel and concrete are placed. This observation is to evaluate whether the soils exposed are similar to those anticipated for support of the footings. Any soft, loose, or unacceptable soils should be undercut to suitable materials and backfilled with approved fill materials or lean concrete. Soil backfill should be properly compacted.

## 6.4 Tank Foundations

It is our opinion that a concrete ring wall foundation confining a concrete slab can be used to support the proposed tank. Since the on-site soils exhibit moderate to high compressibility within the upper 5 feet, the ring wall foundations should bear on engineered fills achieved by removal and recompaction of the soils below the foundations. The depth and lateral extent of the engineered fills are presented in the **EARTHWORK** section of this report. The ring wall should bear at a minimum of 24 inches below finished grade, which is the lowest adjacent grade for perimeter footings and floor level for interior footings.

We recommend that the proposed ring wall foundation be structurally reinforced to limit the anticipated total and differential settlement to ¾ inch and ½ inch, respectively.

### 6.5 Stormwater Pipe Foundations

The soils encountered within the upper 10 feet are predominantly Class III according to the New Mexico Standard Specification for Public Works (NMSSPW), Section 701. These materials should provide adequate support for the culverts and stormwater pipes. Class IV material including coal were encountered in Borings 1, 5 and 7. The majority of the site is coal, which varied in the degree of lithification and cementation. Any undisturbed coal can support the proposed stormwater pipes. However, we recommend that pipe bears on a minimum of 12 inches of Class I, II, or III as recommended in the **EARTHWORK** section of this report. Class IV material is not suitable for pipe support and should be removed if encountered. The stormwater pipes foundation should be prepared in accordance with NMSSPW section 700. Differential settlement in the pipe should not exceed ½ of an inch for 20-foot sewer sections if the recommended **EARTHWORK** is followed. Settlement will primarily result from elastic movement of the soil mass during backfill and compaction operations.

### 6.6 Lateral Design Criteria

Lateral loads may be resisted by concrete interface friction and by passive resistance. For shallow foundations bearing on properly compacted fill at this site, we recommend the following lateral resistance criteria:

- Passive:
  Shallow wall footings..........250 psf/ft
  Shallow column footings..........400 psf/ft

- Coefficient of base friction (passive)..........0.30

Earth retaining structures less than 10 feet in height, above any free water surface, with level backfill and no surcharge loads may be designed using the equivalent fluid pressure method. Recommended active equivalent fluid pressures and coefficients of base friction for unrestrained elements are:

- Active:
  Undisturbed subsoil........................................................................................40 psf/ft
  Compacted granular backfill ....................................................................30 psf/ft
  Compacted site soils ..........................................................................35 psf/ft
  On-site clayey soils ..........................................................not recommended for use

- Coefficient of base friction (active)...................................................................0.40

Where the design includes restrained elements, the following equivalent fluid pressures are recommended:

- At-rest:
  Undisturbed subsoil........................................................................................60 psf/ft
  Compacted granular backfill ....................................................................55 psf/ft

The equivalent fluid pressures presented herein do not include the lateral pressures arising from the presence of:

- hydrostatic conditions, submergence or partial submergence
- sloping backfill, positively or negatively
- surcharge loading, permanent or temporary
- seismic or dynamic conditions

We recommend a free-draining soil layer or manufactured geosynthetic material be constructed adjacent to the back of any retaining walls. A filter may be required between the soil backfill and drainage layer. This drainage zone should help prevent development of hydrostatic pressure on the wall. This vertical drainage zone should be tied into a gravity drainage system at the base of the wall. It is important that all backfill be properly placed and compacted. Backfill should be mechanically compacted in layers. Flooding or jetting should not be permitted. Care should be taken not to damage the walls when placing the backfill. Backfills should be observed and tested during placement.

Fill against footings, stem walls, and retaining walls should be compacted to densities specified in **EARTHWORK**. Compaction of each lift adjacent to walls should be accomplished with hand-operated tampers or other lightweight compactors. Over-compaction may cause excessive lateral earth pressures that could result in wall movements.

## 6.7 Seismic Considerations

Structures should be designed in accordance with applicable building codes. The seismic design parameters presented in the following table, in accordance with the 2021 International Building Code/American Society of Civil Engineers (ASCE) 7-16 are applicable to the project site:

| Seismic Design Parameters 2021 IBC/ASCE 7-16 | |
|---|---|
| Soil Site Class based on ReMi Velocity Profile | C |
| Mapped Spectral Response Acceleration at 0.2 sec period ($S_s$) | 0.411g |
| Mapped Spectral Response Acceleration at 1.0 sec period ($S_1$) | 0.137g |
| Site Coefficient for 0.2 sec period ($F_a$) | 1.300 |
| Site Coefficient for 1.0 sec period ($F_v$) | 1.500 |
| Design Spectral Response Acceleration at 0.2 sec period ($S_{DS}$) | 0.356g |
| Design Spectral Response Acceleration at 1.0 sec period ($S_{D1}$) | 0.137g |

## 6.8 Slab Support

Floor slabs can be supported on properly placed and compacted fill. The slab subgrade should be prepared by the procedures outlined in this report. A minimum 4-inch layer of base course should be provided beneath all slabs to help prevent capillary rise and a damp slab. The modulus of subgrade reaction (k) is estimated to be 150 pounds per cubic inch (pci), based upon a 30-inch diameter plate.

The use of vapor retarders or barriers is desirable for any slab-on-grade where the floor will be covered by products using water-based adhesives, wood, vinyl backed carpet, impermeable floor coatings (urethane, epoxy, acrylic terrazzo, etc.) or where the floor will be in contact with moisture sensitive equipment or product. When used, the design and installation should be in accordance with the recommendations given in ACI 302.1R and 302.2R. Final determination on the use of a vapor retarder should be left to the slab designer.

All concrete placement and curing operations should follow the American Concrete Institute manual recommendations. Improper curing techniques and/or high slump (high water-cement ratio) could cause excessive shrinkage, cracking or curling. Concrete slabs should be allowed to cure adequately before placing vinyl or other moisture sensitive floor covering.

## 6.9 Drainage

The major cause of soil problems in this vicinity is moisture increase in soils below structures. Therefore, it is extremely important that positive drainage be provided during construction and maintained throughout the life of the proposed structures. Infiltration of water into utility or foundation excavations must be prevented during construction. Planters or other surface features that could retain water adjacent to the proposed structures, should not be constructed. It is also important that proper planning and control of any landscape and irrigation practices be performed.

In areas where sidewalks or paving do not immediately adjoin the building, protective slopes should be provided with an outfall of 5 percent for at least 10 feet from perimeter walls. Scuppers and drainpipes should be designed to provide drainage away from the structures for a minimum of 10 feet. Backfill against footings, exterior walls, and in utility and sprinkler line trenches should be well compacted and free of all construction debris to minimize the possibility of moisture infiltration.

Water and sewer utility lines should be properly installed to avoid possible sources for subsurface saturation. It is important that all utility trenches be properly backfilled. If practicable, planters and/or landscaping should not be constructed adjacent to or near structures. If planters and/or landscaping are adjacent to or near the structures, we recommend the following:

- Planters should be sealed
- Grades should slope away from the proposed structures
- Only shallow rooted landscaping should be used
- Watering should be kept to a minimum

## 6.10 Corrosivity to Concrete and Metal Components

A major factor in determining soil corrosivity is electrical resistivity. The electrical resistivity of a soil is a measure of its resistance to the flow of electrical current. Corrosion of buried metal is an electrochemical process in which the amount of metal loss due to corrosion is directly proportional to the flow of electrical current (DC) from the metal into the soil.

Corrosion current, following Ohm's Law, is inversely proportional to soil resistivity. Lower electrical resistivities result from higher moisture and soluble salt contents and indicate corrosive soil.

The correlation between electrical resistivity and corrosivity ferrous metals is presented in the table below.

| Soil Resistivity (ohm-cm) | Corrosivity Category |
|---|---|
| Greater than 10,000 | Mildly Corrosive |
| 2,001 to 10,000 | Moderately Corrosive |
| 1,001 to 2,000 | Corrosive |
| 0 to 1,000 | Severely Corrosive |

Based on the laboratory results, the soils at the site can be classified as moderately corrosive to ferrous metals and severe for sulfate attack on concrete. Consequently, ASTM Type V cement or equivalent sulfate resistant cement be used for concrete structures bearing on and/or in on-site soils. For metallic components of the structures in contact with soils and groundwater in this site, we recommend that the contractor implement corrosion protection.

### 6.11 Pavements

Pavement analysis was performed for the residential streets. We have also provided concrete paving and treated base course options for the roadway sections crossing the Madrid arroyo. We assumed design vehicles consisted of:

- 18-wheelers/trailers
- Firetrucks/ambulances
- Snowplows
- Passenger cars
- Trucks/SUVs

The encountered soils in the areas of the roadways at Borings 10, 11, 12, 13, 14, 15, and 16 consisted of predominantly COAL. The CBRs for these roadways ranged from 3 (Boring 16) to 32 (Boing 10). The coal is considered highly lithified and cemented in Borings 10 through 15. Boring 16 showed less lithification and cementations. Due to wide variation in the degree of lithification and compaction of the coal, separation pavement sections are provided as well as subgrade preparation as outlined in the **EARTHWORK** section of this report.

This slab analysis utilized the flexible pavement CBR analysis of the U.S. Army Corps of Engineers' PCASE pavement design program. This PCASE design methodology determines a design vehicle from vehicles input by the user for analysis and then determines the equivalent number of passes or load repetitions of all the input vehicles equated to the design vehicle.

Traffic analysis was performed based on estimates of the number of passes of the fully loaded vehicle on a given point during a standard business day. The number of projected passes was not provided to us, so we performed an analysis using the estimated passes, as follows:

- 18-wheelers/trailers – 29,200 total passes - 4 loaded passes per day for 20 years
- Firetrucks/ambulances – 3,650 total passes – 0.5 loaded passes per day for 20 years
- Snowplows – 3,650 total passes – 0.5 loaded passes per day for 20 years
- Passenger cars – 584,000 total passes – 80 loaded passes per day for 20 years
- Trucks/SUVs – 146,000 total passes – 30 loaded passes per day for 20 years

The rigid pavement was designed as plain, unreinforced 650 psi flexural strength concrete. The k-value used in design calculations was 200 pounds per cubic inch (pci) for subgrade soils. The CBRs used for the various are listed on the below. The recommended section thicknesses for the paved areas are included in the following table.

| Pavement Area | Surfacing Option | Design CBR | Portland Cement Concrete (PCC) Thickness | Treated ABC | ABC |
|---|---|---|---|---|---|
| Firehouse Lane | ABC | 3 | -- | -- | 12 |
| Other Residential Streets | ABC | 24 | -- | -- | 10 |
| Madrid Arroyo Crossing | PCC | 24 | 6 | -- | 4 |
| | Treated ABC | 24 | -- | 8 | -- |
| Fire Lane | ABC | 24 | -- | -- | 10 |

Note: PCC – Portland Cement Concrete
ABC- Aggregate Base Course

For the design of concrete pavement subjected to loading, the important strength property is flexural strength. The design strength value of 650 psi utilized here is reasonable and achievable for our local concrete materials. Because flexural strength is seldom measured or even understood on most commercial projects, it is usually best to specify the concrete with a required compressive strength. We recommend utilizing a concrete compressive strength of 4,000 psi or an NMDOT Class P concrete.

Pavements Sections for NM Highway 14

| Pavement Areas | Design ESAL | Design Boring ID | Asphalt Concrete Pavement (inches) | Base Course (inches) |
|---|---|---|---|---|
| 1 | 10 | 8 | 4.0 | 10 |
| 2 | | | 4.5 | 8 |

If the existing pavement sections on NM 14 are thicker than those recommended above, the existing pavement section should be matched. Once final traffic information becomes available, we can provide final pavement design sections.

Base course and asphalt concrete should conform to the New Mexico Department of Transportation (NMDOT) Standard Specifications for Road and Bridge Construction or the New Mexico Standard Specifications for Public Works Construction, whichever is applicable. Bituminous surfacing should be constructed of dense-graded, central plant-mix, asphalt concrete and SP-IV or SP-III.

Material and compaction requirements should conform to recommendations presented under **EARTHWORK**. The gradient of paved surfaces should ensure positive drainage. Water should not pond in areas directly adjoining paved sections. The on-site subgrade soils may soften and lose stability if subjected to conditions that result in an increase in water content.

**Jointing**

As stated in ACI 360R-10, Guide to Design of Slabs-on-Ground: "Joints are used in slab-on-ground construction to limit the frequency and width of random cracks caused by concrete volume changes." The volume changes are caused by changing temperature and from concrete moisture loss over time. Cracking then occurs in the concrete due to resistance to those movements by gravity and subgrade friction. Joints are placed at relatively close spacing for plain, unreinforced slabs and are typically spaced farther apart when slabs are reinforced. Joint spacing recommendations are provided in Table 2 below. Dowels should be placed in all construction joints and are not necessary in sawcut contraction joints. Dowel recommendations are also included in Table 2.

Contraction joints should be made by appropriately timed sawcuts following the guidelines of Section 6.3 of ACI 360R-10. Sawcuts can be made with conventional wet-cut (water-injection) saws, conventional dry-cut saws, or early-entry dry-cut sawcuts. Sawcuts made by conventional saws should be made to a minimum depth of 1/4 of the concrete depth whereas early-entry cuts should be a minimum of 1.5 inches deep.

An isolation joint is recommended at or along all interfaces with existing structures or building components. At those edge locations that will be subjected to vehicular loading such as at dock entry points, the concrete slab should be thickened an additional 25 percent with a taper or transition of 5 feet back to the standard pavement thickness.

The joints, and particularly the joint edges, need to be protected from degradation due to impact loading from the fire app and from the dragging of pallets, etc., across the joints. Typically, the more economical method to provide protection is to fill the joint with an appropriate material to maintain surface continuity across the joint. The typical joint fill materials for this purpose are certain types of semi-rigid epoxy and polyuria. These materials should be 100 percent solids and have a minimum ASTM D2240 Shore A hardness of 80. These particular joint fillers should be installed full depth to the bottom of the sawcut so that the sawcut ledge provides support for the filler material.

The table below summarizes joint and dowel spacing per the PCASE pavement design program.

PCASE Joint and Dowel Summary

| Pavement Area | Joint Spacing, feet | Dowel Spacing, inches | Dowel Length, inches | Dowel Diameter, inches |
|---|---|---|---|---|
| Pavement Areas | 10 – 15 | 12 | 16 | 0.8 |

# 7.0 EARTHWORK

## 7.1 General

The conclusions contained in this report for the proposed construction are contingent upon compliance with recommendations presented in this section. Any excavating, trenching, or disturbance that occurs after completion of the earthwork must be backfilled, compacted and tested in accordance with the recommendations contained herein. It is not reasonable to rely upon our conclusions and recommendations if any future unobserved and untested trenching, earthwork activities or backfilling occurs.

If any unobserved and untested earthwork, trenching or backfilling occurs, then the conclusions and recommendations in this report may not be relied on. We recommend that Western Technologies Inc. be retained to provide services during these phases of the project. Observation and testing of all foundation excavations should be performed prior to placement of reinforcing steel and concrete to confirm that foundations are constructed on satisfactory bearing materials.

## 7.2 Site Clearing

Strip and remove any existing vegetation, debris, and any other deleterious materials from the structures areas. The structures area is defined as areas within the structures' footprint plus 5 feet beyond the perimeter of that footprint. All exposed surfaces should be free of mounds and depressions that could prevent uniform compaction.

## 7.3 Excavation

We anticipate that excavations for the foundations and utility trenches for the proposed construction can be accomplished with conventional equipment. It is our opinion that that the auger refusal material is rippable, but may require the use of heavy-duty or specialized equipment to facilitate removal. The speed and ease of excavation is dependent on the nature of the deposit, the type of equipment used, and the skill and experience of the equipment operator. Note that selection of excavation equipment is the responsibility of the contractor.

The soils to be penetrated by the proposed excavations may vary significantly across the site. Our soil classifications are based solely on the materials encountered in widely spaced exploratory test borings. The contractor should verify that similar conditions exist throughout the proposed area of excavation. If different subsurface conditions are found at the time of construction, we should be contacted immediately to evaluate the conditions encountered.

### 7.3.1 Temporary Excavations and Slopes

Temporary, non-surcharged construction excavations should be sloped or shored. The individual contractor should be made responsible for designing and constructing stable, temporary excavations as required to maintain stability of both the excavation sides and bottom. All excavations should be sloped or shored in the interest of safety following local and federal regulations, including current OSHA excavation and trench safety standards. OSHA recommends a maximum slope inclination of ¾:1 (horizontal:vertical) for Type A soils, 1:1 for Type B soils, and 1½:1 for Type C soils.

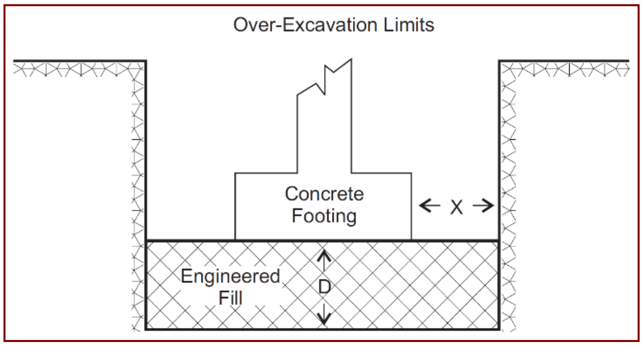
As a safety measure, it is recommended that all vehicles and soil piles be kept a minimum lateral distance back from the crest of the slope at least equal to the slope height. The exposed slope face should be protected against the elements.

