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GEOTECHNICAL EVALUATION REPORT

CALIBER COLLISION
98TH Street Northwest & Volcano Road Northwest
Albuquerque, New Mexico

WT Job No. 32-223528-0

PREPARED FOR:
Cross Development
4336 Marsh Ridge Road
Carrolton, Texas 75010

August 25, 2023

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1.0 PURPOSE

This report contains the results of our geotechnical evaluation for a proposed auto mechanic shop to be located in Albuquerque, New Mexico. The purpose of these services is to provide information and recommendations regarding:

- Subsurface conditions
- Foundation Design
- Slabs-on-grade
- Lateral Earth Pressure
- Earthwork Recommendations
- Drainage
- Pavement Design
- Seismic Considerations
- Corrosion Potential
- Groundwater

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

2.0 PROJECT DESCRIPTION

Based on information provided by Meagan Vieren, we understand that the proposed project consists of 16,000 square foot single-story auto mechanic structure and associated parking areas to be located in Albuquerque, New Mexico. We assumed that there will be no below grade structures such as basements and 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

Four (4) borings were drilled to depths of 21.5 below existing site grade in the proposed building areas. In addition, three (3) borings were drilled to depths of 5 in the proposed pavement areas. The borings were at the approximate locations shown on the attached Boring Location Diagram. 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.

The Unified Soil Classification System was used to classify soils. The soil classification symbols appear on the boring logs and are briefly described in Appendix A. Local and regional geologic characteristics were used to estimate the seismic design criteria.

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
- Swell Potential
- Compression
- Gradation
- Liquid Limit and Plasticity Index
- Water soluble sulfate content

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 in the development process with ongoing construction. The ground surface was relatively flat and contained a sparse to moderate growth of shrubs and grasses. Site drainage trended to the southeast as sheet surface flow. Other site features included gas station to the north, shopping area and car wash to the west, and a restaurant to the south. The site is bounded by 98th Street to the west, Volcano Road to the south, and Avalon Road to the north.

4.2 Subsurface

As presented on the Boring Logs, surface soils to the full depth of exploration consisted of loose to medium dense Poorly-graded to Silty SAND. Near surface soils are of nil plasticity.

Groundwater was not encountered 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 the building foundation level exhibit low compressibility at existing water contents. Low levels of additional compression occurs when the water content is increased.

Near-surface soils are of nil plasticity. These soils will exhibit low expansion potential when recompacted, confined by loads approximating floor loads and saturated. Slabs-on-grade supported on recompacted on-site soils will have a low potential for heaving if the water content of the soil increases.

Chemical tests were performed on representative samples of on-site soils to determine the amount of water-soluble sulfates and chlorides. The test results indicate that the soils classify as negligibly corrosive to concrete according to Table 19.3.1.1 of ACI 318-19.

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.

6.2 Foundation

The proposed building can be supported by spread-type footing bearing on engineered fill. The depth and lateral extent of the engineered fills is presented in the **EARTHWORK**

section of this report. An allowable bearing capacity of 2,500 pounds per square foot (psf) should be used in proportioning the footings. Footings should bear a minimum of 18 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.

We anticipate that total and differential settlement of the proposed structures, supported as recommended, should be less than ¾ 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.

All foundations and stem walls should be reinforced to reduce the potential for distress caused by differential foundation movements.

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 foundation. 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.

6.3 Lateral Design Criteria

Lateral loads may be resisted by concrete interface friction and by passive resistance. For shallow foundations bearing on properly compacted engineered 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 0.40

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

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

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.

6.4 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 2015 International Building Code are applicable to the project site:

Seismic Design Parameters International Building Code 2015	
Soil Site Class	D
Mapped Spectral Response Acceleration at 0.2 sec period (S_s)	0.451g
Mapped Spectral Response Acceleration at 1.0 sec period (S_1)	0.137g
Site Coefficient for 0.2 sec period (F_a)	1.439
Site Coefficient for 1.0 sec period (F_v)	2.255
Design Spectral Response Acceleration at 0.2 sec period (S_{DS})	0.433g
Design Spectral Response Acceleration at 1.0 sec period (S_{D1})	0.205g

The soil site class is based upon conditions identified in shallow explorations and local knowledge of the soil conditions in the vicinity of the site. Soil conditions extending beyond the depth of our explorations to a depth of 100 feet were assumed for the purposes of providing the information presented in the table.

