ACS SERVICES LLC

ENGINEERING DESIGN • MATERIAL TESTING • CONSTRUCTION INSPECTION
DBE - SBE - WBE

REPORT OF GEOTECHNICAL INVESTIGATION

SEDONA HOTEL BUILDINGS

725 HIGHWAY 179
SEDONA, ARIZONA 86336
ACS PROJECT NO. 2101203

PREPARED FOR:

Mr. Trevor Hewison
ARABELLA HOTEL SEDONA
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Sedona, AZ 86336

PREPARED BY:

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April 23, 2021

ACS

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ACS SERVICES LLC

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April 23, 2021 Project 2101203

Mr. Trevor Hewison
ARABELLA HOTEL SEDONA
725 Highway 179
Sedona, AZ 86336

RE: GEOTECHNICAL INVESTIGATION REPORT
SEDONA HOTEL BUILDINGS
725 HIGHWAY 179
SEDONA, ARIZONA 86336

Dear Trevor:

Transmitted herewith is a copy of the final report of the subsurface soil and foundation investigation on the above-mentioned project. The services performed provide an evaluation at selected locations of the subsurface soil conditions throughout the zone of significant foundation influence. As an additional service, this firm may review the project plans and structural notes for conformance to the intent of this report.

This firm possesses the capability to provide testing and inspection services during the course of construction. Such quality control/assurance activities may include, but are not limited to, compaction testing as related to fill control, foundation inspection, and concrete sampling. Please notify this firm if a proposal for such services is desired.

Should any questions arise concerning the content of this report, please feel free to contact this office at your earliest convenience.

Respectfully submitted,

ACS SERVICES LLC

H. Eugene Hansen, P.E.
Geotechnical and Materials Testing Engineer

cc: (1) Addressee via email (pdf copy)

SCOPE

This report is submitted following a geotechnical investigation conducted by this firm for the proposed **SEDONA HOTEL BUILDINGS**, to be located at 725 Highway 179, in Sedona, Arizona 86336. The objectives of the investigation were to determine the physical characteristics of the soil and rock underlying the site and to provide final recommendations for safe and economical foundation design and slab support. For purposes of foundation design, the maximum column and wall loads have been assumed to be as summarized below.

	Maximum Column Load (KIPS)	Maximum Wall Load (KLF)
Shallow Spread Foundations	98	6.0

Anticipated structural loads in excess of those stated above will need to be addressed in an addendum, i.e. they are not covered under the scope of work involved with this effort. The recommendations for site grading contained in this report do not address the presence or removal of contaminants from the site soils.

FIELD INVESTIGATION

On March 31, 2021, this firm advanced two (2) exploratory test borings (6.25-inch hollow stem auger) and monitored the excavation of ten (10) test pits (rubber-tired backhoe) for examination of the subsurface profile to depths ranging from 1.0 to 5.0 feet below the existing site grade. All borings and test pits were terminated due to auger or backhoe refusal on mudstone bedrock (Supai Formation). The soils and rock encountered were examined, visually classified and wherever applicable, sampled. Refer to the Boring and Test Pit Logs in Appendix B for a detailed description of the subsurface soil and rock conditions at the specified locations. Refer to Figure 2 in Appendix A for the approximate locations of the borings and test pits.

LABORATORY TESTING

Representative samples obtained during the field investigation were subjected to the following laboratory analyses:

Test	Sample(s)	Purpose
Sieve Analysis and Atterberg Limits	Native subgrade soils (12)	Soil classification
Proctor	Native subgrade soils (2)	Moisture-Density Relationship

Refer to Appendix C of this report for the results of the laboratory testing.

SITE CONDITIONS

General Notes:

(1) Topographic relief	The western portion of the site is at approximately Elevation 4312 and the site slopes downward to the main building area which is at approximately Elevation 4286. Refer to Figure 3 in Appendix for a view of the site topography and building layout.
(2) Fill	No fill was encountered at the locations of the borings.
(3) Evidence of surface disturbance	The surface of the site has generally not been disturbed except for some access roads that are located in the northeast portion of the site.
(4) Site use	The site is primarily a vacant lot with National Forest land beyond the east border of the site. The site is covered with moderate vegetation consisting of Pinion and Juniper trees and other small bushes.