If any excavation, including a utility trench, is extended to a depth of more than 20 feet, it will be necessary to have the side slopes designed by a professional engineer.

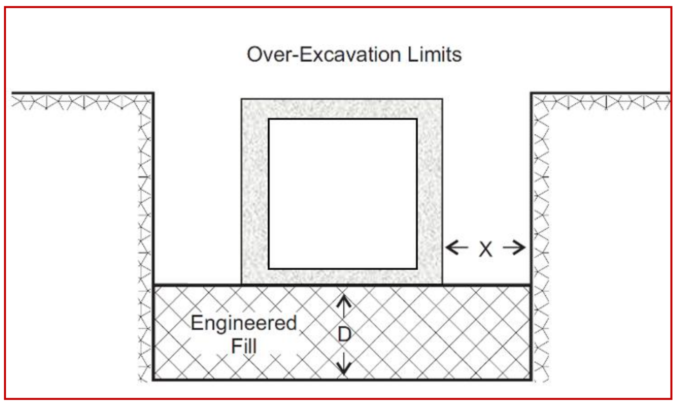
We recommend that the contractor retain a geotechnical engineer to observe the soils exposed in all excavations and provide engineering design for the slopes. This will provide an opportunity to classify the soil types encountered, and to modify the excavation slopes as necessary. This also allows the opportunity to analyze the stability of the excavation slopes during construction.

## 7.4 Foundation Preparation

In the tank and retaining wall areas, remove existing soils throughout the entire tank footprint to a minimum depth of 3 feet below the bottom of footing elevation or 5 below existing site grade, whichever is deepest. Following the removal, scarify, moisten or dry as required, and recompact the bottom of the excavation to a minimum depth of 10 inches. Refill the excavation with properly compacted engineered fill material. The removal and replacement should extend laterally a minimum of 3 feet beyond the foundation or perimeter of the tank.




In drainage crossing areas, remove existing soils as required to a minimum depth of 2 feet below the bottom of the box culvert (length Y in the diagram below). Removal and recompaction should extend a minimum of 3 feet beyond the footing edges (length X in the diagram below).




## 7.5 Slab Preparation

Slabs should be founded on engineered fill material. Remove existing soils to a minimum depth of 24 inches below the bottom of the slab. Replace with properly compacted, low-expansive, fill material.

## 7.6 Pavement Preparation

In pavement areas, remove existing soils to minimum depths of 18 inches and replace with engineered fill. Following the removal, the bottom of the excavation should be scarified, moistened as required, and recompacted to a minimum depth of 10 inches prior to placement of fill and pavement materials.

## 7.7 Stormwater Pipes Foundation Preparation

The sewer line should be installed in accordance with New Mexico Standard Specification for Public Works (NMSSPW), specifically, Section 701.13 and any other applicable national, state, city, and county standards. Bedding materials should surround the sewer line for support. The sewer line trench backfill should be designed in accordance with NMSSPW, Section 701.14.

## 7.8 Materials

Clean on-site soils with low expansive potentials and maximum dimension of 6 inches or imported materials may be used as fill material for the following:

- Foundation areas
- Slabs
- Pavement
- Backfill

Frozen soils should not be used as fill or backfill.

Imported soils should conform to the following:

- Gradation (ASTM C136): percent finer by weight

  6" ........................................ 100
  4" ........................................ 85-100
  ¾" ........................................ 70-100
  No. 4 Sieve ........................................ 50-100
  No. 200 Sieve ........................................ 30 (max)
- Maximum Plasticity Index ........................................ 5
- Maximum soluble sulfates (%) ........................................ 0.10

On-site low expansive soils can be used as backfill.

Base course should conform to the New Mexico Department of Transportation (NMDOT) Standard Specifications for Road and Bridge Construction or the New Mexico Standard Specifications for Public Works Construction, whichever is applicable.

## 7.9 Placement and Compaction

a. Place and compact fill in horizontal lifts, using equipment and procedures that will produce recommended water contents and densities throughout the lift.

b. Uncompacted lift thickness should not exceed 10 inches.

c. Materials should be compacted to the following:

| Material | Minimum Percent Compaction (ASTM D1557) |
|---|---|
| On-site or imported soil, reworked and fill | 95 |
| Base course below slabs-on-grade | 95 |
| Aggregate base below pavement | 96 |
| Nonstructural backfill | 90 |

Fill at depths greater than 5 feet below finished grade should be compacted to at least 98 percent of the ASTM D1557 dry-density value to within 5 feet of finished grade. Fill at depths less than 5 feet below finished grade should be compacted to the minimum values provided above.

Imported or blended soils meeting import soils specification should be compacted to within a water content range of 3 percent below to 3 percent above optimum. On-site clay soils should be compacted to within a water content range of 1 percent below to 3 percent above optimum.

## 7.10 Compliance

Recommendations for foundations, and pavements supported on compacted fills or prepared subgrade depend upon compliance with the **EARTHWORK** recommendations. To assess compliance, observation and testing should be performed under the direction of a WT geotechnical engineer. Please contact us to provide these observation and testing services.

## 8.0 PLAN REVIEW

Foundation and grading plans were not available at the time of this report. WT should be retained to review the final plans to determine if they are consistent with the recommendations presented in this report. If the Client does not retain WT to review the plans and specifications, WT shall have no responsibility for the suitability of the plans for project application.

## 9.0 ADDITIONAL SERVICES

The recommendations provided in this report are based on the assumption that a sufficient schedule of tests and observations will be performed during construction to verify compliance. At a minimum, these tests and observations should be comprised of the following:

- Observations and testing during site preparation and earthwork,
- Observation of foundation excavations, and
- Consultation as may be required during construction.

Retaining the geotechnical engineer who developed your report to provide construction observation is the best way to verify compliance and to help you manage the risks associated with unanticipated conditions.

## 10.0 LIMITATIONS

This report has been prepared assuming the project criteria described in **2.0 PROJECT DESCRIPTION**. If changes in the project criteria occur, or if different subsurface conditions are encountered or become known, the conclusions and recommendations presented herein shall become invalid. In any such event, WT should be contacted in order to assess the effect that such variations may have on our conclusions and recommendations. If WT is not retained for the construction observation and testing services to determine compliance with this report, our professional responsibility is accordingly limited.

The recommendations presented are based entirely upon data derived from a limited number of samples obtained from widely spaced explorations. The attached logs are indicators of subsurface conditions only at the specific locations and times noted. This report assumes the uniformity of the geology and soil structure between explorations, however variations can and often do exist. Whenever any deviation, difference, or change is encountered or becomes known, WT should be contacted.

This report is for the exclusive benefit of our client alone. There are no intended third-party beneficiaries of our contract with the client or this report, and nothing contained in the contract or this report shall create any express or implied contractual or any other relationship with, or claim or cause of action for, any third party against WT.

This report is valid for the earlier of one year from the date of issuance, a change in circumstances, or discovered variations. After expiration, no person or entity shall rely on this report without the express written authorization of WT.

## 11.0 CLOSURE

We prepared this report as an aid to the designers of the proposed project. The comments, statements, recommendations and conclusions set forth in this report reflect the opinions of the authors. These opinions are based upon data obtained at the location of the explorations, and from laboratory tests. Work on your project was performed in accordance with generally accepted standards and practices utilized by professionals providing similar services in this locality. No other warranty, express or implied, is made.


Approximate ReMi Location

Approximate Boring Location

NOT TO SCALE

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| | |
|---|---|
| PROJECT: | MADRID STORMWATER & EROSION CONTROL |
| JOB NO.: | 32-223560-0 |

**BORING LOCATION DIAGRAM**

PLATE

1

| Term | Definition |
|---|---|
| **Allowable Soil Bearing Capacity** | The recommended maximum contact stress developed at the interface of the foundation element and the supporting material. |
| **Backfill** | A specified material placed and compacted in a confined area. |
| **Base Course** | A layer of specified aggregate material placed on a subgrade or subbase. |
| **Base Course Grade** | Top of base course. |
| **Bench** | A horizontal surface in a sloped deposit. |
| **Caisson/Drilled Shaft** | A concrete foundation element cast in a circular excavation which may have an enlarged base (or belled caisson). |
| **Concrete Slabs-On-Grade** | A concrete surface layer cast directly upon base course, subbase or subgrade. |
| **Crushed Rock Base Course** | A base course composed of crushed rock of a specified gradation. |
| **Differential Settlement** | Unequal settlement between or within foundation elements of a structure. |
| **Engineered Fill** | Specified soil or aggregate material placed and compacted to specified density and/or moisture conditions under observations of a representative of a soil engineer. |
| **Existing Fill** | Materials deposited through the action of man prior to exploration of the site. |
| **Existing Grade** | The ground surface at the time of field exploration. |
| **Expansive Potential** | The potential of a soil to expand (increase in volume) due to absorption of moisture. |
| **Fill** | Materials deposited by the actions of man. |
| **Finished Grade** | The final grade created as a part of the project. |
| **Gravel Base Course** | A base course composed of naturally occurring gravel with a specified gradation. |
| **Heave** | Upward movement. |
| **Native Grade** | The naturally occurring ground surface. |
| **Native Soil** | Naturally occurring on-site soil. |
| **Rock** | A natural aggregate of mineral grains connected by strong and permanent cohesive forces. Usually requires drilling, wedging, blasting or other methods of extraordinary force for excavation. |
| **Sand and Gravel Base Course** | A base course of sand and gravel of a specified gradation. |
| **Sand Base Course** | A base course composed primarily of sand of a specified gradation. |
| **Scarify** | To mechanically loosen soil or break down existing soil structure. |
| **Settlement** | Downward movement. |
| **Soil** | Any unconsolidated material composed of discrete solid particles, derived from the physical and/or chemical disintegration of vegetable or mineral matter, which can be separated by gentle mechanical means such as agitation in water. |
| **Strip** | To remove from present location. |
| **Subbase** | A layer of specified material placed to form a layer between the subgrade and base course. |
| **Subbase Grade** | Top of subbase. |
| **Subgrade** | Prepared native soil surface. |

## COARSE-GRAINED SOILS
LESS THAN 50% FINES

| GROUP SYMBOLS | DESCRIPTION | MAJOR DIVISIONS |
|---|---|---|
| **GW** | WELL-GRADED GRAVEL OR WELL-GRADED GRAVEL WITH SAND, LESS THAN 5% FINES | GRAVELS<br>MORE THAN HALF OF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE SIZE |
| **GP** | POORLY-GRADED GRAVEL OR POORLY-GRADED GRAVEL WITH SAND, LESS THAN 5% FINES | |
| **GM** | SILTY GRAVEL OR SILTY GRAVEL WITH SAND, MORE THAN 12% FINES | |
| **GC** | CLAYEY GRAVEL OR CLAYEY GRAVEL WITH SAND, MORE THAN 12% FINES | |
| **SW** | WELL-GRADED SAND OR WELL-GRADED SAND WITH GRAVEL, LESS THAN 5% FINES | SANDS<br>MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE SIZE |
| **SP** | POORLY-GRADED SAND OR POORLY-GRADED SAND WITH GRAVEL, LESS THAN 5% FINES | |
| **SM** | SILTY SAND OR SILTY SAND WITH GRAVEL, MORE THAN 12% FINES | |
| **SC** | CLAYEY SAND OR CLAYEY SAND WITH GRAVEL, MORE THAN 12% FINES | |

**NOTE:** Coarse-grained soils receive dual symbols if they contain 5% to 12% fines (e.g., SW-SM, GP-GC).

## FINE-GRAINED SOILS
MORE THAN 50% FINES

| GROUP SYMBOLS | DESCRIPTION | MAJOR DIVISIONS |
|---|---|---|
| **ML** | SILT, SILT WITH SAND OR GRAVEL, SANDY SILT, OR GRAVELLY SILT | SILTS AND CLAYS<br>LIQUID LIMIT LESS THAN 50 |
| **CL** | LEAN CLAY OF LOW TO MEDIUM PLASTICITY, SANDY CLAY, OR GRAVELLY CLAY | |
| **OL** | ORGANIC SILT OR ORGANIC CLAY OF LOW TO MEDIUM PLASTICITY | |
| **MH** | ELASTIC SILT, SANDY ELASTIC SILT, OR GRAVELLY ELASTIC SILT | SILTS AND CLAYS<br>LIQUID LIMIT MORE THAN 50 |
| **CH** | FAT CLAY OF HIGH PLASTICITY, SANDY FAT CLAY, OR GRAVELLY FAT CLAY | |
| **OH** | ORGANIC SILT OR ORGANIC CLAY OF HIGH PLASTICITY | |
| **PT** | PEAT AND OTHER HIGHLY ORGANIC SOILS | HIGHLY ORGANIC SOILS |

**NOTE:** Fine-grained soils may receive dual classification based upon plasticity characteristics (e.g. CL-ML).

## SOIL SIZES

| COMPONENT | SIZE RANGE |
|---|---|
| BOULDERS | Above 12 in. |
| COBBLES | 3 in. – 12 in. |
| GRAVEL | No. 4 – 3 in. |
| Coarse | ¾ in. – 3 in. |
| Fine | No. 4 – ¾ in. |
| SAND | No. 200 – No. 4 |
| Coarse | No. 10 – No. 4 |
| Medium | No. 40 – No. 10 |
| Fine | No. 200 – No. 40 |
| Fines (Silt or Clay) | Below No. 200 |

**NOTE:** Only sizes smaller than three inches are used to classify soils

## CONSISTENCY

| CLAYS & SILTS | BLOWS PER FOOT |
|---|---|
| VERY SOFT | 0 – 2 |
| SOFT | 3 – 4 |
| FIRM | 5 – 8 |
| STIFF | 9 – 15 |
| VERY STIFF | 16 – 30 |
| HARD | OVER 30 |

## RELATIVE DENSITY

| SANDS & GRAVELS | BLOWS PER FOOT |
|---|---|
| VERY LOOSE | 0 – 4 |
| LOOSE | 5 – 10 |
| MEDIUM DENSE | 11 – 30 |
| DENSE | 31 – 50 |
| VERY DENSE | OVER 50 |

**NOTE:** Number of blows using 140-pound hammer falling 30 inches to drive a 2-inch-OD (1⅜-inch ID) split-barrel sampler (ASTM D1586).

## PLASTICITY OF FINE GRAINED SOILS

| PLASTICITY INDEX | TERM |
|---|---|
| 0 | NON-PLASTIC |
| 1 – 7 | LOW |
| 8 – 20 | MEDIUM |
| Over 20 | HIGH |

## DEFINITION OF WATER CONTENT

DRY
SLIGHTLY DAMP
DAMP
MOIST
WET
SATURATED

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**METHOD OF CLASSIFICATION**

PLATE
**A-2**

The number shown in **"BORING NO."** or "**TEST PIT NO.**" refers to the approximate location of the same number indicated on the "Boring and Test Pit Location Diagram" as positioned in the field by pacing or measurement from property lines and/or existing features, or through the use of Global Positioning System (GPS) devices. The accuracy of GPS devices is somewhat variable.

**"DRILLING TYPE"** refers to the exploratory equipment used in the boring wherein **HSA = hollow stem auger**, and the dimension presented is the outside diameter of the HSA used.

**"EQUIPMENT TYPE"** refers to the equipment used in the excavation of the test pit, and may include the width of the bucket on the excavator and the use of "rock" teeth or attachments.

**"N" in "BLOW COUNTS"** refers to a 2-in. outside diameter split-barrel sampler driven into the ground with a 140 lb. drop-hammer dropped 30 in. repeatedly until a penetration of 18 in. is achieved or until refusal. The number of blows, or "blow count", of the hammer is recorded for each of three 6-in. increments totaling 18 in. The number of blows required for advancing the sampler for the last 12 in. ($2^{nd}$ and $3^{rd}$ increments) is defined as the Standard Penetration Test (SPT) "N"-Value. Refusal to penetration is considered more than 50 blows for a 6-inch increment. (Ref. ASTM D1586).
If,
N = a whole # e.g. "15", it represents the SPT blow counts for the last 12 inches.
N = stacked numbers e.g., 5/10/20, it represents the blow counts for each 6 inches increment.

**"R" in "BLOW COUNTS"** refers to a 3-in. outside diameter ring-lined split spoon sampler driven into the ground with a 140 lb. drop-hammer dropped 30 inches repeatedly until a penetration of 12 inches is achieved or until refusal. The number of blows required to advance the sampler 12 inches is defined as the "R" blow count. The "R" blow count requires an engineered conversion to an equivalent SPT N-Value. Refusal to penetration is considered more than 50 blows for a 6-inch increment. (Ref. ASTM D3550).
If,
R = a whole # e.g. "15", it represents the unconverted blow counts for 12 inches.
For refusal (penetration less than 12 inches), R=a whole #/X" e.g., 50/10"

**"CS" in "BLOWS/FT."** refers to a 2½-in. outside diameter California style split-barrel sampler, lined with brass sleeves, driven into the ground with a 140-pound hammer dropped 30 inches repeatedly until a penetration of 18 inches is achieved or until refusal. The number of blows of the hammer is recorded for each of the three 6-inch increments totaling 18 inches. The number of blows required for advancing the sampler for the last 12 inches ($2^{nd}$ and $3^{rd}$ increments) is defined as the "CS" blow count. The "CS" blow count requires an engineered conversion to an equivalent SPT N-Value. Refusal to penetration is considered more than 50 blows for a 6-inch increment. (Ref. ASTM D3550)

**"SAMPLE TYPE"** refers to the form of sample recovery, in which **N** = Split-barrel sample, **R** = Ring-lined sample, **CS** = California style split-barrel sample, **G** = Grab sample, **B** = Bucket sample, **C** = Core sample (ex. diamond-bit rock coring), **S** = Shelby Tube.