6.5 Conventional Slab-on-Grade 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 200 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.

6.6 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.

In areas where sidewalks or paving do not immediately adjoin the structures, 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 structures
- Only shallow rooted landscaping should be used
- Watering should be kept to a minimum

6.7 Corrosivity to Concrete

In order to be consistent with standard local practice and for reasons of material availability, we recommend a Type II portland cement be used for all concrete on and below grade.

6.8 Pavements

Based on existing subgrade conditions, the following pavement sections are recommended:

Traffic Area	Asphalt Concrete Pavement (inches)	Base Course (inches)
Passenger car parking and drives	2.5	4
Major access drives	3	6

Base course and asphalt concrete should conform to New Mexico Department of Transportation (NMDOT) Standard Specifications for Road and Bridge Constructions. Bituminous surfacing should be constructed of dense-graded, central plant-mix, asphalt concrete of an SP-IV or SP-III mix design.

The "design life" (20 years) of a pavement is defined as the expected life at the end of which reconstruction of the pavement will need to occur. Normal maintenance, including crack sealing, slurry sealing, and/or chip sealing, should be performed during the life of the pavement.

Based on the classification of the soils at the site, the following minimum section for on-site non-reinforced portland cement concrete (PCC) pavements are:

Traffic Area	PCC (inches)	Base Course (inches)
Light-duty Parking	5	4
Dumpster/Loading Areas	6	4
Major access drives	6	4

The minimum portland cement pavement section is based on a minimum compressive strength of 4,000 pounds per square inch and being placed on a properly prepared subgrade and base course.

PCC non-reinforced pavements should contain properly spaced weakened plane control joints in both the longitudinal and transverse directions. Normal control joints should be square patterns not to exceed 10 feet per side. All control joints should have a depth of at least 1/3 of the slab thickness. Depending on the method used, control joints should be cut as soon as possible during curing operations to prevent random cracking. Structures and features projecting into the pavement should be isolated from the pavement with a 1-inch thick pre-molded expansion joint material. Transverse expansion joints should be

placed at proper intervals to provide expansion/contraction relief. All joints should be cleaned and sealed with an approved material prior to opening to traffic.

The American Concrete Institute's, Guide for the Design and Construction of Concrete Site Paving for Industrial and Trucking Facilities (ACI PRC – 330.2-17(20), The American Concrete Institute's, Guide for the Design and Construction of Concrete Parking (ACI 330R), should be used for reference. Field and laboratory testing of the concrete and base materials should be performed to determine whether specific requirements have been meet.

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.

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 building and pavement areas. The building area is defined as that area within the building 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 shallow foundations and utility trenches for the proposed construction can be accomplished with conventional equipment.

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 Building Pad Preparation

Remove existing soils throughout the entire building area to a minimum depth of 3 feet below the bottom of footing elevation or 5 below existing site grade, whichever is deeper. This includes both foundation and interior floor slab areas. 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 5 feet beyond the perimeter of the building.

7.5 Pavement Preparation

The subgrade should be scarified, moistened as required, and recompacted for a minimum depth of 10 inches prior to placement of fill and pavement materials.

7.6 Materials

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

- Foundation areas
- Pavement areas
- Backfill/embankment
- Interior/exterior slab areas

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 soils can be used as engineered fill.

Base course should conform to NMDOT Specifications.

7.7 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

Imported and on-site soils should be compacted within a water content range of 3 percent below to 3 percent above optimum.

7.8 Compliance

Recommendations for foundations, slabs-on-grade, 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.