GEOLOGIC HAZARDS

The following list represents a general summary of the on-site soil characteristics relative to engineering applications:

Depth to groundwater	- None encountered
Potential for soil expansion	- Low based on the plasticity index data for the upper soils at the site
Potential for soil collapse	- Low due to the shallow depth of weathered or hard mudstone bedrock (Supai Formation) below depths ranging from 0.0 to 1.5 feet at the locations of the borings and test pits
Existence of loose soil at foundation bearing elevation	- Possible only in the low area around Test Pits 8 and 9
Potential for excessive differential soil movement	- Low
Potential for earth subsidence fissures	- Not applicable
Frost depth	- 1.0 feet for Sedona based on 2012 IBC
Presence of caliche, bedrock or other hard stratum	- Dense to very dense, clayey to silty gravel with sand soils or hard mudstone bedrock (Supai Formation) were encountered below depths ranging from 0.0 to 1.5 feet at the locations of the borings and test pits. Auger or backhoe refusal was encountered at depths ranging from 1.0 to 5.0 feet at the locations of the borings and test pits.
2012/2018 IBC Site Class	B, rock

RECOMMENDATIONS

The recommendations contained herein are based upon the properties of the surface and subsurface soils and rock as described by the field and laboratory testing, the results of which are presented and discussed in this report. Alternate recommendations may be possible and will be considered upon request.

Conventional Spread Foundations

It is recommended that all perimeter foundations and isolated exterior foundations be embedded a minimum of 1.5 feet below the lowest adjacent finish grade within 5.0 feet of proposed foundation walls. Interior footings should be founded a minimum of 1.5 feet below finish floor level. For all construction, 2.0 feet and 1.33 feet are recommended as the minimum width of spread and continuous footings, respectively.

The following tabulation may be used in the design of spread (column) and continuous (wall) foundations for the proposed structures. The column labeled Bearing stratum refers to the soil layer that the footing pad rests on, and does not imply that the foundation be fully embedded into that particular stratum.

Surface Level Foundations Bearing on Controlled Compacted Fill:

			Allowable Load	
Foundation Depth (ft)	**Bearing Stratum**	**Allowable Soil Bearing Pressure**	**Wall (KLF)**	**Column (KIP)**
1.5	0.5 feet of controlled compacted fill*	2000 PSF	6.0	98

***To achieve an allowable soil bearing pressure of 2000 PSF, conventional spread foundations must bear on a minimum of 0.5 feet of controlled compacted fill. To accommodate the required 0.5 feet of controlled compacted fill below foundations, it is recommended that over-excavation and re-compaction of soils be accomplished to a minimum depth of 2.0 feet below finished pad grade. The controlled compacted fill should have a lateral extent of at least twice the fill thickness beyond the edges of wall or column footing pads. A minimum pad blow-up of 5 feet is recommended.**

Surface Level or Retaining Wall Foundations Bearing on Red, Hard Mudstone Bedrock (Supai Formation):

Foundation Depth (ft)	**Bearing Stratum**	**Allowable Soil Bearing Pressure**
1.5	Red, hard mudstone bedrock (Supai Formation)*	3000 PSF

*The presence of red, hard mudstone bedrock (Supai Formation) at foundation bearing level must be verified by a representative of **ACS Services LLC** prior to placing foundation reinforcing steel to utilize an allowable soil bearing pressure of 3000 PSF. In cases where the red, hard mudstone bedrock (Supai Formation) is encountered deeper than 1.5 feet, a mixture of 2-sack ABC/cement slurry may be utilized to occupy the lower portion of the foundation excavations, below a conventional foundation embedment depth of 1.5 feet.

Special Note: Foundations should all bear on either the red, hard mudstone bedrock (Supai Formation) or on controlled compacted fill. It is not considered good construction practice to bear some foundations directly on the hard bedrock and bear other foundations on a minimum of 0.5 feet of controlled compacted fill. If any foundations will bear on controlled compacted fill, all foundations should bear on a minimum of 0.5 feet of controlled compacted fill to reduce the potential for differential settlement. Alternatively, if any foundations will bear directly on the red, hard mudstone bedrock (Supai Formation), all foundations should bear directly on this harder stratum. This does not apply to exterior retaining or site wall foundations that are structurally separate.