**"DRY DENSITY (LBS/CU FT)"** refers to the laboratory-determined dry density in pounds per cubic foot. The symbol **"NR"** indicates that no sample was recovered.

**"WATER (MOISTURE) CONTENT (% OF DRY WT.)"** refers to the laboratory-determined water content in percent using the standard test method ASTM D2216.

**"USCS"** refers to the "Unified Soil Classification System" Group Symbol for the soil type as defined by ASTM D2487 and D2488. The soils were classified visually in the field, and where appropriate, classifications were modified by visual examination of samples in the laboratory and/or by appropriate tests.

These notes and boring logs are intended for use in conjunction with the purposes of our services defined in the text. Boring log data should not be construed as part of the construction plans nor as defining construction conditions.

Boring logs depict our interpretations of subsurface conditions at the locations and on the date(s) noted. Variations in subsurface conditions and characteristics may occur between borings. Groundwater levels may fluctuate due to seasonal variations and other factors.

The stratification lines shown on the boring logs represent our interpretation of the approximate boundary between soil or rock types based upon visual field classification at the boring location. The transition between materials is approximate and may be more or less gradual than indicated.

| Project: MADRID STORMWATER END EROSION CONTROL<br>Project Number: 32-223560-0 | # BORING NO. 1 | Western Technologies<br>An RMA Company |
|---|---|---|

| | | |
|---|---|---|
| Date(s) Drilled **1/17/2024** | Logged By **S. O'HERRON-ALEX** | Checked By **A. KABA** |
| Drilling Method **GEOPROB** | Drill Bit Size/Type **7"** | Total Depth of Borehole **21.5** |
| Drill Rig Type **GEOPROB** | Drilling Contractor **WESTERN TECHNOLOGIES** | Approximate Surface Elevation **NOT DETERMINED** |
| Groundwater Level and Date Measured **NO GROUNDWATER ENCOUNTERED** | Sampling Method(s) **GRAB, RING, SPT** | Hammer Data **140-LB AUTOHAMMER** |
| Borehole Backfill **GEOPROB CUTTINGS** | Location **SEE LOCATION DIAGRAM** | |

| Depth (feet) | WATER CONTENT | DRY DENSITY (LBS/CU FT) | SAMPLE TYPE | SAMPLE | BLOW COUNTS | USCS | GRAPHIC LOG | SOIL DESCRIPTION | REMARKS AND OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | G | | CH | | Fat CLAY with Sand and Gravel; dark grey, very stiff or medium dense, moist | |
| | | | | N | 9 14 15 | | | no gravel | |
| 5 | | | | R | 41 | | | | |
| | | | | N | 13 15 19 | | | hard or dense | |
| 10 | | | | R | 50/10" | | | brown, hard or dense, damp | |
| | | | | G | | | | | |
| 15 | | | | N | 76/4" | SC | | Clayey SAND; brown, very dense, damp | |
| 20 | | | | N | 50/5" | CL | | Lean CLAY; with shale / sandstone, dark brown, hard, damp | |
| | | | | | | | | BORING TERMINATED AT 21.5 FEET | |
| 25 | | | | | | | | | |

| | | |
|---|---|---|
| **Project: MADRID STORMWATER END EROSION CONTROL**<br><br>**Project Number: 32-223560-0** | **BORING NO. 2** | Western Technologies An RMA Company |

| | | |
|---|---|---|
| Date(s) Drilled **1/17/2024** | Logged By **S. O'HERRON-ALEX** | Checked By **A. KABA** |
| Drilling Method **GEOPROB** | Drill Bit Size/Type **7"** | Total Depth of Borehole **21.5** |
| Drill Rig Type **GEOPROB** | Drilling Contractor **WESTERN TECHNOLOGIES** | Approximate Surface Elevation **NOT DETERMINED** |
| Groundwater Level and Date Measured **NO GROUNDWATER ENCOUNTERED** | Sampling Method(s) **GRAB, RING, SPT** | Hammer Data **140-LB AUTOHAMMER** |
| Borehole Backfill **GEOPROB CUTTINGS** | Location **SEE LOCATION DIAGRAM** | |

| Depth (feet) | WATER CONTENT | DRY DENSITY (LBS/CU FT) | SAMPLE TYPE | SAMPLE | BLOW COUNTS | USCS | GRAPHIC LOG | SOIL DESCRIPTION | REMARKS AND OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | SC | | Clayey SAND; light brown, medium dense, damp | |
| | | | | B | 37 | | | | |
| 5 | | | | N | 68/5" | Sandstone | | with sandstone, very dense | |
| | | | | R | 50/4" | | | | |
| 10 | | | | N | 29<br>39<br>36 | CL | | Lean CLAY; grey, hard, damp | |
| | | | | G | | | | | |
| 15 | | | | N | 79/45" | | | with coal, black, very dense, damp | |
| | | | | G | | | | less coal, dark grey | |
| 20 | | | | N | 92/3" | | | | |
| | | | | | | | | BRING TERMINATED AT 21.5 FEET | |
| 25 | | | | | | | | | |

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| Project: MADRID STORMWATER END EROSION CONTROL<br>Project Number: 32-223560-0 | BORING NO. 3 | Western Technologies An RMA Company |
|---|---|---|

| | | |
|---|---|---|
| Date(s) Drilled **1/17/2024** | Logged By **S. O'HERRON-ALEX** | Checked By **A. KABA** |
| Drilling Method **GEOPROB** | Drill Bit Size/Type **7"** | Total Depth of Borehole **11.5** |
| Drill Rig Type **GEOPROB** | Drilling Contractor **WESTERN TECHNOLOGIES** | Approximate Surface Elevation **NOT DETERMINED** |
| Groundwater Level and Date Measured **NO GROUNDWATER ENCOUNTERED** | Sampling Method(s) **GRAB, RING, SPT** | Hammer Data **140-LB AUTOHAMMER** |
| Borehole Backfill **GEOPROB CUTTINGS** | Location **SEE LOCATION DIAGRAM** | |

| Depth (feet) | WATER CONTENT | DRY DENSITY (LBS/CU FT) | SAMPLE TYPE | SAMPLE | BLOW COUNTS | USCS | GRAPHIC LOG | SOIL DESCRIPTION | REMARKS AND OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | G | | SC | | Clayey SAND with cobbles and Gravel; dark brown, dense, fine to coarse grained, low to medium PI, damp | |
| | | | | R | 54 | | | white layers / light brown | |
| 5 | | | | N | 13<br>12<br>17 | SP-SM | | Poorly-graded SAND with Silt; with gravel and cobbles, light brown / white, medium dense, fine to coarse grained, low to medium PI | |
| 10 | | | | R | 50/8" | | | partial recovery, cobbles, dense, low PI | |
| | | | | | | | | REFUSAL ENCOUNTERED AT 11.5 FEET | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |
| 25 | | | | | | | | | |

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| Project: MADRID STORMWATER END EROSION CONTROL<br>Project Number: 32-223560-0 | BORING NO. 4 | Western Technologies An RMA Company |
|---|---|---|

| | | |
|---|---|---|
| Date(s) Drilled 1/17/2024 | Logged By S. O'HERRON-ALEX | Checked By A. KABA |
| Drilling Method GEOPROB | Drill Bit Size/Type 7" | Total Depth of Borehole 14 |
| Drill Rig Type GEOPROB | Drilling Contractor WESTERN TECHNOLOGIES | Approximate Surface Elevation NOT DETERMINED |
| Groundwater Level and Date Measured NO GROUNDWATER ENCOUNTERED | Sampling Method(s) GRAB, RING, SPT | Hammer Data 140-LB AUTOHAMMER |
| Borehole Backfill GEOPROB CUTTINGS | Location SEE LOCATION DIAGRAM | |

| Depth (feet) | WATER CONTENT | DRY DENSITY (LBS/CU FT) | SAMPLE TYPE | SAMPLE | BLOW COUNTS | USCS | GRAPHIC LOG | SOIL DESCRIPTION | REMARKS AND OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | G | | SM | | Silty SAND with Gravel and Cobbles; brown, medium dense | |
| | | | | N | 10<br>7<br>8 | | | | |
| 5 | | | | N | 9<br>11<br>15 | | | | |
| | | | | R | 20 | | | | |
| 10 | | | | N | 13<br>18<br>27 | SP-SM | | Poorly-graded SAND with Silt; brown, medium dense, damp | |
| | | | | N | 50/2" | | | cobbles | |
| 14 | | | | | | | | REFUSAL ENCOUNTERED AT 14 FEET | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |
| 25 | | | | | | | | | |

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**Project: MADRID STORMWATER END EROSION CONTROL**

**Project Number: 32-223560-0**

# BORING NO. 5

Western Technologies — An RMA Company

| | | | | | |
|---|---|---|---|---|---|
| Date(s) Drilled | **1/17/2024** | Logged By | **S. O'HERRON-ALEX** | Checked By | **A. KABA** |
| Drilling Method | **GEOPROB** | Drill Bit Size/Type | **7"** | Total Depth of Borehole | **10** |
| Drill Rig Type | **GEOPROB** | Drilling Contractor | **WESTERN TECHNOLOGIES** | Approximate Surface Elevation | **NOT DETERMINED** |
| Groundwater Level and Date Measured | **NO GROUNDWATER ENCOUNTERED** | Sampling Method(s) | **GRAB, RING, SPT** | Hammer Data | **140-LB AUTOHAMMER** |
| Borehole Backfill | **GEOPROB CUTTINGS** | Location | **SEE LOCATION DIAGRAM** | | |

| Depth (feet) | WATER CONTENT | DRY DENSITY (LBS/CU FT) | SAMPLE | BLOW COUNTS | USCS | SOIL DESCRIPTION | REMARKS AND OTHER TESTS |
|---|---|---|---|---|---|---|---|
| 0 | | | G | | C | COAL consisting of Poorly-graded to Silty Sand fragments that of fine to coarse grained | |
| | | | N | 3 4 4 | | | |
| 5 | | | R | 15 | | | |
| | NR | | N | 50/3" | | | |
| | | | | | | cobbles | |
| | NR | | N | 50/1" | | | |
| 10 | | | | | | REFUSAL ENCOUNTERED AT 10 FEET | |
| 15 | | | | | | | |

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| | | |
|---|---|---|
| **Project: MADRID STORMWATER END EROSION CONTROL**<br>**Project Number: 32-223560-0** | **BORING NO. 6** | Western Technologies An RMA Company |

| | | |
|---|---|---|
| Date(s) Drilled **1/17/2024** | Logged By **S. O'HERRON-ALEX** | Checked By **A. KABA** |
| Drilling Method **GEOPROB** | Drill Bit Size/Type **7"** | Total Depth of Borehole |
| Drill Rig Type **GEOPROB** | Drilling Contractor **WESTERN TECHNOLOGIES** | Approximate Surface Elevation **NOT DETERMINED** |
| Groundwater Level and Date Measured **NO GROUNDWATER ENCOUNTERED** | Sampling Method(s) **GRAB, RING, SPT** | Hammer Data **140-LB AUTOHAMMER** |
| Borehole Backfill **GEOPROB CUTTINGS** | Location **SEE LOCATION DIAGRAM** | |

| Depth (feet) | WATER CONTENT | DRY DENSITY (LBS/CU FT) | SAMPLE TYPE | SAMPLE | BLOW COUNTS | USCS | GRAPHIC LOG | SOIL DESCRIPTION | REMARKS AND OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | G | | SM | | Silty SAND with Gravel and Cobbles; dark brown, fine to coarse grained, low PI | |
| 2 | | | | | | | | large boulders | |
| 5 | | | | N | 8<br>10<br>10 | SP-SM | | Poorly-graded SAND with Silt; trace gravel and coal, brown /white / grey, medium dense, coarse grained, low PI | |
| 7 | | | | R | 60 | | | cobbles, dark brown, dense | |
| 10 | | | | N | 55/4.5" | | | some gravel, grey, very dense | |
| 15 | | | | N | 50/3" | | | | |
| 16.5 | | | | | | | | BORING TERMINATED AT 16.5 FEET | |
| 20 | | | | | | | | | |

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| Project: MADRID STORMWATER END EROSION CONTROL<br>Project Number: 32-223560-0 | BORING NO. 7 | Western Technologies An RMA Company |
|---|---|---|

| | | |
|---|---|---|
| Date(s) Drilled **1/17/2024** | Logged By **S. O'HERRON-ALEX** | Checked By **A. KABA** |
| Drilling Method **GEOPROB** | Drill Bit Size/Type **7"** | Total Depth of Borehole **16.5** |
| Drill Rig Type **GEOPROB** | Drilling Contractor **WESTERN TECHNOLOGIES** | Approximate Surface Elevation **NOT DETERMINED** |
| Groundwater Level and Date Measured **NO GROUNDWATER ENCOUNTERED** | Sampling Method(s) **GRAB, RING, SPT** | Hammer Data **140-LB AUTOHAMMER** |
| Borehole Backfill **GEOPROB CUTTINGS** | Location **SEE LOCATION DIAGRAM** | |

| Depth (feet) | WATER CONTENT | DRY DENSITY (LBS/CU FT) | SAMPLE TYPE | SAMPLE | BLOW COUNTS | USCS | GRAPHIC LOG | SOIL DESCRIPTION | REMARKS AND OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 18.7 | | | G | | CL | | Sandy Lean CLAY; dark brown, very stiff, moist | |
| 2 | | | | N | 6 8 8 | | | with coal | |
| 5 | | | | G | | | | grey / brown | |
| | 8.9 | 95 | | R | 18 | | | | |
| 7 | | | | N | 12 15 20 | | | | |
| 10 | | | | N | 11 15 21 | Shale | | with shale | |
| 15 | | | | N | 50/4" | | | lots of shale | |
| 16.5 | | | | | | | | BORING TERMINATED AT 16.5 FEET | |
| 20 | | | | | | | | | |

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|---|---|---|
| **Project: MADRID STORMWATER END EROSION CONTROL**<br>**Project Number: 32-223560-0** | **BORING NO. 8** | Western Technologies An RMA Company |

| | | |
|---|---|---|
| Date(s) Drilled **1/17/2024** | Logged By **S. O'HERRON-ALEX** | Checked By **A. KABA** |
| Drilling Method **GEOPROB** | Drill Bit Size/Type **7"** | Total Depth of Borehole **16.5** |
| Drill Rig Type **GEOPROB** | Drilling Contractor **WESTERN TECHNOLOGIES** | Approximate Surface Elevation **NOT DETERMINED** |
| Groundwater Level and Date Measured **NO GROUNDWATER ENCOUNTERED** | Sampling Method(s) **GRAB, RING, SPT** | Hammer Data **140-LB AUTOHAMMER** |
| Borehole Backfill **GEOPROB CUTTINGS** | Location **SEE LOCATION DIAGRAM** | |

| Depth (feet) | WATER CONTENT | DRY DENSITY (LBS/CU FT) | SAMPLE TYPE | SAMPLE | BLOW COUNTS | USCS | GRAPHIC LOG | SOIL DESCRIPTION | REMARKS AND OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 8.7 | | | G | | SC | | Clayey SAND with Gravel; dark brown, dense, damp | |
| | 13.1 | 103 | | R | 50/7" | | | | |
| 5 | | | | N | 22<br>38<br>49 | CL | | Lean CLAY; dark brown / dark grey, hard, damp | |
| | 10.8 | 95 | | R | 50/6" | | | | |
| 10 | | | | N | 50/3" | | | | |
| | | | | G | | | | | |
| 15 | | | | N | 50/3" | Shale | | shale and sandstone | |
| | | | | | | | | BORING TERMINATED AT 16.5 FEET | |
| 20 | | | | | | | | | |

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| Project: MADRID STORMWATER END EROSION CONTROL<br>Project Number: 32-223560-0 | BORING NO. 9 | Western Technologies An RMA Company |
|---|---|---|

| | | |
|---|---|---|
| Date(s) Drilled: 1/17/2024 | Logged By: S. O'HERRON-ALEX | Checked By: A. KABA |
| Drilling Method: GEOPROB | Drill Bit Size/Type: 7" | Total Depth of Borehole: 16.5 |
| Drill Rig Type: GEOPROB | Drilling Contractor: WESTERN TECHNOLOGIES | Approximate Surface Elevation: NOT DETERMINED |
| Groundwater Level and Date Measured: NO GROUNDWATER ENCOUNTERED | Sampling Method(s): GRAB, RING, SPT | Hammer Data: 140-LB AUTOHAMMER |
| Borehole Backfill: GEOPROB CUTTINGS | Location: SEE LOCATION DIAGRAM | |

| Depth (feet) | WATER CONTENT | DRY DENSITY (LBS/CU FT) | SAMPLE TYPE | SAMPLE | BLOW COUNTS | USCS | GRAPHIC LOG | SOIL DESCRIPTION | REMARKS AND OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | G | | C | | COAL consisting of Poorly-graded to Silty Sand fragments that of fine to coarse grained | |
| | | | | R | 6 | | | | |
| 5 | | | | G | | | | | |
| | | | | N | 2<br>3<br>8 | | | | |
| | | | | N | 3<br>5<br>8 | | | medium dense | |
| 10 | | | | R | 41 | CL | | Lean CLAY; trace coal, brown / grey, hard, damp | |
| 15 | | | | N | 34<br>35<br>38 | | | very hard | |
| | | | | | | | | BORING TERMINATED AT 16.5 FEET | |
| 20 | | | | | | | | | |