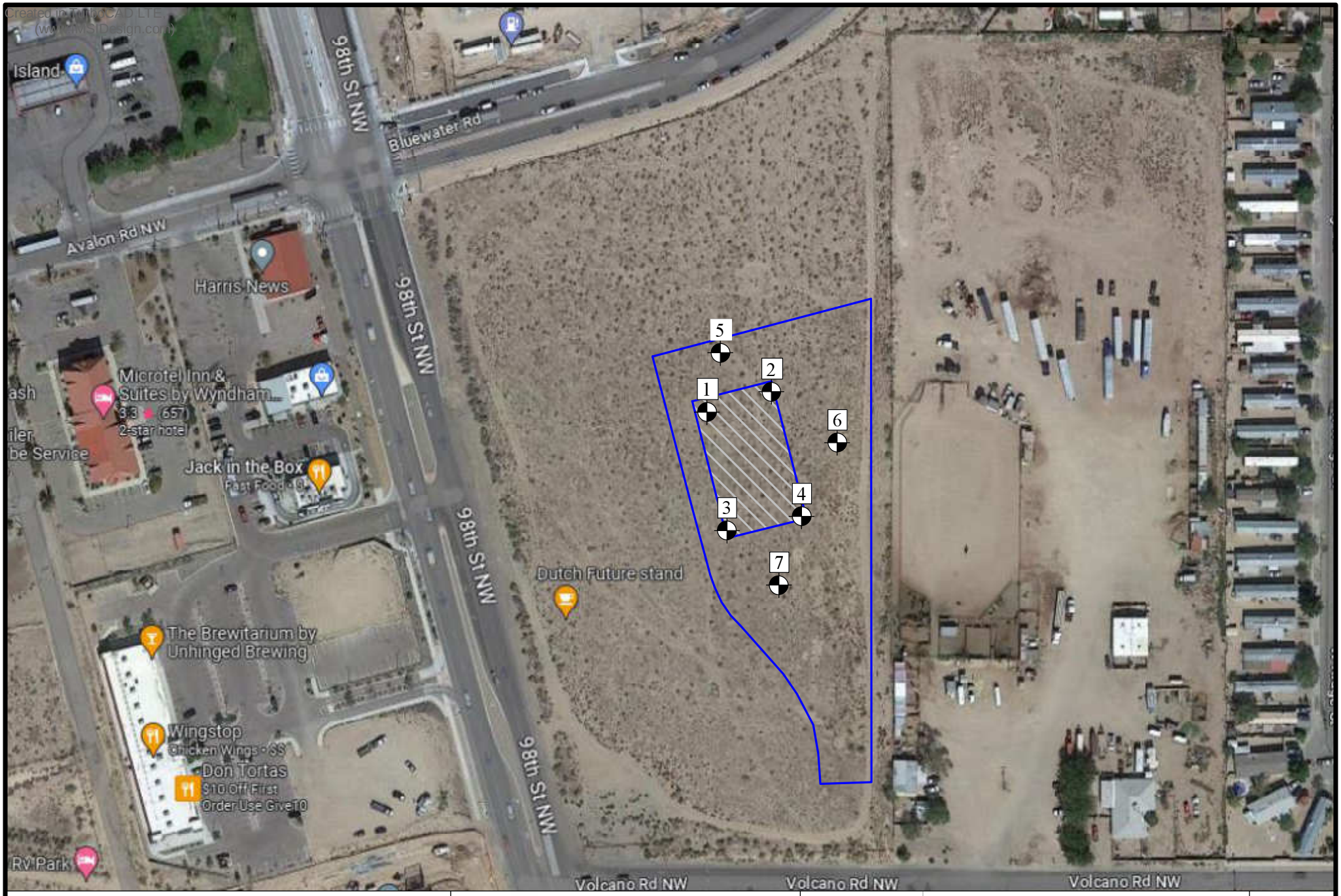
The recommendations presented are based entirely upon data derived from a limited number of samples obtained from widely spaced explorations. The attached logs are indicators of subsurface conditions only at the specific locations and times noted. This report assumes the uniformity of the geology and 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 Boring Location
Proposed Building Area

NOT TO SCALE

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PROJECT:	**CALIBER COLLISION**
JOB NO.:	**32-223528-0**

PLATE
1

BORING LOCATION DIAGRAM

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 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 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 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 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."** refers to the approximate location of the same number indicated on the "Boring 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.