Explanations

Foundation Embedment Depth - i.e.,

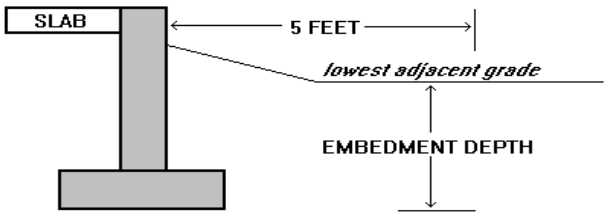
A) The depth below the lowest adjacent exterior pad grade within 5.0 feet of proposed exterior walls;

B) The depth below finish compacted pad grade provided that a sufficient pad blow-up (the lateral extent to which the building pad is constructed beyond the limits of the exterior walls or other structural elements, inclusive of exterior column foundations) has been incorporated into the grading and drainage design (5.0 feet or greater);

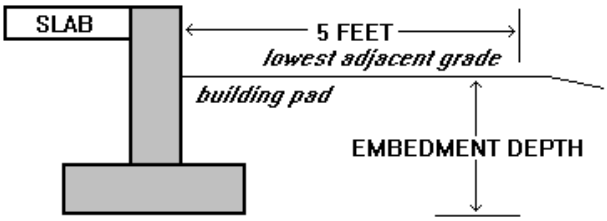
C) The depth below finish floor level for interior foundations.

FOUNDATION EMBEDMENT

Condition A



Condition B



The previously tabulated bearing values and the allowable wall and column loads associated with each are based on a total settlement of 1/2 inch. **It is anticipated that the magnitude of differential settlement will be roughly 1/4 inch** if construction is performed in accordance with locally accepted standards and the recommendations contained herein.

The allowable loads are based on maximum footing sizes of 3.0 and 7.0 feet for continuous and spread footings, respectively. Greater loads and larger footings may be accommodated by the listed bearing values, if there is toleration for increased settlements. This office should be contacted if this situation should arise.

The weight of the foundation below grade may be neglected in dead load computations.

The previously tabulated bearing capacities should be considered allowable maximums for dead plus design live loads and may be increased by one-third when considering total loads, including wind or seismic forces or other transient loading conditions.

Retaining wall or building foundations to be constructed in close proximity to retention basins (within 5.0 feet) should be embedded 1.0 feet deeper than the stated depths in the preceding bearing capacity tables.

Shallow foundations that are adjacent to lower foundation areas must be stepped down so that their base is below the lower backfill materials, and below a line projected upward from the nearest lower foundation edge at a 45 degree angle. In no case should ancillary structures be designed or constructed, whose foundations will bear into deeper, non-verified backfills.

This firm recommends that continuous footings and stem walls be reinforced, and bearing walls be constructed with frequent joints to better distribute stresses in the event of localized foundation movements. Similarly, all masonry walls should be constructed with both vertical and horizontal reinforcement.

It is strongly recommended that all foundation excavations be inspected (prior to the placement of reinforcing steel) by a representative of the project geotechnical engineer, **ACS Services LLC**, to ensure that they are free of loose soil which may have blown or sloughed into the excavations, the embedment depth is adequate, and the dimensions are in accordance with the project requirements. It will also be necessary for the project geotechnical engineer to verify

that the footings will bear upon one of the strata described above with a minimum foundation embedment of 1.5 feet.

A minimum of MAG A (3000 PSI), or equivalent, concrete with Type II cement should be used for footings, stem walls and floor slabs.

Lateral Stability Analyses

The following tabulation presents recommendations for lateral stability analyses for native undisturbed soil, controlled compacted fill, and the red, hard mudstone bedrock (Supai Formation):

[a]Foundation Toe Pressures .....1.33 x max. allowable

	Native Undisturbed Soil	Controlled Compacted Fill	Red, Hard Mudstone Bedrock
[b]Lateral Backfill Pressures:			
Unrestrained walls	37 psf/ft.	34 psf/ft.	31 psf/ft.
Restrained walls[c]	55 psf/ft.	52 psf/ft.	49 psf/ft.
Lateral Passive Pressures For Surficial Soils:			
Continuous walls/footings	221 psf/ft.	240 psf/ft.	310 psf/ft.
Spread columns/footings	330 psf/ft.	358 psf/ft.	462 psf/ft.
Coefficient of Base Friction For Surficial Soils:			
Independent of passive resistance	0.58	0.62	0.73
In conjunction with passive resistance	0.39	0.42	0.49

Superscript Explanations

[a]Increase in allowable foundation bearing pressure (previously stated) for foundation toe pressures due to eccentric or lateral loading.