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| **Project: MADRID STORMWATER END EROSION CONTROL**<br>**Project Number: 32-223560-0** | **BORING NO. 10** | Western Technologies An RMA Company | |

| | | |
|---|---|---|
| Date(s) Drilled **1/17/2024** | Logged By **S. O'HERRON-ALEX** | Checked By **A. KABA** |
| Drilling Method **GEOPROB** | Drill Bit Size/Type **7"** | Total Depth of Borehole **6.5** |
| Drill Rig Type **GEOPROB** | Drilling Contractor **WESTERN TECHNOLOGIES** | Approximate Surface Elevation **NOT DETERMINED** |
| Groundwater Level and Date Measured **NO GROUNDWATER ENCOUNTERED** | Sampling Method(s) **GRAB, RING, SPT** | Hammer Data **140-LB AUTOHAMMER** |
| Borehole Backfill **GEOPROB CUTTINGS** | Location **SEE LOCATION DIAGRAM** | |

| Depth (feet) | WATER CONTENT | DRY DENSITY (LBS/CU FT) | SAMPLE TYPE | SAMPLE | BLOW COUNTS | USCS | GRAPHIC LOG | SOIL DESCRIPTION | REMARKS AND OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 18.1 | | | G | | SM | | Silty SAND; dark brown, medium dense, moist | |
| | | | | | | | | with gravel | |
| | 6.0 | 104 | | R | 32 | | | | |
| 5 | | | | | | | | dense | |
| | | | | N | 23<br>27<br>13 | | | | |
| | | | | | | | | BORING TERMINATED AT 6.5 FEET | |
| 10 | | | | | | | | | |

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| Project: MADRID STORMWATER END EROSION CONTROL<br>Project Number: 32-223560-0 | BORING NO. 11 | Western Technologies An RMA Company |
|---|---|---|

| | | |
|---|---|---|
| Date(s) Drilled **1/17/2024** | Logged By **S. O'HERRON-ALEX** | Checked By **A. KABA** |
| Drilling Method **GEOPROB** | Drill Bit Size/Type **7"** | Total Depth of Borehole **2** |
| Drill Rig Type **GEOPROB** | Drilling Contractor **WESTERN TECHNOLOGIES** | Approximate Surface Elevation **NOT DETERMINED** |
| Groundwater Level and Date Measured **NO GROUNDWATER ENCOUNTERED** | Sampling Method(s) **GRAB, RING, SPT** | Hammer Data **140-LB AUTOHAMMER** |
| Borehole Backfill **GEOPROB CUTTINGS** | Location **SEE LOCATION DIAGRAM** | |

| Depth (feet) | WATER CONTENT | DRY DENSITY (LBS/CU FT) | SAMPLE TYPE | SAMPLE | BLOW COUNTS | USCS | GRAPHIC LOG | SOIL DESCRIPTION | REMARKS AND OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | G | | SC | | Clayey SAND with Gravel and Cobbles; dark brown, very dense, moist | |
| | | | | N | 50/1" | | | | |
| | | | | | | | | REFUSAL ENCOUNTERED AT 2 FEET | |
| 5 | | | | | | | | | |

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| Project: MADRID STORMWATER END EROSION CONTROL<br>Project Number: 32-223560-0 | BORING NO. 12 | Western Technologies An RMA Company |
|---|---|---|

| | | |
|---|---|---|
| Date(s) Drilled **1/17/2024** | Logged By **S. O'HERRON-ALEX** | Checked By **A. KABA** |
| Drilling Method **GEOPROB** | Drill Bit Size/Type **7"** | Total Depth of Borehole **6.5** |
| Drill Rig Type **GEOPROB** | Drilling Contractor **WESTERN TECHNOLOGIES** | Approximate Surface Elevation **NOT DETERMINED** |
| Groundwater Level and Date Measured **NO GROUNDWATER ENCOUNTERED** | Sampling Method(s) **GRAB, RING, SPT** | Hammer Data **140-LB AUTOHAMMER** |
| Borehole Backfill **GEOPROB CUTTINGS** | Location **SEE LOCATION DIAGRAM** | |

| Depth (feet) | WATER CONTENT | DRY DENSITY (LBS/CU FT) | SAMPLE TYPE | SAMPLE | BLOW COUNTS | USCS | GRAPHIC LOG | SOIL DESCRIPTION | REMARKS AND OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | G | | SM | | Silty SAND with Shale; dark brown, grey, very stiff or medium dense, moist | |
| | | | | N | 8<br>10<br>11 | | | | |
| 5 | | | | R | 50/3" | | | | |
| | | | | | | | | BORING TERMINATED AT 6.5 FEET | |
| 10 | | | | | | | | | |

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| Project: MADRID STORMWATER END EROSION CONTROL<br>Project Number: 32-223560-0 | BORING NO. 13 | Western Technologies An RMA Company |
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|---|---|---|
| Date(s) Drilled: **1/17/2024** | Logged By: **S. O'HERRON-ALEX** | Checked By: **A. KABA** |
| Drilling Method: **GEOPROB** | Drill Bit Size/Type: **7"** | Total Depth of Borehole: **5** |
| Drill Rig Type: **GEOPROB** | Drilling Contractor: **WESTERN TECHNOLOGIES** | Approximate Surface Elevation: **NOT DETERMINED** |
| Groundwater Level and Date Measured: **NO GROUNDWATER ENCOUNTERED** | Sampling Method(s): **GRAB, RING, SPT** | Hammer Data: **140-LB AUTOHAMMER** |
| Borehole Backfill: **GEOPROB CUTTINGS** | Location: **35.40836°,-106.15289°** | |

| Depth (feet) | WATER CONTENT | DRY DENSITY (LBS/CU FT) | SAMPLE TYPE | SAMPLE | BLOW COUNTS | USCS | GRAPHIC LOG | SOIL DESCRIPTION | REMARKS AND OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | SC | | Clayey SAND; light brown, medium PI, damp | |
| | 14.4 | | | G | | | | | A-6(5) |
| 5 | | | | | | | | BORING TERMINATED AT 5 FEET | |
| 10 | | | | | | | | | |

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| Project: MADRID STORMWATER END EROSION CONTROL<br>Project Number: 32-223560-0 | # BORING NO. 14 | Western Technologies An RMA Company |
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|---|---|---|
| Date(s) Drilled **1/17/2024** | Logged By **S. O'HERRON-ALEX** | Checked By **A. KABA** |
| Drilling Method **GEOPROB** | Drill Bit Size/Type **7"** | Total Depth of Borehole **6.5** |
| Drill Rig Type **GEOPROB** | Drilling Contractor **WESTERN TECHNOLOGIES** | Approximate Surface Elevation **NOT DETERMINED** |
| Groundwater Level and Date Measured **NO GROUNDWATER ENCOUNTERED** | Sampling Method(s) **GRAB, RING, SPT** | Hammer Data **140-LB AUTOHAMMER** |
| Borehole Backfill **GEOPROB CUTTINGS** | Location **SEE LOCATION DIAGRAM** | |

| Depth (feet) | WATER CONTENT | DRY DENSITY (LBS/CU FT) | SAMPLE TYPE | SAMPLE | BLOW COUNTS | USCS | GRAPHIC LOG | SOIL DESCRIPTION | REMARKS AND OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 7.0 | | | G | | SC | | Clayey SAND with Gravel; brown, loose, damp | |
| | | | | N | 4<br>4<br>5 | | | | |
| 5 | 11.5 | 90 | | R | 13 | | | | |
| 6.5 | | | | | | | | BORING TERMINATED AT 6.5 FEET | |
| 10 | | | | | | | | | |

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| Project: MADRID STORMWATER END EROSION CONTROL<br>Project Number: 32-223560-0 | BORING NO. 15 | Western Technologies An RMA Company |
|---|---|---|
| Date(s) Drilled **1/17/2024** | Logged By **S. O'HERRON-ALEX** | Checked By **A. KABA** |
| Drilling Method **GEOPROB** | Drill Bit Size/Type **7"** | Total Depth of Borehole **6.5** |
| Drill Rig Type **GEOPROB** | Drilling Contractor **WESTERN TECHNOLOGIES** | Approximate Surface Elevation **NOT DETERMINED** |
| Groundwater Level and Date Measured **NO GROUNDWATER ENCOUNTERED** | Sampling Method(s) **GRAB, RING, SPT** | Hammer Data **140-LB AUTOHAMMER** |
| Borehole Backfill **GEOPROB CUTTINGS** | Location **SEE LOCATION DIAGRAM** | |

| Depth (feet) | WATER CONTENT | DRY DENSITY (LBS/CU FT) | SAMPLE TYPE | SAMPLE | BLOW COUNTS | USCS | GRAPHIC LOG | SOIL DESCRIPTION | REMARKS AND OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 12.5 | | | G | | C | | COAL consisting of Poorly-graded to Silty Sand fragments that of fine to coarse grained | |
| | 10.6 | | | G | | | | | |
| | 9.6 | 65 | | R | 15 | | | | |
| | | | | | | | | basalt | |
| 5 | | | | | | | | loose, damp | |
| | | | | N | 3<br>3<br>2 | | | | |
| | | | | | | | | BORING TERMINATED AT 6.5 FEET | |
| 10 | | | | | | | | | |

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| Project: MADRID STORMWATER END EROSION CONTROL<br>Project Number: 32-223560-0 | BORING NO. 16 | Western Technologies An RMA Company |
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|---|---|---|
| Date(s) Drilled **1/17/2024** | Logged By **S. O'HERRON-ALEX** | Checked By **A. KABA** |
| Drilling Method **GEOPROB** | Drill Bit Size/Type **7"** | Total Depth of Borehole **6.5** |
| Drill Rig Type **GEOPROB** | Drilling Contractor **WESTERN TECHNOLOGIES** | Approximate Surface Elevation **NOT DETERMINED** |
| Groundwater Level and Date Measured **NO GROUNDWATER ENCOUNTERED** | Sampling Method(s) **GRAB, RING, SPT** | Hammer Data **140-LB AUTOHAMMER** |
| Borehole Backfill **GEOPROB CUTTINGS** | Location **SEE LOCATION DIAGRAM** | |

| Depth (feet) | WATER CONTENT | DRY DENSITY (LBS/CU FT) | SAMPLE TYPE | SAMPLE | BLOW COUNTS | USCS | GRAPHIC LOG | SOIL DESCRIPTION | REMARKS AND OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 10.1 | | | G | | SC | | Clayey SAND with gravel; dark brown / black, very dense, moist | |
| | NR | | | R | 50/2" | | | with cobbles | |
| | | | | | | SP-SC | | Poorly-graded SAND with Clay; trace gravel, brown, medium dense, damp | |
| 5 | | | | N | 6<br>8<br>6 | | | | |
| | | | | | | | | BORING TERMINATED AT 6.5 FEET | |
| 10 | | | | | | | | | |

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| Boring No. | Depth (ft.) | USCS (AASHTO) | Initial Dry Density (pcf) | Initial Water Content (%) | Compression Properties | | | Expansion Properties | | Plasticity | | Soluble Sulfate (ppm) | Soluble Sulfate (ppm) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Surcharge (ksf) | Total Compression (%) | | Surcharge (ksf) | Expansion (%) | Liquid Limit | Plasticity Index | | | |
| | | | | | | In-Situ | After Saturation | | | | | | | |
| 1 | 5-6 | CH (A-7-6(27)) | 112 | 9.1 | | | | 0.1 | 6.0 | | | | | 1,2 |
| 1 | 5-6 | CH (A-7-6(27)) | 112 | 9.1 | 0.5 | -0.4 | 3.6 | | | | | | | 2 |
| | | | | | 1.0 | | 3.3 | | | | | | | 2 |
| | | | | | 2.0 | | 2.4 | | | | | | | 2 |
| | | | | | 4.0 | | 1.0 | | | | | | | 2 |
| 2 | 2-3 | SC (A-6(7)) | 100 | 6.4 | 0.5 | 0.4 | | | | | | | | |
| | | | | | 1.0 | 1.0 | | | | | | | | |
| | | | | | 2.0 | 1.4 | 2.3 | | | | | | | 2 |
| | | | | | 4.0 | | 3.6 | | | | | | | 2 |
| 4 | 7-8 | SM (A-1-b(0)) | 104 | 3.0 | 0.5 | 1.6 | | | | | | | | |
| | | | | | 1.0 | 2.9 | | | | | | | | |
| | | | | | 2.0 | 3.9 | 9.2 | | | | | | | 2 |
| | | | | | 4.0 | | 11.2 | | | | | | | 2 |

**Note**: Initial Dry Density and Initial Water Content are in-situ values unless otherwise noted.
NP = Non-Plastic

**Remarks**

1. Compacted density (approx. 95% of ASTM D1557 max. density at moisture content slightly below optimum.)
2. Submerged to approximate saturation.
3. Slight rebound after saturation.
4. Sample disturbance observed.

Western Technologies
An RMA Company

PROJECT: **MADRID STORMWATER**
JOB NO.: **32-223560-0**

**SOIL PROPERTIES**

PLATE
**B-1**

| Boring No. | Depth (ft.) | USCS (AASHTO) | Initial Dry Density (pcf) | Initial Water Content (%) | Compression Properties | | | Expansion Properties | | Plasticity | | Soluble Chloride (ppm) | Soluble Sulfate (ppm) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Surcharge (ksf) | Total Compression (%) | | Surcharge (ksf) | Expansion (%) | Liquid Limit | Plasticity Index | | | |
| | | | | | | In-Situ | After Saturation | | | | | | | |
| 5 | 5-6 | COAL (A-1-a(0)) | 77 | 5.6 | 0.5 | 1.6 | | | | | | | | |
| | | | | | 1.0 | 2.1 | | | | | | | | |
| | | | | | 2.0 | 3.1 | 4.6 | | | | | | | 2 |
| | | | | | 4.0 | | 6.7 | | | | | | | 2 |
| 5 | 0-5 | COAL (A-1-a(0)) | | | | | | | | | | ND | 2200 | |
| 7 | 5-6 | CL (A-6(9)) | 95 | 8.9 | | | | 0.1 | 0.4 | | | | | 1,2 |
| 7 | 5-6 | CL (A-6(9)) | 95 | 8.9 | 0.6 | 1.5 | 6.4 | | | | | | | 2 |
| | | | | | 1.1 | | 9.1 | | | | | | | 2 |
| | | | | | 2.2 | | 12.7 | | | | | | | 2 |
| | | | | | 4.4 | | 16.5 | | | | | | | 2 |
| 9 | 2-3 | SP-SM (A-1-b(0)) | 46 | 10.3 | 0.6 | 2.6 | | | | | | | | |
| | | | | | 1.1 | 3.7 | | | | | | | | |
| | | | | | 2.2 | 5.7 | 7.3 | | | | | | | 2 |
| | | | | | 4.4 | | 10.4 | | | | | | | 2 |

**Note**: Initial Dry Density and Initial Water Content are in-situ values unless otherwise noted.
NP = Non-Plastic

**Remarks**

1. Compacted density (approx. 95% of ASTM D1557 max. density at moisture content slightly below optimum.)
2. Submerged to approximate saturation.
3. Slight rebound after saturation.
4. Sample disturbance observed.

Western Technologies
An RMA Company

PROJECT: **MADRID STORMWATER**
JOB NO.: **32-223560-0**

**SOIL PROPERTIES**

PLATE
**B-2**

| Boring No. | Depth (ft.) | USCS Class. | Initial Dry Density (pcf) | Initial Water Content (%) | Compression Properties | | | Expansion Properties | | Plasticity | | Soluble Chloride (ppm) | Soluble Sulfate (ppm) | Minimum Resistivity (OHM-CM) | pH | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Surcharge (ksf) | Total Compression (%) | | Surcharge (ksf) | Expansion (%) | Liquid Limit | Plasticity Index | | | | | |
| | | | | | | In-Situ | After Saturation | | | | | | | | | |
| 5 | 0-5 | COAL | | 9.4 | | | | | | NV | NP | ND | 2200 | 1400 | 8 | |
| 5 | 5-6 | COAL | 77 | 5.6 | 0.5 | 1.6 | | | | | | | | | | |
| | | | | | 1.0 | 2.1 | | | | | | | | | | |
| | | | | | 2.0 | 3.1 | 4.6 | | | | | | | | | 2 |
| | | | | | 4.0 | | 6.7 | | | | | | | | | 2 |
| 7 | 5-6 | CL | 95 | 8.9 | | | | 0.1 | 0.4 | | | | | | | 1,2 |
| 7 | 5-6 | CL | 95 | 8.9 | 0.6 | 1.5 | 6.4 | | | | | | | | | 2 |
| | | | | | 1.1 | | 9.1 | | | | | | | | | 2 |
| | | | | | 2.2 | | 12.7 | | | | | | | | | 2 |
| | | | | | 4.4 | | 16.5 | | | | | | | | | 2 |
| 9 | 2-3 | COAL | 46 | 10.3 | 0.6 | 2.6 | | | | | | | | | | |
| | | | | | 1.1 | 3.7 | | | | | | | | | | |
| | | | | | 2.2 | 5.7 | 7.3 | | | | | | | | | 2 |
| | | | | | 4.4 | | 10.4 | | | | | | | | | 2 |

**Note**: Initial Dry Density and Initial Water Content are in-situ values unless otherwise noted.
NP = Non-Plastic

**Remarks**

1. Compacted density (approx. 95% of ASTM D1557 max. density at moisture content slightly below optimum.)
2. Submerged to approximate saturation.
3. Slight rebound after saturation.
4. Sample disturbance observed.