"N" in "BLOW COUNTS" refers to a 2-inch outside diameter split-barrel sampler driven into the ground with a 140 pound drop-hammer dropped 30 inches repeatedly until a penetration of 18 inches is achieved or until refusal. The number of blows, or "blow count", of the hammer is recorded for each of three 6-inch increments totaling 18 inches. The number of blows required for advancing the sampler for the last 12 inches (2nd and 3rd increments) is defined as the Standard Penetration Test (SPT) "**N**"-Value. Refusal to penetration is considered more than 50 blows per 6 inches. (Ref. ASTM D1586).

"R" in "BLOW COUNTS" refers to a 3-inch outside diameter ring-lined split barrel sampler driven into the ground with a 140 pound 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 per foot. (Ref. ASTM D3550).

"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 (2nd and 3rd 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 D 3550)

"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).

"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: CALIBER COLLISION Project Number: 32-223528-0	**BORING NO. 1**	Western Technologies An RMA Company

Date(s) Drilled **8/3/2023**	Logged By **S. O'HERRON-ALEX**	Checked By **A. KABA**
Drilling Method **HOLLOW STEM AUGER**	Drill Bit Size/Type **7"**	Total Depth of Borehole **21.5'**
Drill Rig Type **CME 75**	Drilling Contractor **ENVIRO-DRILL**	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 **AUGER 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	5.3			G		SM		Silty SAND; brown, medium dense, damp	
	2.6	108		R	28				
5	1.3	109		R	13			loose	
10	2.2	107		R	15				
15				N	6 7 9			medium dense	
20				N	6 6 7			BORING TERMINATED AT 21.5 FEET	
25									
30									
35									

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PLATE A-4

Project: CALIBER COLLISION Project Number: 32-223528-0	**BORING NO. 2**	Western Technologies An RMA Company

Date(s) Drilled **8/3/2023**	Logged By **S. O'HERRON-ALEX**	Checked By **A. KABA**
Drilling Method **HOLLOW STEM AUGER**	Drill Bit Size/Type **7"**	Total Depth of Borehole **21.5'**
Drill Rig Type **CME 75**	Drilling Contractor **ENVIRO-DRILL**	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 **AUGER 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	4.4			G		SM		Silty SAND; brown, medium dense, damp	
				N	7 8 10				
5				N	5 6 6				
10				N	4 4 5			loose	
15				N	5 5 7			medium dense	
20				N	6 6 7			BORING TERMINATED AT 21.5 FEET	
25									
30									
35									

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PLATE A-5

Project: CALIBER COLLISION Project Number: 32-223528-0	**BORING NO. 3**	Western Technologies An RMA Company

Date(s) Drilled **8/3/2023**	Logged By **S. O'HERRON-ALEX**	Checked By **A. KABA**
Drilling Method **HOLLOW STEM AUGER**	Drill Bit Size/Type **7"**	Total Depth of Borehole **21.5'**
Drill Rig Type **CME 75**	Drilling Contractor **ENVIRO-DRILL**	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 **AUGER 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	5.5			G		SM		Silty SAND; brown, medium dense, damp	
				N	7 9 9				
5				N	6 7 8				
10				N	5 4 5			loose	
15				N	6 6 7			medium dense	
20				N	7 7 9			BORING TERMINATED AT 21.5 FEET	
25									
30									
35									

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PLATE A-6

Project: CALIBER COLLISION Project Number: 32-223528-0	**BORING NO. 4**	Western Technologies An RMA Company