[b]Equivalent fluid pressures for vertical walls and horizontal backfill surfaces (maximum 12.0 feet in height). Pressures do not include temporary forces during compaction of the backfill, expansion pressures developed by overcompacted clayey backfill, hydrostatic pressures from inundation of backfill, or surcharge loads. Walls should be suitably braced during backfilling to prevent damage and excessive deflection.

[c]The backfill pressure can be reduced to the unrestrained value if the backfill zone between the wall and cut slope is a narrow wedge (width less than one-half height).

Retaining or Basement Wall Backfill and Subsurface Drainage

Retaining or basement wall backfill in building areas should be compacted to the density criteria presented herein. If backfills are not compacted as recommended, excessive settlement may result in areas adjoining backfilled retaining or basement walls, or over utilities. Excessive

settlement of loose backfills has caused damage to pavements, floor slabs, pedestrian walkways, planters, etc., which adjoin backfilled retaining or basement walls. Deep, compacted backfills will also tend to settle differently relative to the retaining or basement wall and should not be used for support of adjoining facilities prone to damage from differential settlements, or facilities attached to the main structure.

Backfills may consist of compacted fill or native soils. Backfill compaction should be accomplished by mechanical methods. Water jetting or flooding of loose, dumped backfills to increase moisture contents should be prohibited in all wall backfills and in utility trench backfills within 10.0 feet of structures.

Because of the critical factor of minimizing settlements of approach slabs, particularly careful quality control should be exercised over wall backfill operations. Even with proper backfill compaction (well compacted - 95% minimum), the wall backfill will have the potential for about 1.5 inches of settlement (for 12.0 feet of total backfill) in the event of wetting by irrigation or broken conduits. With moderately compacted backfill (90% minimum), the magnitude of wall backfill settlement may approach 3.6 inches (for 12.0 feet of total backfill). Further, with poorly compacted wall backfill (85% minimum), the approximate magnitude of wall backfill settlement may reach as much as 7.2 inches (for 12.0 feet of total wall backfill). The preceding estimates for wall backfill settlement are those which may occur through settlement of the backfill alone, without any surcharge or other structural loading condition.

Accordingly, it is recommended that where upper slabs or a pool are supported on grade over retaining or basement wall backfill, but are also tied to or connected to the retaining or basement wall, special construction details be utilized. Concrete slabs should be hinged or keyed at the base where they join the rigid structure in order to allow slight rotation of the slab. Consideration should be made to reinforcing concrete floor slabs to span over the wall backfill zone. These measures will reduce the likelihood that such slabs will crack or suffer noticeable deformations.
Because of the possibility of leakage from subsurface water lines or sewer lines, and seepage of surface water into the soils immediately behind the retaining or basement walls, below grade waterproofing will need to be provided to prevent efflorescence from forming on the exterior front face for exterior retaining walls or to prevent moisture intrusion into the interior of the buildings for basement walls. For conventional, cast-in-place concrete or masonry walls with open cuts, conventional waterproofing may be applied to the back of the walls.