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PROJECT: **MADRID STORMWATER**
JOB NO.: **32-223560-0**

**SOIL PROPERTIES**

PLATE
**B-2**

## SOIL PROPERTIES

| Boring No. | Depth (ft.) | Soil Class (AASHTO) | Particle Size Distribution - (%) Passing by Weight | | | | | | | | | | | | | | Plasticity | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1¼" | 1" | ¾" | ½" | 3/8" | #4 | #8 | #10 | #16 | #30 | #40 | #50 | #100 | #200 | L L | P I | |
| 1 | 0-5 | CH (A-7-6(27)) | - | 100 | 97 | 96 | 96 | 94 | 92 | 91 | 90 | 89 | 88 | 87 | 83 | 78 | 56 | 33 | |
| 2 | 0-5 | SC (A-6(7)) | - | - | 100 | 99 | 98 | 91 | 84 | 83 | 77 | 72 | 70 | 69 | 56 | 49 | 39 | 23 | |
| 3 | 0-5 | SC (A-2-6(0)) | - | 100 | 93 | 84 | 78 | 65 | 54 | 52 | 45 | 42 | 40 | 36 | 29 | 28 | 29 | 13 | |
| 4 | 0-5 | SM (A-1-b(0)) | - | 100 | 88 | 85 | 77 | 66 | 60 | 59 | 55 | 50 | 46 | 42 | 30 | 19 | NV | NP | |
| 5 | 0-5 | COAL (A-1-a(0)) | - | 100 | 95 | 88 | 79 | 53 | 37 | 34 | 27 | 21 | 18 | 16 | 12 | 8.8 | NV | NP | |
| 6 | 0-5 | SM (A-1-b(0)) | - | 100 | 93 | 86 | 80 | 68 | 57 | 55 | 46 | 37 | 32 | 28 | 19 | 13 | NV | NP | |
| 6 | 15-16.5 | SC (A-2-6(0)) | - | 100 | 97 | 91 | 88 | 72 | 55 | 52 | 42 | 35 | 32 | 29 | 24 | 20 | 29 | 14 | |
| 7 | 0-5 | CL (A-6(9)) | - | - | 100 | 98 | 96 | 91 | 86 | 85 | 81 | 78 | 76 | 73 | 65 | 57 | 39 | 21 | |

Note: NP = Non-Plastic
Samples obtained excluded cobbles and boulders.

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PROJECT: MADRID STORMWATER
JOB NO.: 32-223560-0

SOIL PROPERTIES

PLATE

B-3

## SOIL PROPERTIES

| Boring No. | Depth (ft.) | Soil Class (AASHTO) | Particle Size Distribution - (%) Passing by Weight | | | | | | | | | | | | | | Plasticity | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1¼" | 1" | ¾" | ½" | 3/8" | #4 | #8 | #10 | #16 | #30 | #40 | #50 | #100 | #200 | L L | P I | |
| 8 | 0-5 | SC (A-6(3)) | - | 100 | 91 | 88 | 87 | 83 | 76 | 75 | 70 | 63 | 60 | 56 | 47 | 40 | 40 | 20 | |
| 9 | 0-5 | SP-SM (A-1-b(0)) | - | - | 100 | 98 | 95 | 83 | 61 | 58 | 45 | 33 | 27 | 23 | 16 | 12 | NV | NP | |
| 10 | 0-5 | SM (A-2-4(0)) | - | - | 100 | 97 | 96 | 92 | 85 | 84 | 79 | 71 | 64 | 57 | 34 | 19 | NV | NP | |
| 11 | 0-5 | SM (A-1-b(0)) | - | 100 | 89 | 86 | 81 | 75 | 68 | 67 | 61 | 54 | 48 | 43 | 31 | 21 | NV | NP | |
| 12 | 0-5 | SC (A-6(5)) | - | - | 100 | 97 | 95 | 91 | 85 | 84 | 79 | 72 | 69 | 64 | 55 | 48 | 40 | 19 | |
| 13 | 0-5 | SC (A-6(5)) | - | - | 100 | 97 | 95 | 95 | 91 | 85 | 84 | 76 | 72 | 69 | 65 | 55 | 40 | 19 | |
| 14 | 0-5 | SC (A-2-4(0)) | - | 100 | 96 | 89 | 80 | 70 | 62 | 61 | 56 | 50 | 44 | 41 | 34 | 29 | 27 | 10 | |
| 15 | 0-4 | COAL (A-1-b(0)) | - | - | 100 | 97 | 94 | 84 | 71 | 68 | 56 | 43 | 37 | 32 | 23 | 17 | NV | NP | |

Note: NP = Non-Plastic
Samples obtained excluded cobbles and boulders.

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PROJECT: **MADRID STORMWATER**
JOB NO.: **32-223560-0**

**SOIL PROPERTIES**

PLATE
**B-4**

# SOIL PROPERTIES

| Boring No. | Depth (ft.) | Soil Class (AASHTO) | Particle Size Distribution - (%) Passing by Weight | | | | | | | | | | | | | | Plasticity | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1¼" | 1" | ¾" | ½" | 3/8" | #4 | #8 | #10 | #16 | #30 | #40 | #50 | #100 | #200 | L L | P I | |
| 15 | 4-5 | SP-SM (A-1-b(0)) | - | 100 | 98 | 96 | 95 | 82 | 62 | 57 | 44 | 31 | 26 | 22 | 16 | 12 | NV | NP | |
| 16 | 0-5 | SM (A-1-b(0)) | - | 100 | 89 | 85 | 80 | 67 | 57 | 55 | 49 | 41 | 37 | 34 | 25 | 16 | NV | NP | |

Note: NP = Non-Plastic
Samples obtained excluded cobbles and boulders.

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PROJECT: **MADRID STORMWATER**
JOB NO.: **32-223560-0**

**SOIL PROPERTIES**

PLATE
**B-5**

# CALIFORNIA BEARING RATIO (CBR)
## Boring 10 (0'-5')

| | | | |
|---|---|---|---|
| Client: | State of New Mexico EMNRD | Job Number: | 32-223560-0 |
| Address: | | Lab Number: | |
| City, State: | Madrid, New Mexico | Report Date: | |
| Attn: | Leeland Murray | | |

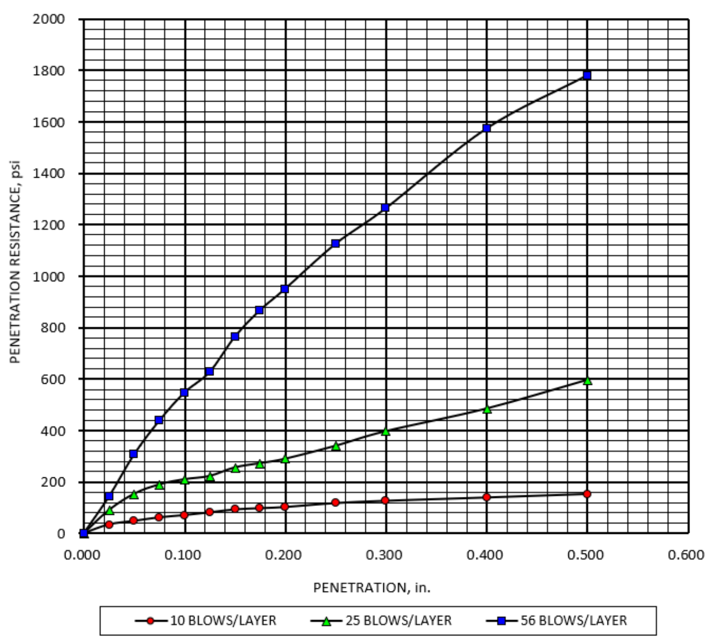
| | | | | | |
|---|---|---|---|---|---|
| Project: | Madrid Stormwater & Eriosion Control | Authorized By: | | Date: | |
| Location: | Madrid, New Meixco | Sampled By: | | Date: | |
| Material: | | Submitted By: | | Date: | |
| Source: | B 10 (0-5') | | | | |

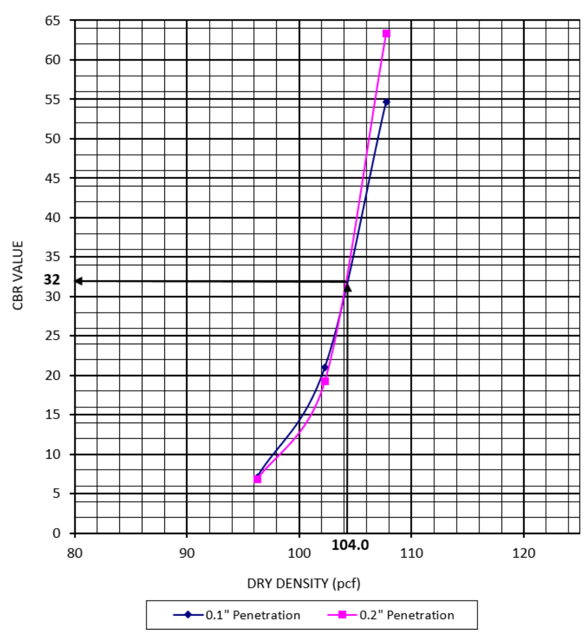
Moisture Density Relationship

| | | | |
|---|---|---|---|
| Procedure: | ASTM D1557 | Method: | A |
| Maximum Dry Density, pcf: | 109.5 | | |
| Optimum Moisture, % : | 12.0 | | |

Compacted Specimen Results — Procedure: ASTM D1883

| | | | |
|---|---|---|---|
| Compactive Effort (Blows per Layer): | 10 | 25 | 56 |
| Dry Density at Compaction, pcf: | 96.2 | 102.3 | 107.8 |
| Percent of Maximum Dry Density: | 87.9 | 93.4 | 98.4 |
| Percent Moisture Before Compaction: | 11.1 | 11.8 | 11.9 |
| Percent Moisture After Compaction: | 11.1 | 12.0 | 11.8 |
| Percent Moisture after Soaking (Avg. of Total Sample): | 18.1 | 15.3 | 11.9 |
| Dry Density after Soaking, pcf: | 97.9 | 104.4 | 110.9 |
| Percent Moisture after Soaking (Top 1 in.): | 19.0 | 16.1 | 11.9 |
| Swell, %: | 0.0 | 0.0 | 0.0 |
| Corrected CBR at 0.100 in. Penetration: | 7 | 21 | 55 |
| Corrected CBR at 0.200 in. Penetration: | 7 | 19 | 63 |
| Surcharge Weight, lbs.: | 10 | 10 | 10 |
| California Bearing Ratio (CBR) at 95% Relative Compaction: | | **32** | |

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| | |
|---|---|
| PROJECT: | **MADRID STORMWATER & EROSION CONTROL IMPROVEMENT** |
| JOB NO.: | **32-223560-0** |

**CALIFORNIA BEARING RATIO**

PLATE **B-5**

# CALIFORNIA BEARING RATIO (CBR)
## Boring 11 (0'-5')

CALIFORNIA BEARING RATIO (CBR)

| | | | |
|---|---|---|---|
| Client: | State of New Mexico EMNRD | Job Number: | 32-223560-0 |
| Address: | | Lab Number: | |
| City, State: | Madrid, New Mexico | Report Date: | |
| Attn: | Leeland Murray | | |

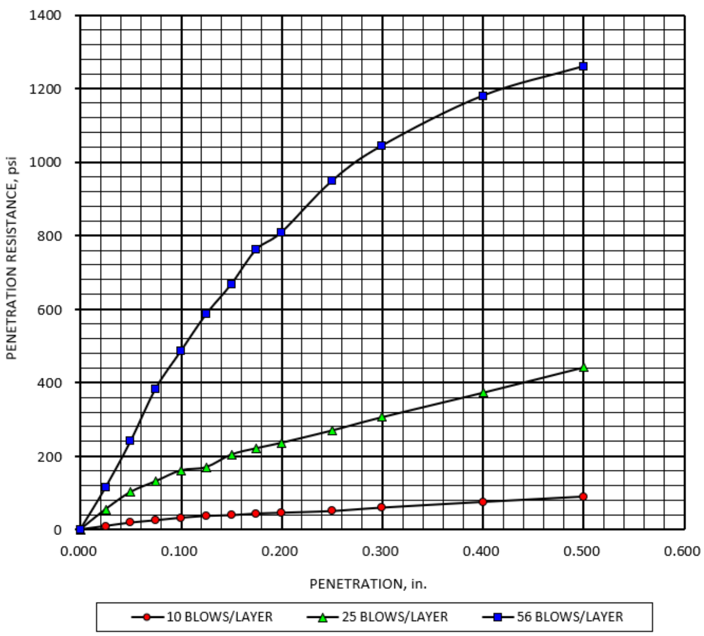
| | | | | | |
|---|---|---|---|---|---|
| Project: | Madrid Stormwater & Erosion Control | Authorized By: | | Date: | |
| Location: | Madrid, New Mexico | Sampled By: | | Date: | |
| Material: | | Submitted By: | | Date: | |
| Source: | B 11 (0-5') | | | | |

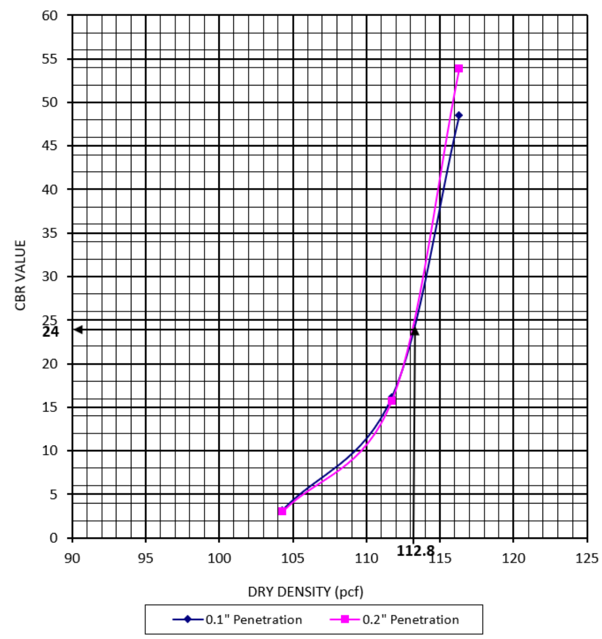
Moisture Density Relationship

| | | | |
|---|---|---|---|
| Procedure: | ASTM D1557 | Method: | A |
| Maximum Dry Density, pcf: | 118.7 | | |
| Optimum Moisture, %: | 9.3 | | |

Compacted Specimen Results — Procedure: ASTM D1883

| | | | |
|---|---|---|---|
| Compactive Effort (Blows per Layer): | 10 | 25 | 56 |
| Dry Density at Compaction, pcf: | 104.3 | 111.7 | 116.3 |
| Percent of Maximum Dry Density: | 87.9 | 94.1 | 98.0 |
| Percent Moisture Before Compaction: | 8.6 | 10.0 | 8.7 |
| Percent Moisture After Compaction: | 8.8 | 9.9 | 9.0 |
| Percent Moisture after Soaking (Avg. of Total Sample): | 17.8 | 14.4 | 12.7 |
| Dry Density after Soaking, pcf: | 104.4 | 111.5 | 116.8 |
| Percent Moisture after Soaking (Top 1 in.): | 20.4 | 15.4 | 14.3 |
| Swell, %: | 0.1 | 0.1 | 0.0 |
| Corrected CBR at 0.100 in. Penetration: | 3 | 16 | 49 |
| Corrected CBR at 0.200 in. Penetration: | 3 | 16 | 54 |
| Surcharge Weight, lbs.: | 10 | 10 | 10 |
| California Bearing Ratio (CBR) at 95% Relative Compaction: | | **24** | |

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| | | |
|---|---|---|
| PROJECT: | **MADRID STORMWATER & EROSION CONTROL IMPROVEMENT** | PLATE |
| JOB NO.: | **32-223560-0** | **B-6** |

**CALIFORNIA BEARING RATIO**

# CALIFORNIA BEARING RATIO (CBR)
## Boring 14 (0'-5')

| | | | |
|---|---|---|---|
| Client: | State of New Mexico EMNRD | Job Number: | 32-223560-0 |
| Address: | | Lab Number: | |
| City, State: | Madrid, New Mexico | Report Date: | |
| Attn: | Leeland Murray | | |