Date(s) Drilled **8/3/2023**	Logged By **S. O'HERRON-ALEX**	Checked By **A. KABA**
Drilling Method **HOLLOW STEM AUGER**	Drill Bit Size/Type **7"**	Total Depth of Borehole **21.5'**
Drill Rig Type **CME 75**	Drilling Contractor **ENVIRO-DRILL**	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 **AUGER 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	2.6			G		SM		Silty SAND; brown, medium dense, damp	
	7.7	110		R	21				
5	4.5	110		R	14			loose	
10	1.5	107		R	18			medium dense	
15				N	5 6 6				
20				N	6 7 8				
								BORING TERMINATED AT 21.5 FEET	
25									
30									
35									

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PLATE A-7

Project: CALIBER COLLISION Project Number: 32-223528-0	**BORING NO. 5**	Western Technologies An RMA Company

Date(s) Drilled **8/3/2023**	Logged By **S. O'HERRON-ALEX**	Checked By **A. KABA**
Drilling Method **HOLLOW STEM AUGER**	Drill Bit Size/Type **7"**	Total Depth of Borehole **5'**
Drill Rig Type **CME 75**	Drilling Contractor **ENVIRO-DRILL**	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 **AUGER 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	4.5			G		SM		Silty SAND; brown, damp	
5								BORING TERMINATED AT 5 FEET	
10									
15									
20									
25									
30									
35									

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PLATE A-8

Project: CALIBER COLLISION Project Number: 32-223528-0	**BORING NO. 6**	Western Technologies An RMA Company

Date(s) Drilled **8/3/2023**	Logged By **S. O'HERRON-ALEX**	Checked By **A. KABA**
Drilling Method **HOLLOW STEM AUGER**	Drill Bit Size/Type **7"**	Total Depth of Borehole **5'**
Drill Rig Type **CME 75**	Drilling Contractor **ENVIRO-DRILL**	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 **AUGER 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	4.2			G		SM		Silty SAND; brown, damp	
5								BORING TERMINATED AT 5 FEET	
10									
15									
20									
25									
30									
35									

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PLATE A-9

Project: CALIBER COLLISION Project Number: 32-223528-0	**BORING NO. 7**	Western Technologies An RMA Company

Date(s) Drilled **8/3/2023**	Logged By **S. O'HERRON-ALEX**	Checked By **A. KABA**
Drilling Method **HOLLOW STEM AUGER**	Drill Bit Size/Type **7"**	Total Depth of Borehole **5'**
Drill Rig Type **CME 75**	Drilling Contractor **ENVIRO-DRILL**	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 **AUGER 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	3.9			G		SM		Silty SAND; brown, damp	
5								BORING TERMINATED AT 5 FEET	
10									
15									
20									
25									
30									
35									

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PLATE A-10

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									
1	0-5	SM		5.3						NV	NP	24	24			
1	5-6	SM	109	1.3	0.5	0.3										
					1.0	0.4										
					2.0	0.7	1.5									2
					4.0		1.9									2
4	2-3	SM	110	7.7	0.5	0.3										
					1.0	0.5										
					2.0	0.8	1.7									2
					4.0		2.6									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: **CALIBER COLLISION**
JOB NO.: **32-223528-0**

SOIL PROPERTIES

PLATE
B-1

SOIL PROPERTIES

Boring No.	Depth (ft.)	Soil Class	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	SM	-	-	100	99	99	99	97	97	94	87	78	66	34	15	NV	NP	
2	0-5	SM	-	-	100	99	99	99	98	98	95	87	78	67	33	14	NV	NP	
3	0-5	SM	-	-	100	99	98	96	94	93	90	82	73	62	30	14	NV	NP	
4	0-5	SM	-	-	-	-	100	99	99	99	97	90	82	69	34	14	NV	NP	
5	0-5	SM	-	100	93	93	91	89	88	88	86	80	72	62	32	15	NV	NP	
6	0-5	SM	-	-	-	-	-	100	99	99	98	90	81	69	35	15	NV	NP	
7	0-5	SM	-	-	100	99	97	96	95	94	92	85	77	66	34	15	NV	NP	

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

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PROJECT: **CALIBER COLLISION**
JOB NO.: **32-223528-0**

SOIL PROPERTIES

PLATE
B-2