Subsurface wall drainage can be efficiently provided by a geocomposite wall drain (filter fabric and drainage core) attached to the soil side of the retaining or basement wall. The geocomposite wall drain should extend to within 2 feet of the final ground surface or to the bottom of the interior floor slabs. For conventional, cast-in-place concrete or masonry retaining walls, the geocomposite wall drain system should be bonded or securely attached with adhesive to the waterproofing on the soil side of the retaining or basement wall prior to backfilling. Weep holes may be placed above the ground level in front of exterior retaining walls at an approximately 10 foot or less spacing to allow any subsurface water that collects in the geocomposite wall drain to exit. For interior basement walls, It will be necessary to interconnect the system to a small drain pipe at the base of the lower level basement walls leading to a daylight outlet or sump. **The drain pipe must be at an elevation that is at least 6 inches below the interior lower level floor slab elevation for the structure.**

Surface Drainage

In unpaved areas, it is suggested that finished slopes extend a minimum of 5.0 feet horizontally from building walls and have a minimum vertical fall of 3.0 inches. Minimum grades of 2 percent should be maintained where the horizontal slope distance exceeds 5.0 feet. **In no case should long-term ponding be allowed near structures.** Backfill against footings, exterior walls, retaining walls, and in utility trenches should be well compacted to minimize the possibility of moisture infiltration through loose soil.

Slab Support

Site grading within the building areas should be accomplished as recommended herein. Four (4.0) inches of aggregate base course (ABC) floor fill should immediately underlie interior grade floor slabs with a typical thickness of four (4.0) inches. The aggregate base material should conform to the requirements of Section 702 under Sub-section 702.2 "Crushed Aggregate" of the "Uniform Standard Specifications for Public Works Construction" sponsored by the Maricopa Association of Governments and all supplements which requires a particle size grading as follows:

Sieve Size	Percent Passing
1-1/4”	100
#4	38-65
#8	25-60
#30	10-40
#200	3-12

Maximum Plasticity Index - 5

Special Note: To further reduce the potential for slab related damage, we recommend the following for conventional systems:

1. Placement of effective control joints on relatively close centers.
2. Proper moisture and density control during placement of subgrade fills.
3. Provision for adequate drainage in areas adjoining the slabs.
4. Use of designs which allow for the differential vertical movement described herein between the slabs and adjoining structural elements, i.e. ½ **inch**.

The use of vapor retarders may be considered for any slab-on-grade where the floor will be covered by products using water based adhesives, wood, vinyl backed carpet, vinyl tile, impermeable floor coatings (urethane, epoxy, or acrylic terrazzo),and moisture-sensitive rock tile products. When used, the design and installation should be in accordance with the recommendations given in ACI 302.1R-04, Section 3.2.3 Moisture protection.

A minimum of MAG A (3000 PSI), or equivalent, concrete with Type II cement should be used for unreinforced interior and exterior slabs.

Fill Slope Stability

The maximum fill slopes may conform to a 2:1 (horizontal:vertical) ratio if fill is placed in accordance with the recommendations contained herein.

Pavement Design

Site grading within pavement areas should provide requisite subgrade support for flexible pavements. A compacted subgrade of on-site soils or soils with comparable properties is assumed. The stability of compacted pavement subgrade soils is reduced under conditions of increased soil moisture. Therefore, base course or pavement materials should not be placed when the surface is in a wet condition. Adequate surface drainage should be provided away from the edge of paved areas to minimize lateral moisture transmission into the subgrade.

The following presents the recommended pavement sections for on-site pavements:

Light Vehicles or Low Volume Traffic Areas

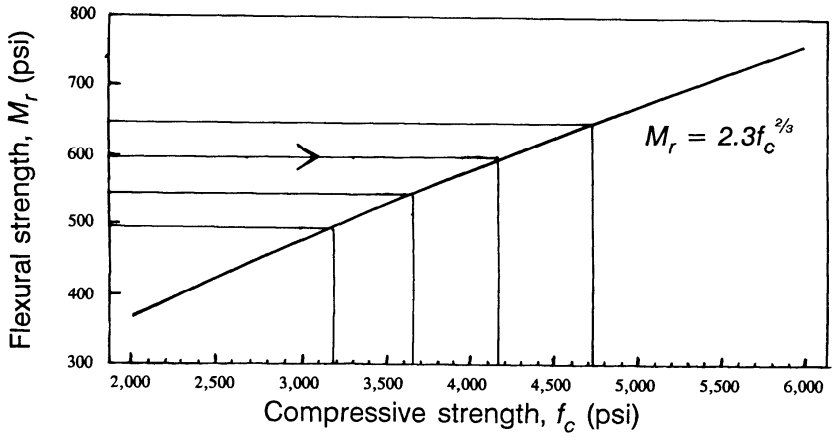
Alternate	Prepared Subgrade (Inches)	ABC (Inches)	Asphaltic Concrete (Inches)	Concrete Pavement (Inches)
A[a]	6	5	2	
B[a]	6		4	
C[b]	6			5.0*