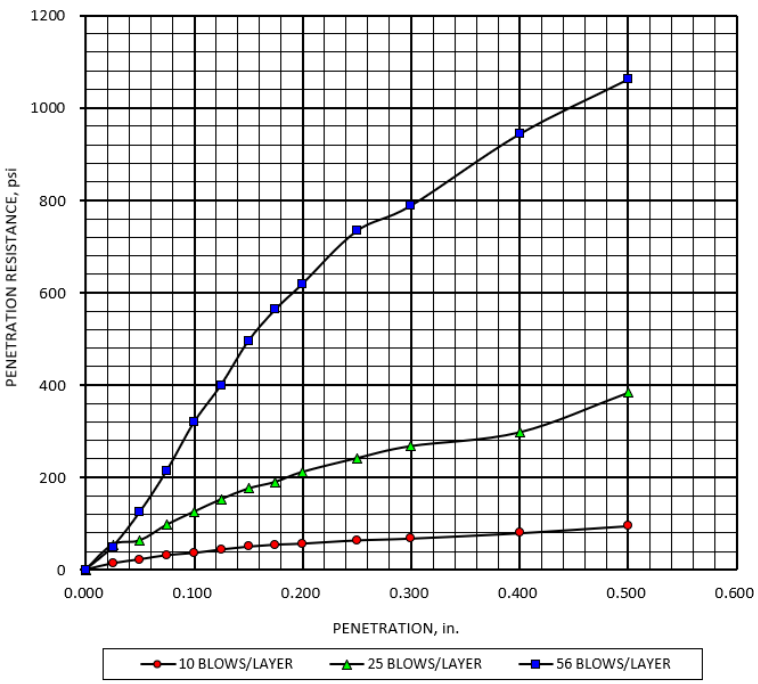
| | | | | | |
|---|---|---|---|---|---|
| Project: | Madrid Stormwater & Eriosion Control | Authorized By: | | Date: | |
| Location: | Madrid, New Meixco | Sampled By: | | Date: | |
| Material: | | Submitted By: | | Date: | |
| Source: | B 14 (0-5') | | | | |

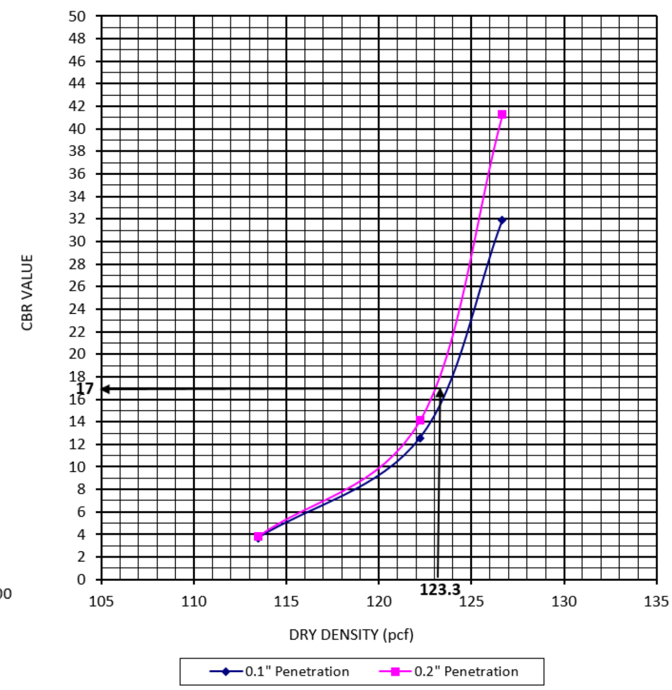
Moisture Density Relationship

| | | | |
|---|---|---|---|
| Procedure: | ASTM D1557 | Method: | C |
| Maximum Dry Density, pcf: | 129.8 | | |
| Optimum Moisture, %: | 8.2 | | |

Compacted Specimen Results — Procedure: ASTM D1883

| | | | |
|---|---|---|---|
| Compactive Effort (Blows per Layer): | 10 | 25 | 56 |
| Dry Density at Compaction, pcf: | 113.5 | 122.2 | 126.7 |
| Percent of Maximum Dry Density: | 87.4 | 94.2 | 97.6 |
| Percent Moisture Before Compaction: | 7.7 | 7.6 | 7.8 |
| Percent Moisture After Compaction: | 7.9 | 7.7 | 8.1 |
| Percent Moisture after Soaking (Avg. of Total Sample): | 14.3 | 13.6 | 12.9 |
| Dry Density after Soaking, pcf: | 112.7 | 123.6 | 124.3 |
| Percent Moisture after Soaking (Top 1 in.): | 15.6 | 15.2 | 14.6 |
| Swell, %: | 0.1 | 0.1 | 0.2 |
| Corrected CBR at 0.100 in. Penetration: | 4 | 13 | 32 |
| Corrected CBR at 0.200 in. Penetration: | 4 | 14 | 41 |
| Surcharge Weight, lbs.: | 10 | 10 | 10 |
| California Bearing Ratio (CBR) at 95% Relative Compaction: | 17 | | |




| | | |
|---|---|---|
| PROJECT: | MADRID STORMWATER & EROSION CONTROL IMPROVEMENT | PLATE |
| JOB NO.: | 32-223560-0 | B-6 |

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**CALIFORNIA BEARING RATIO**

# CALIFORNIA BEARING RATIO (CBR)
## Boring 15 (0'-5')

CALIFORNIA BEARING RATIO (CBR)

| | | | |
|---|---|---|---|
| Client: | State of New Mexico EMNRD | Job Number: | 32-223560-0 |
| Address: | | Lab Number: | |
| City, State: | Madrid, New Mexico | Report Date: | |
| Attn: | Leeland Murray | | |

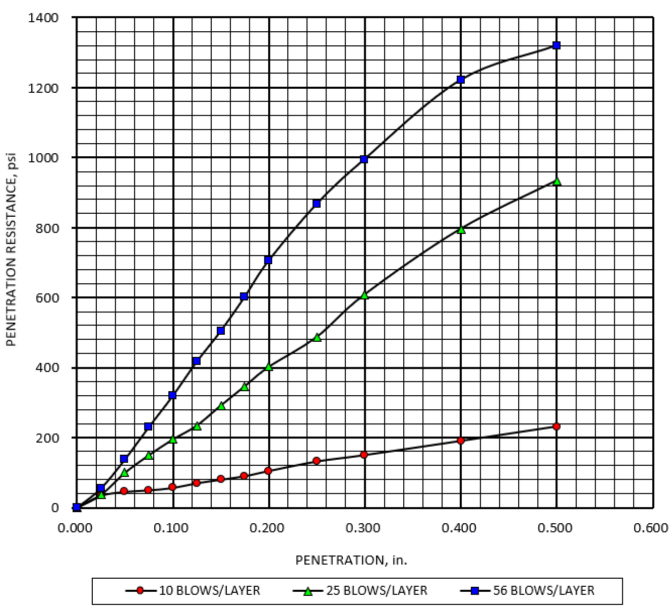
| | | | | | |
|---|---|---|---|---|---|
| Project: | Madrid Stormwater & Erosion Control | Authorized By: | | Date: | |
| Location: | Madrid, New Mexico | Sampled By: | | Date: | |
| Material: | | Submitted By: | | Date: | |
| Source: | B 15 (0-5') | | | | |

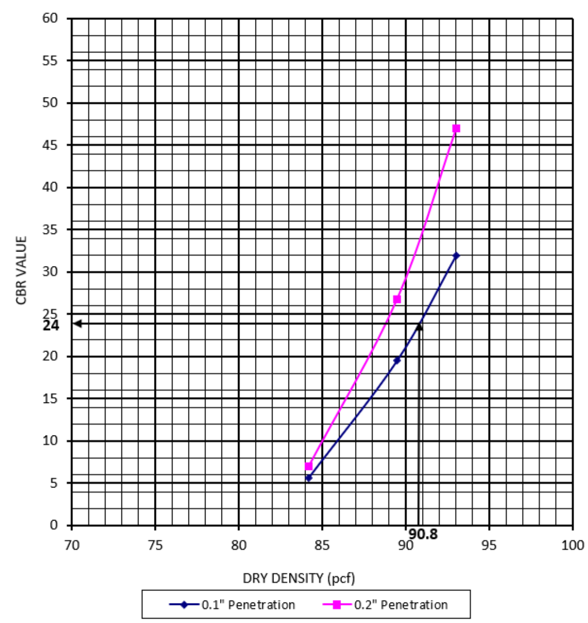
Moisture Density Relationship

| | | | |
|---|---|---|---|
| Procedure: | ASTM D1557 | Method: | A |
| Maximum Dry Density, pcf: | 95.6 | | |
| Optimum Moisture, % : | 14.8 | | |

Compacted Specimen Results — Procedure: ASTM D1883

| | | | |
|---|---|---|---|
| Compactive Effort (Blows per Layer): | 10 | 25 | 56 |
| Dry Density at Compaction, pcf: | 84.2 | 89.5 | 93.0 |
| Percent of Maximum Dry Density: | 88.1 | 93.6 | 97.3 |
| Percent Moisture Before Compaction: | 15.1 | 14.9 | 16.1 |
| Percent Moisture After Compaction: | 15.0 | 14.8 | 14.7 |
| Percent Moisture after Soaking (Avg. of Total Sample): | 20.5 | 17.0 | 15.4 |
| Dry Density after Soaking, pcf: | 85.8 | 90.6 | 94.6 |
| Percent Moisture after Soaking (Top 1 in.): | 21.6 | 18.0 | 16.1 |
| Swell, %: | 0.0 | 0.0 | 0.0 |
| Corrected CBR at 0.100 in. Penetration: | 6 | 20 | 32 |
| Corrected CBR at 0.200 in. Penetration: | 7 | 27 | 47 |
| Surcharge Weight, lbs.: | 10 | 10 | 10 |
| California Bearing Ratio (CBR) at 95% Relative Compaction: | | **24** | |

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| | | |
|---|---|---|
| PROJECT: | MADRID STORMWATER & EROSION CONTROL IMPROVEMENT | PLATE |
| JOB NO.: | 32-223560-0 | B-8 |

**CALIFORNIA BEARING RATIO**

# CALIFORNIA BEARING RATIO (CBR)
## Boring 16 (0'-5')

CALIFORNIA BEARING RATIO (CBR)

| | | | |
|---|---|---|---|
| Client: | State of New Mexico EMNRD | Job Number: | 32-223560-0 |
| Address: | | Lab Number: | |
| City, State: | Madrid, New Mexico | Report Date: | |
| Attn: | Leeland Murray | | |

| | | | | | |
|---|---|---|---|---|---|
| Project: | Madrid Stormwater & Erosion Control | Authorized By: | | Date: | |
| Location: | Madrid, New Mexico | Sampled By: | | Date: | |
| Material: | | Submitted By: | | Date: | |
| Source: | B 16 (0-5') | | | | |

Moisture Density Relationship

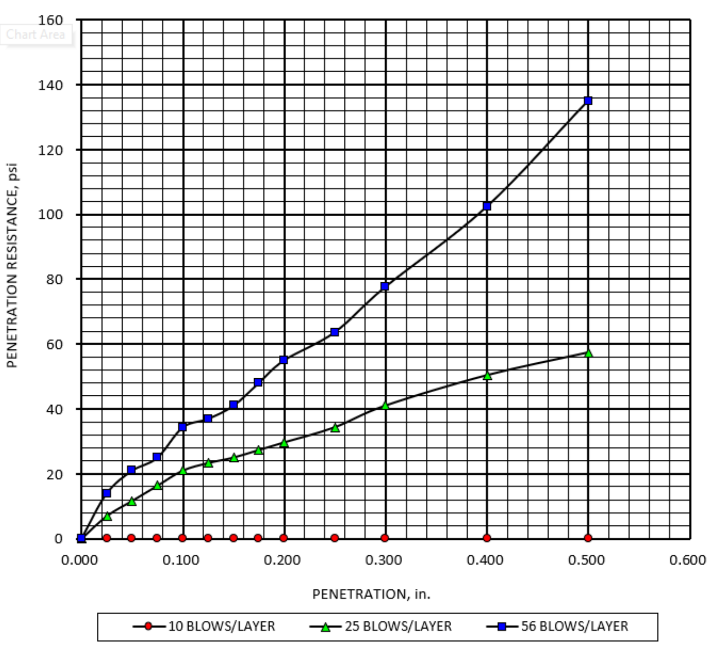
Procedure: ASTM D1557 Method: A

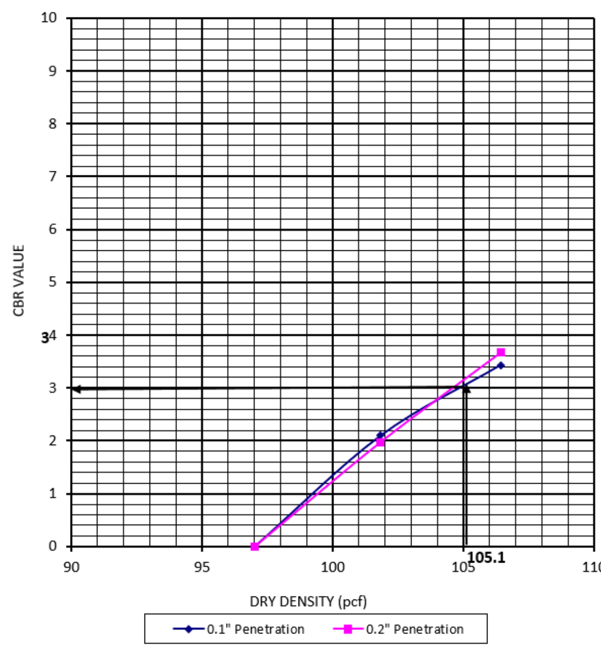
Maximum Dry Density, pcf: 110.6

Optimum Moisture, % : 13.8

Compacted Specimen Results Procedure: ASTM D1883

| | | | |
|---|---|---|---|
| Compactive Effort (Blows per Layer): | 10 | 25 | 56 |
| Dry Density at Compaction, pcf: | 97.0 | 101.8 | 106.4 |
| Percent of Maximum Dry Density: | 87.7 | 92.1 | 96.2 |
| Percent Moisture Before Compaction: | 14.7 | 14.9 | 14.8 |
| Percent Moisture After Compaction: | 14.3 | 14.6 | 14.8 |
| Percent Moisture after Soaking (Avg. of Total Sample): | 27.8 | 25.7 | 23.5 |
| Dry Density after Soaking, pcf: | 91.8 | 99.3 | 103.3 |
| Percent Moisture after Soaking (Top 1 in.): | 30.5 | 28.6 | 27.5 |
| Swell, %: | 0.4 | 0.4 | 0.4 |
| Corrected CBR at 0.100 in. Penetration: | 0 | 2 | 3 |
| Corrected CBR at 0.200 in. Penetration: | 0 | 2 | 4 |
| Surcharge Weight, lbs.: | 10 | 10 | 10 |
| California Bearing Ratio (CBR) at 95% Relative Compaction: | | 3 | |

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| | | |
|---|---|---|
| PROJECT: | MADRID STORMWATER & EROSION CONTROL IMPROVEMENT | PLATE |
| JOB NO.: | 32-223560-0 | B-9 |
| CALIFORNIA BEARING RATIO | | |

# CALIFORNIA BEARING RATIO (CBR)
## Boring 13 (0'-5')

CALIFORNIA BEARING RATIO (CBR)

| | | | |
|---|---|---|---|
| Client: | State of New Mexico EMNRD | Job Number: | 32-223560-0 |
| Address: | | Lab Number: | |
| City, State: | Madrid, New Mexico | Report Date: | |
| Attn: | Leeland Murray | | |

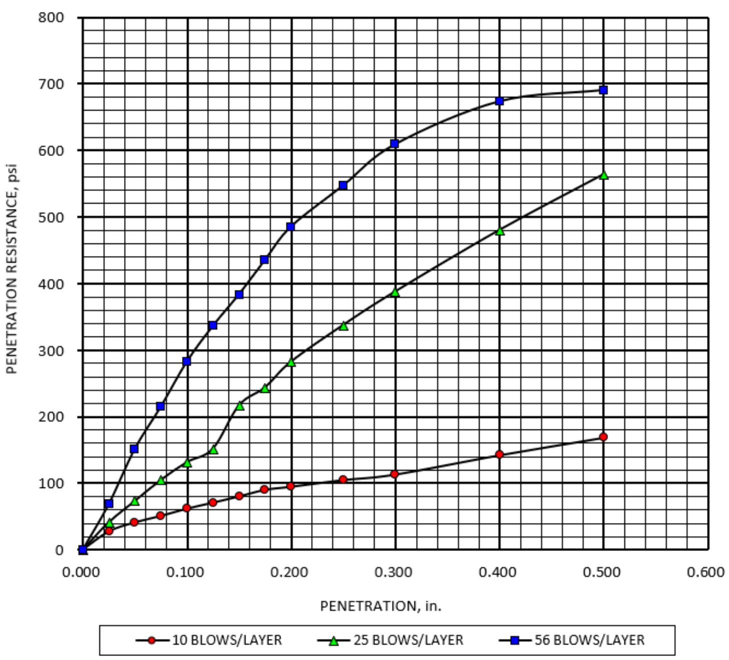
| | | | | | |
|---|---|---|---|---|---|
| Project: | Madrid Stormwater & Erosion Control | Authorized By: | | Date: | |
| Location: | Madrid, New Mexico | Sampled By: | | Date: | |
| Material: | | Submitted By: | | Date: | |
| Source: | B 13 (0-5') | | | | |

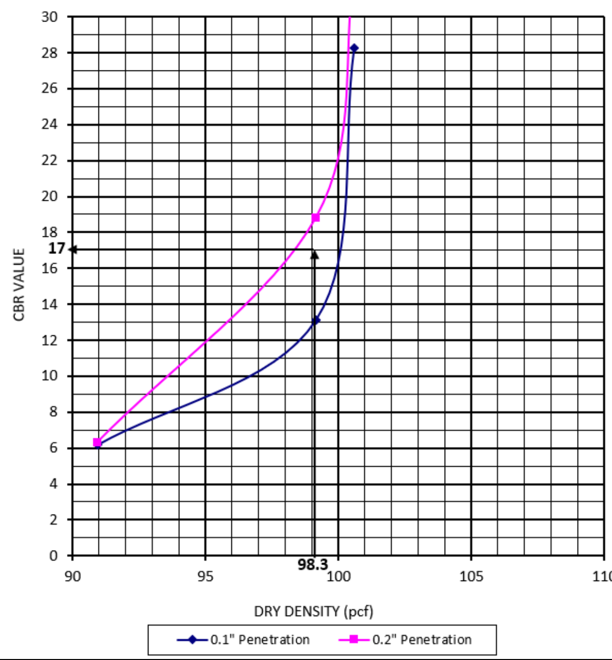
Moisture Density Relationship

| | | | |
|---|---|---|---|
| Procedure: | ASTM D1557 | Method: | A |
| Maximum Dry Density, pcf: | 103.5 | | |
| Optimum Moisture, %: | 12.7 | | |

Compacted Specimen Results — Procedure: ASTM D1883

| | | | |
|---|---|---|---|
| Compactive Effort (Blows per Layer): | 10 | 25 | 56 |
| Dry Density at Compaction, pcf: | 90.9 | 99.1 | 100.6 |
| Percent of Maximum Dry Density: | 87.9 | 95.8 | 97.2 |
| Percent Moisture Before Compaction: | 11.1 | 12.4 | 11.5 |
| Percent Moisture After Compaction: | 11.1 | 12.2 | 11.7 |
| Percent Moisture after Soaking (Avg. of Total Sample): | 19.4 | 16.7 | 14.3 |
| Dry Density after Soaking, pcf: | 90.1 | 97.3 | 101.5 |
| Percent Moisture after Soaking (Top 1 in.): | 20.1 | 17.7 | 16.1 |
| Swell, %: | 0.0 | 0.0 | 0.0 |
| Corrected CBR at 0.100 in. Penetration: | 6 | 13 | 28 |
| Corrected CBR at 0.200 in. Penetration: | 6 | 19 | 32 |
| Surcharge Weight, lbs.: | 10 | 10 | 10 |
| California Bearing Ratio (CBR) at 95% Relative Compaction: | | 12 | |

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| | | |
|---|---|---|
| PROJECT: | MADRID STORMWATER & EROSION CONTROL IMPROVEMENT | PLATE |
| JOB NO.: | 32-223560-0 | B-10 |
| CALIFORNIA BEARING RATIO | | |

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8305 Washington Place, N.E.
Albuquerque, New Mexico 87113
(505) 823-4488 • wt-us.com

# Soil / Aggregate Test Report



Client **STATE OF NEW MEXICO EMNRD**
**1220 SOUTH ST FRANCIS DRIVE**
**SANTA FE , NM**

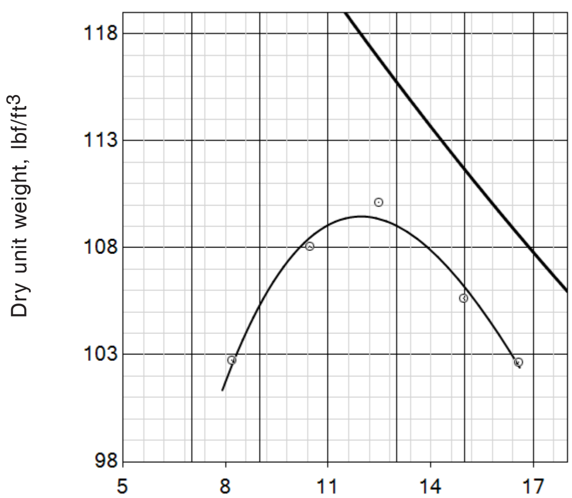
Date of Report **03/26/24**
Job No. **32-223560-0**
Event No. **10 (0-5)** | Lab No. **50535**
Authorized By **A. Kaba** | Date **01/17/24**
Sample Location Designated By | Date
Sampled By **S. O'Herron-Alex** | Date **01/17/24**
Submitted By **L. Anderson** | Date **03/26/24**

Project **MADRID STORMWATER AND EROSION CONTROL PROJECT**
Project Address **ICE HOUSE ROAD TO FIREHOUSE LANE - MADRID, NM**
Material Description **A-2-4 (0)**
Material Use **Silty SAND**
Material Source **B 10 (0-5')**
Sample Location
Special Instructions

Sieve analysis **AASHTO T27 Non-Referee**
Finer Than No. 200 **AASHTO T11, Procedure A**

| Sieve | Accumulative % passing | Specification |
|---|---|---|
| 6 in. | | |
| 4 in. | | |
| 3 in. | | |
| 2 in. | | |
| 1-1/2 in. | | |
| 1 in. | | |
| 3/4 in. | 100 | |
| 1/2 in. | 97 | |
| 3/8 in. | 96 | |
| 1/4 in. | 95 | |
| No. 4 | 92 | |
| No. 8 | 85 | |
| No. 10 | 84 | |
| No. 16 | 79 | |
| No. 30 | 71 | |
| No. 40 | 64 | |
| No. 50 | 57 | |
| No. 100 | 34 | |
| No. 200 | 19 | |

Laboratory compaction characteristics **ASTM D1557** Method **A**




Sample Preparation **Moist**
Rammer Used **Mechanical**

Proctor curve Id. No. **3**
Maximum dry unit weight, lbf/ft³ **109.5**
Optimum water content, % **12.0**

Oversize Aggregate
Assumed bulk specific gravity **2.60**
Assumed absorption, % **1.0**
Oversize in laboratory sample, % **0**

| | | Result | Specs. |
|---|---|---|---|
| Liquid Limit, Plastic Limit & Plasticity Index | | | |
| Preparation method | **Oven-dried** | | |
| Processing method | **ASTM D4318, Dry Preparation** | | |
| Liquid Limit | **ASTM D4318, Method B** LL | **NV** | |
| Plastic Limit | **ASTM D4318** PL | | |
| Plasticity Index | **ASTM D4318** PI | **NP** | |
| Water Content **AASHTO T265** | % dry weight | **18.1** | |
| Swell Test Surcharge psf; Compacted to approximately of ASTM Method; Initial water content %; Dry unit weight lbf/ft3 | Expansion, % | | |
| Organic Matter | % | | |

Unified Soil Classification **AASHTO M145**
Group Symbol: **A-2-4(0)** Name: **Silty Sand**

| | | Result | Specs. |
|---|---|---|---|
| Los Angeles (LA) Abrasion | Grading rev., % loss | | |
| | Grading rev., % loss | | |
| Fractured Faces By Weight | One or more, % | | |
| | Two or more, % | | |
| Total Salts (Solubility) | % | | |
| Sulfates | % | | |
| Chlorides | | | |
| pH Determination | pH | | |
| Minimum Resistivity | ohm-cm | | |
| Expansion Index of Soil | EI | | |
| | Initial dry unit weight, lbf/ft3 | | |
| | Initial degree of saturation | | |
| Initial water content, % | Final water content, % | | |

Comments:

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Reviewed By **JAMES DACY, LAB SUPERVISOR**

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# Soil / Aggregate Test Report

Client **STATE OF NEW MEXICO EMNRD**
**1220 SOUTH ST FRANCIS DRIVE**
**SANTA FE , NM**



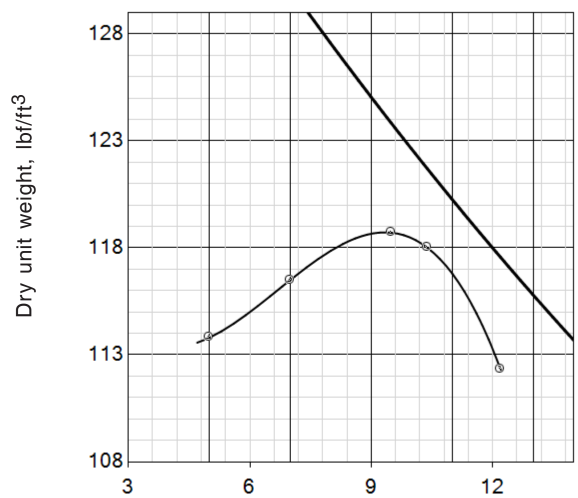
Date of Report **03/26/24**
Job No. **32-223560-0**
Event No. **11 (0-5)** Lab No. **50518**
Authorized By **A. Kaba** Date **01/17/24**
Sample Location Designated By Date
Sampled By **S. O'Herron-Alex** Date **01/17/24**
Submitted By **L. Anderson** Date **03/26/24**

Project **MADRID STORMWATER AND EROSION CONTROL PROJECT**
Project Address **ICE HOUSE ROAD TO FIREHOUSE LANE, MADRID, NM**
Material Description **A-1-b (0)**
Material Use **Silty SAND with Gravel**
Material Source **B 11 (0-5)**
Sample Location **B 11 (0-5)**
Special Instructions

Sieve analysis **AASHTO T27 Non-Referee**
Finer Than No. 200 **AASHTO T11, Procedure A**

| Sieve | Accumulative % passing | Specification |
|---|---|---|
| 6 in. | | |
| 4 in. | | |
| 3 in. | | |
| 2 in. | | |
| 1-1/2 in. | | |
| 1 in. | 100 | |
| 3/4 in. | 89 | |
| 1/2 in. | 86 | |
| 3/8 in. | 81 | |
| 1/4 in. | 78 | |
| No. 4 | 75 | |
| No. 8 | 68 | |
| No. 10 | 67 | |
| No. 16 | 61 | |
| No. 30 | 53 | |
| No. 40 | 48 | |
| No. 50 | 43 | |
| No. 100 | 31 | |
| No. 200 | 21 | |

Laboratory compaction characteristics **ASTM D1557** Method **C**




Sample Preparation **Moist**

Rammer Used **Mechanical**

Proctor curve Id. No. **1**
Maximum dry unit weight, lbf/ft³ **118.7**
Optimum water content, % **9.3**

Oversize Aggregate
Assumed bulk specific gravity **2.60**
Assumed absorption, % **1.0**
Oversize in laboratory sample, % **0**

| | Result | Specs. |
|---|---|---|
| Liquid Limit, Plastic Limit & Plasticity Index | | |
| Preparation method **Oven-dried** | | |
| Processing method **ASTM D4318, Dry Preparation** | | |
| Liquid Limit **ASTM D4318, Method B** LL | **NV** | |
| Plastic Limit **ASTM D4318** PL | | |
| Plasticity Index **ASTM D4318** PI | **NP** | |
| Water Content **AASHTO T265** % dry weight | **11.3** | |
| Swell Test Surcharge psf Expansion, %<br>Compacted to approximately of ASTM Method<br>Initial water content % Dry unit weight lbf/ft3 | | |
| Organic Matter % | | |
| Unified Soil Classification **AASHTO M145**<br>Group Symbol: **A-1-b(0)** Name: **Silty Sand with Gravel** | | |

| | Result | Specs. |
|---|---|---|
| Los Angeles (LA) Abrasion — Grading rev., % loss | | |
| Los Angeles (LA) Abrasion — Grading rev., % loss | | |
| Fractured Faces By Weight — One or more, % | | |
| Fractured Faces By Weight — Two or more, % | | |
| Total Salts (Solubility) % | | |
| Sulfates % | | |
| Chlorides | | |
| pH Determination pH | | |
| Minimum Resistivity ohm-cm | | |
| Expansion Index of Soil EI | | |
| Initial dry unit weight, lbf/ft3 | | |
| Initial degree of saturation | | |
| Initial water content, % Final water content, % | | |

Comments:



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# Soil / Aggregate Test Report

Client **STATE OF NEW MEXICO EMNRD**
**1220 SOUTH ST FRANCIS DRIVE**
**SANTA FE , NM**

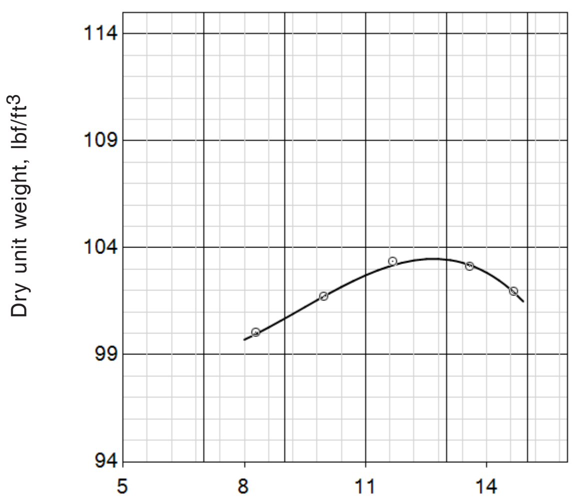
Date of Report **03/26/24**
Page **1** of **1**
Job No. **32-223560-0**
Event No. **13 (0-5)**
Lab No. **50773**
Authorized By **A. Kaba** Date **01/17/24**
Sample Location Designated By Date
Sampled By **S. O'Herron-Alex** Date **01/17/24**
Submitted By **L. Anderson** Date **03/26/24**

Project **MADRID STORMWATER AND EROSION CONTROL PROJECT**
Project Address **ICE HOUSE ROAD TO FIREHOUSE LANE, MADRID, NM**
Material Description **A-6 (5)**
Material Use **Clayey SAND**
Material Source **B 13 (0-5')**
Sample Location
Special Instructions

Sieve analysis **AASHTO T27 Non-Referee**
Finer Than No. 200 **AASHTO T11, Procedure A**

| Sieve | Accumulative % passing | Specification |
|---|---|---|
| 6 in. | | |
| 4 in. | | |
| 3 in. | | |
| 2 in. | | |
| 1-1/2 in. | | |
| 1 in. | | |
| 3/4 in. | **100** | |
| 1/2 in. | **97** | |
| 3/8 in. | **95** | |
| 1/4 in. | **95** | |
| No. 4 | **91** | |
| No. 8 | **85** | |
| No. 10 | **84** | |
| No. 16 | **79** | |
| No. 30 | **72** | |
| No. 40 | **69** | |
| No. 50 | **64** | |
| No. 100 | **55** | |
| No. 200 | **48** | |

Laboratory compaction characteristics **ASTM D1557** Method **A**




Sample Preparation **Moist**
Rammer Used **Manual**

Proctor curve Id. No. **6**
Maximum dry unit weight, lbf/ft³ **103.5**
Optimum water content, % **12.7**

Oversize Aggregate
Assumed bulk specific gravity **2.60**
Assumed absorption, % **1.0**
Oversize in laboratory sample, % **0**

| Test | | Result | Specs. |
|---|---|---|---|
| Liquid Limit, Plastic Limit & Plasticity Index | | | |
| Preparation method | **Oven-dried** | | |
| Processing method | **ASTM D4318, Dry Preparation** | | |
| Liquid Limit | **ASTM D4318, Method B** LL | **40** | |
| Plastic Limit | **ASTM D4318** PL | **21** | |
| Plasticity Index | **ASTM D4318** PI | **19** | |
| Water Content **AASHTO T265** | % dry weight | **14.4** | |
| Swell Test Surcharge psf | Expansion, % | | |
| Compacted to approximately of ASTM Method | | | |
| Initial water content % Dry unit weight | lbf/ft$^3$ | | |
| Organic Matter | % | | |
| Unified Soil Classification **AASHTO M145** | | | |
| Group Symbol: **A-6(5)** Name: **Clayey Sand** | | | |

| Test | | Result | Specs. |
|---|---|---|---|
| Los Angeles (LA) Abrasion | Grading rev., % loss | | |
| | Grading rev., % loss | | |
| Fractured Faces By Weight | One or more, % | | |
| | Two or more, % | | |
| Total Salts (Solubility) | % | | |
| Sulfates | % | | |
| Chlorides | | | |
| pH Determination | pH | | |
| Minimum Resistivity | ohm-cm | | |
| Expansion Index of Soil | EI | | |
| | Initial dry unit weight, lbf/ft$^3$ | | |
| | Initial degree of saturation | | |
| Initial water content, % | Final water content, % | | |

Comments:



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# Soil / Aggregate Test Report

Client **STATE OF NEW MEXICO EMNRD**
**1220 SOUTH ST FRANCIS DRIVE**
**SANTA FE , NM**

Date of Report **03/26/24**

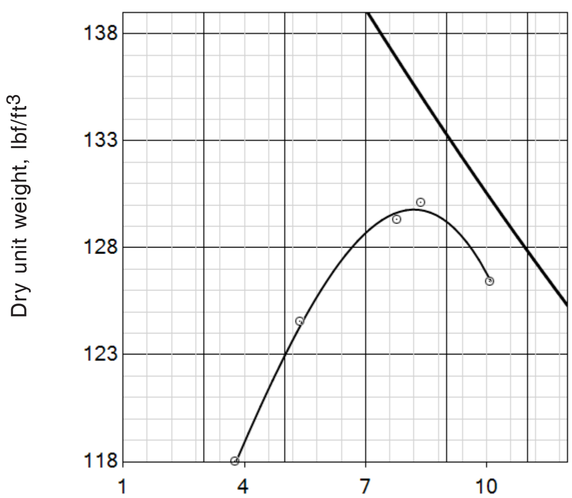
Job No. **32-223560-0**
Event No. **14 (0-5)** Lab No. **50534**
Authorized By **A. Kaba** Date **01/17/24**
Sample Location Designated By Date
Sampled By **S. O'Herron-Alex** Date **01/17/24**
Submitted By **L. Anderson** Date **03/26/24**

Project **MADRID STORMWATER AND EROSION CONTROL PROJECT**
Project Address **ICE HOUSE ROAD TO FIREHOUSE LANE, MADRID, NM**
Material Description **A-2-4 (0)**
Material Use **Clayey SAND with Gravel**
Material Source **B 14 (0-5')**
Sample Location
Special Instructions

Sieve analysis **AASHTO T27 Non-Referee**
Finer Than No. 200 **AASHTO T11, Procedure A**

| Sieve | Accumulative % passing | Specification |
|---|---|---|
| 6 in. | | |
| 4 in. | | |
| 3 in. | | |
| 2 in. | | |
| 1-1/2 in. | | |
| 1 in. | 100 | |
| 3/4 in. | 96 | |
| 1/2 in. | 86 | |
| 3/8 in. | 80 | |
| 1/4 in. | 79 | |
| No. 4 | 70 | |
| No. 8 | 62 | |
| No. 10 | 61 | |
| No. 16 | 56 | |
| No. 30 | 50 | |
| No. 40 | 44 | |
| No. 50 | 41 | |
| No. 100 | 29 | |
| No. 200 | 29 | |

Laboratory compaction characteristics **ASTM D1557** Method **C**




Sample Preparation **Moist**
Rammer Used **Mechanical**

Proctor curve Id. No. **2**
Maximum dry unit weight, lbf/ft³ **129.8**
Optimum water content, % **8.2**

Oversize Aggregate
Assumed bulk specific gravity **2.60**
Assumed absorption, % **1.0**
Oversize in laboratory sample, % **0**

| Test | | Result | Specs. |
|---|---|---|---|
| Liquid Limit, Plastic Limit & Plasticity Index | | | |
| Preparation method | **Oven-dried** | | |
| Processing method | **ASTM D4318, Dry Preparation** | | |
| Liquid Limit | **ASTM D4318, Method B** LL | **27** | |
| Plastic Limit | **ASTM D4318** PL | **17** | |
| Plasticity Index | **ASTM D4318** PI | **10** | |
| Water Content **AASHTO T265** | % dry weight | **7.0** | |
| Swell Test Surcharge psf | Expansion, % | | |
| Compacted to approximately of ASTM Method | | | |
| Initial water content % Dry unit weight lbf/ft³ | | | |
| Organic Matter | % | | |

Unified Soil Classification **AASHTO M145**
Group Symbol: **A-2-4(0)** Name: **Clayey Sand with Gravel**

| Test | | Result | Specs. |
|---|---|---|---|
| Los Angeles (LA) Abrasion | Grading rev., % loss | | |
| | Grading rev., % loss | | |
| Fractured Faces By Weight | One or more, % | | |
| | Two or more, % | | |
| Total Salts (Solubility) | % | | |
| Sulfates | % | | |
| Chlorides | | | |
| pH Determination | pH | | |
| Minimum Resistivity | ohm-cm | | |
| Expansion Index of Soil | EI | | |
| | Initial dry unit weight, lbf/ft³ | | |
| | Initial degree of saturation | | |

Initial water content, % Final water content, %

Comments:



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# Soil / Aggregate Test Report

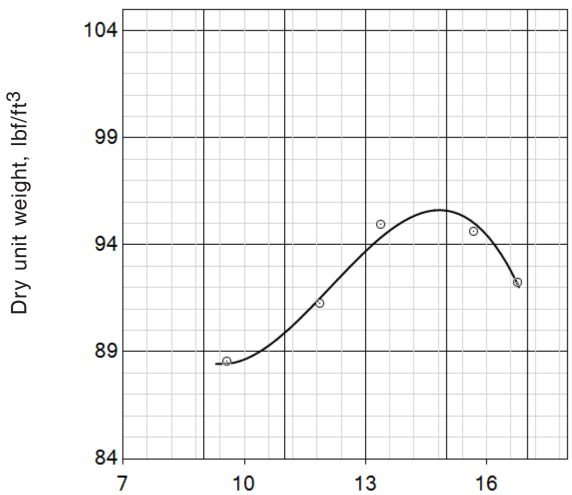
| | | | |
|---|---|---|---|
| Client | **STATE OF NEW MEXICO EMNRD**<br>**1220 SOUTH ST FRANCIS DRIVE**<br>**SANTA FE , NM** | | |
| Date of Report | **03/26/24** | Page **1** of **1** | |
| Job No. | **32-223560-0** | | |
| Event No. | **15 (0-5)** | Lab No. | **50638** |
| Authorized By | **A. Kaba** | Date | **01/17/24** |
| Sample Location Designated By | | Date | |
| Sampled By | **S. O'Herron-Alex** | Date | **01/17/24** |
| Submitted By | **L. Anderson** | Date | **03/26/24** |

Project **MADRID STORMWATER AND EROSION CONTROL PROJECT**
Project Address **ICE HOUSE ROAD TO FIREHOUSE LANE, MADRID, NM**
Material Description **A-1-b (0)**
Material Use **Silty SAND with Gravel**
Material Source **B 15 (0-5')**
Sample Location
Special Instructions

Sieve analysis **AASHTO T27 Non-Referee**
Finer Than No. 200 **AASHTO T11, Procedure A**

| Sieve | Accumulative % passing | Specification |
|---|---|---|
| 6 in. | | |
| 4 in. | | |
| 3 in. | | |
| 2 in. | | |
| 1-1/2 in. | | |
| 1 in. | | |
| 3/4 in. | **100** | |
| 1/2 in. | **97** | |
| 3/8 in. | **94** | |
| 1/4 in. | **93** | |
| No. 4 | **84** | |
| No. 8 | **71** | |
| No. 10 | **68** | |
| No. 16 | **56** | |
| No. 30 | **43** | |
| No. 40 | **37** | |
| No. 50 | **32** | |
| No. 100 | **23** | |
| No. 200 | **17** | |

Laboratory compaction characteristics **ASTM D1557** Method **A**




Sample Preparation **Moist**

Rammer Used **Manual**

Proctor curve Id. No. **5**
Maximum dry unit weight, lbf/ft³ **95.6**
Optimum water content, % **14.8**

Oversize Aggregate
Assumed bulk specific gravity **2.60**
Assumed absorption, % **1.0**
Oversize in laboratory sample, % **0**

| | Result | Specs. |
|---|---|---|
| Liquid Limit, Plastic Limit & Plasticity Index | | |
| Preparation method **Oven-dried** | | |
| Processing method **ASTM D4318, Dry Preparation** | | |
| Liquid Limit **ASTM D4318, Method B** LL | **NV** | |
| Plastic Limit **ASTM D4318** PL | | |
| Plasticity Index **ASTM D4318** PI | **NP** | |
| Water Content **AASHTO T265** % dry weight | **12.5** | |
| Swell Test Surcharge psf Expansion, %<br>Compacted to approximately of ASTM Method<br>Initial water content % Dry unit weight lbf/ft³ | | |
| Organic Matter % | | |

Unified Soil Classification **AASHTO M145**
Group Symbol: **A-1-b(0)** Name: **Silty Sand with Gravel**

| | Result | Specs. |
|---|---|---|
| Los Angeles (LA) Abrasion — Grading rev., % loss | | |
| Los Angeles (LA) Abrasion — Grading rev., % loss | | |
| Fractured Faces By Weight — One or more, % | | |
| Fractured Faces By Weight — Two or more, % | | |
| Total Salts (Solubility) % | | |
| Sulfates % | | |
| Chlorides | | |
| pH Determination pH | | |
| Minimum Resistivity ohm-cm | | |
| Expansion Index of Soil EI | | |
| Initial dry unit weight, lbf/ft³ | | |
| Initial degree of saturation | | |

Initial water content, % Final water content, %

Comments:



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# Soil / Aggregate Test Report

Client **STATE OF NEW MEXICO EMNRD**
**1220 SOUTH ST FRANCIS DRIVE**
**SANTA FE , NM**



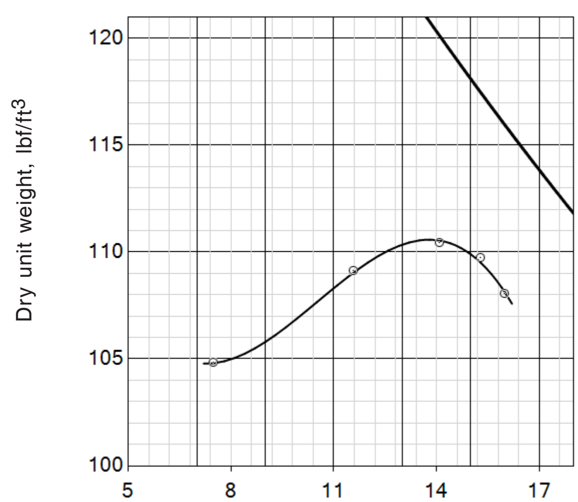
Date of Report **03/26/24**
Job No. **32-223560-0**
Event No. **16 (0-5)** Lab No. **50609**
Authorized By **A. Kaba** Date **01/17/24**
Sample Location Designated By Date
Sampled By **S. O'Herron-Alex** Date **01/17/24**
Submitted By **L. Anderson** Date **03/26/24**

Project **MADRID STORMWATER AND EROSION CONTROL PROJECT**
Project Address **ICE HOUSE ROAD TO FIREHOUSE LANE, MADRID, NM**
Material Description **A-1-b (0)**
Material Use **Silty SAND with Gravel**
Material Source **B 16 (0-5')**
Sample Location
Special Instructions

Sieve analysis **AASHTO T27 Non-Referee**
Finer Than No. 200 **AASHTO T11, Procedure A**

| Sieve | Accumulative % passing | Specification |
|---|---|---|
| 6 in. | | |
| 4 in. | | |
| 3 in. | | |
| 2 in. | | |
| 1-1/2 in. | | |
| 1 in. | **100** | |
| 3/4 in. | **89** | |
| 1/2 in. | **85** | |
| 3/8 in. | **80** | |
| 1/4 in. | **80** | |
| No. 4 | **67** | |
| No. 8 | **57** | |
| No. 10 | **55** | |
| No. 16 | **49** | |
| No. 30 | **41** | |
| No. 40 | **37** | |
| No. 50 | **34** | |
| No. 100 | **25** | |
| No. 200 | **16** | |

Laboratory compaction characteristics **ASTM D1557** Method **A**




Sample Preparation **Moist**
Rammer Used **Manual**

Proctor curve Id. No. **4**
Maximum dry unit weight, lbf/ft³ **110.6**
Optimum water content, % **13.8**

Oversize Aggregate
Assumed bulk specific gravity **2.60**
Assumed absorption, % **1.0**
Oversize in laboratory sample, % **0**

| | Result | Specs. |
|---|---|---|
| Liquid Limit, Plastic Limit & Plasticity Index | | |
| Preparation method **Oven-dried** | | |
| Processing method **ASTM D4318, Dry Preparation** | | |
| Liquid Limit **ASTM D4318, Method B** LL | **NV** | |
| Plastic Limit **ASTM D4318** PL | | |
| Plasticity Index **ASTM D4318** PI | **NP** | |
| Water Content **AASHTO T265** % dry weight | **10.1** | |
| Swell Test Surcharge psf Expansion, % | | |
| Compacted to approximately of ASTM Method | | |
| Initial water content % Dry unit weight lbf/ft³ | | |
| Organic Matter % | | |
| Unified Soil Classification **AASHTO M145** | | |
| Group Symbol: **A-1-b(0)** Name: **Silty Sand with Gravel** | | |

| | Result | Specs. |
|---|---|---|
| Los Angeles (LA) Abrasion — Grading rev., % loss | | |
| Los Angeles (LA) Abrasion — Grading rev., % loss | | |
| Fractured Faces By Weight — One or more, % | | |
| Fractured Faces By Weight — Two or more, % | | |
| Total Salts (Solubility) % | | |
| Sulfates % | | |
| Chlorides | | |
| pH Determination pH | | |
| Minimum Resistivity ohm-cm | | |
| Expansion Index of Soil EI | | |
| Initial dry unit weight, lbf/ft³ | | |
| Initial degree of saturation | | |
| Initial water content, % Final water content, % | | |

Comments:

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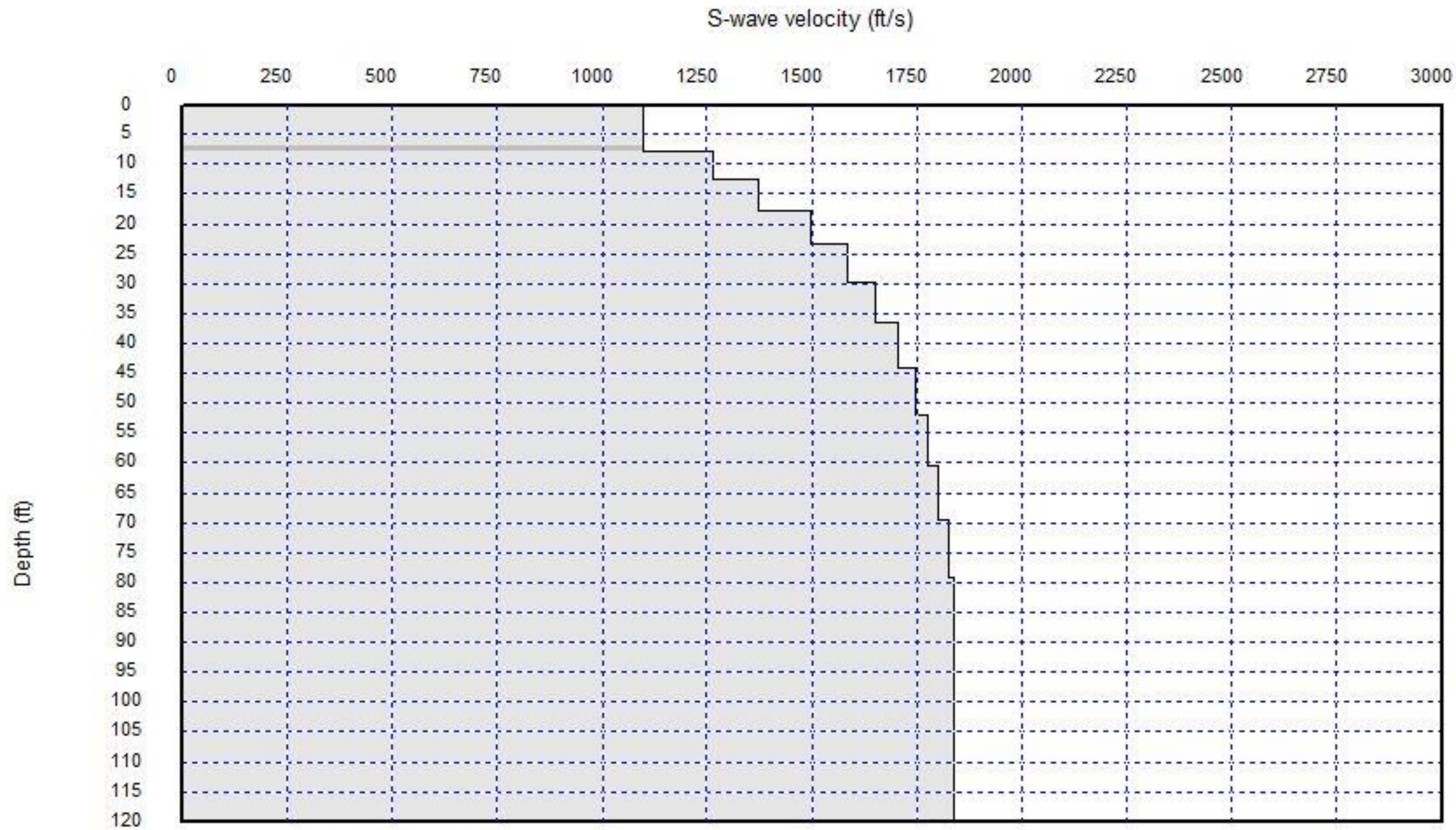


S-wave velocity model (initial) : 72a.dat

Average Vs 100ft = 1616.9 ft/sec

**AVS = 1616.9 ft/s**
**Site Classification is Class C**

Geotechnical
Environmental
Inspections
Materials

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PROJECT: **CMADRID STORMWATER**
JOB NO.: **32-223560-0**

# SHEAR WAVE VELOCITY PROFILE

PLATE

**C-1**