Light Truck Vehicles or Moderate Volume Traffic Areas

Alternate	Prepared Subgrade (Inches)	ABC (Inches)	Asphaltic Concrete (Inches)	Concrete Pavement (Inches)
A[a]	6	5	3	
B[a]	6		5	
C[b]	6			6.0*

[a] – 10 to 15 year design life, with typical maintenance
[b] – 20 year design life, with typical maintenance

***The above thicknesses for Portland Cement concrete pavement are based on a modulus of rupture of 600 PSI. The recommended concrete thicknesses should be increased in increments of 0.5 inch for every 50 PSI decrease in the modulus of rupture. The following chart relates rupture modulus to compressive strength.**



All 8.0 inches of the prepared subgrade may be comprised of the native site soils.

Specifications for ABC should be as previously stated under "Slab Support". Compaction of subbase fill and base course materials should be accomplished to the density criteria listed under "Compaction and Moisture Content Recommendations". Compaction of asphalt should be accomplished to the following density criteria:

Material	Percent Compaction 75-blow method
Asphaltic Concrete	95 minimum

The asphaltic concrete material shall conform to all requirements as established in MAG Section 710 for Asphaltic Concrete Mix Designation 1/2" Marshall mix.

EARTHWORK

The following final earthwork recommendations are presented as a guide in the compilation of construction specifications. The final recommendations are not comprehensive contract documents and should not be utilized as such.

Site Preparation

The following final recommendations are presented as a guide in the compilation of construction specifications. The final recommendations are not comprehensive contract documents and should not be utilized as such.

It is recommended that all vegetation, inclusive of significant root systems, any soft soils or organics (in the area of Test Pits 8 and 9), and all other deleterious matter be removed from the proposed structure and pavement areas at the commencement of site grading activities.

Subsequent to the surface grubbing efforts, and prior to the placement of subgrade or subbase fill, the exposed native ground surface should be prepared to a minimum depth of **6.0 inches** in all proposed building and pavement areas except in areas where the red, hard mudstone bedrock is encountered and scarification is not possible. Subgrade preparation should include some degree of moisture processing and/or scarification prior to compaction and should also incorporate a minimum pad blow-up of five (5) feet in all proposed building areas.

Special note for foundations on controlled compacted fill: To achieve an allowable soil bearing pressure of 2500 PSF, conventional spread foundations must bear on a minimum of 0.5 feet of controlled compacted fill. To accommodate the required 0.5 feet of controlled compacted fill below foundations, it is recommended that over-excavation and re-compaction of soils be accomplished to a minimum depth of 2.0 feet below finished pad grade. The controlled compacted fill should have a lateral extent of at least twice the fill thickness beyond the edges of wall or column footing pads. A minimum pad blow-up of 5 feet is recommended.

If all of the foundations for the structures will bear directly on the red, hard mudstone bedrock (Supai Formation), no controlled compacted fill should be placed below the foundations.

Complete removal and cleaning of any undesirable materials and proper backfilling of depressions or over-excavations will be necessary to develop support for the proposed facilities. Widen all depressions or over-excavations as necessary to accommodate compaction equipment and provide a level base for placing any fill. All fill shall be properly moistened and compacted as specified in the section on compaction and moisture content final recommendations.

All removed native soils and excavated mudstone bedrock are considered by this firm to be suitable for use as engineered fill, provided that they are free of vegetation, debris, and oversized particles (greater than 3.0 inches). Excavated mudstone bedrock will likely require screening or crushing to remove oversized rock particles greater than 3 inches in size for use as controlled compacted fill. Large rock may be utilized in landscape areas or for erosion control..

All subbase fill required to bring the structure areas up to subgrade elevation should be placed in horizontal lifts not exceeding six inches compacted thickness or in horizontal lifts with thickness compatible with the compaction equipment utilized.

It is the understanding of this firm that various utility trenches may traverse the completed building pads, pathways, or parking and drive areas. The backfill of all utility trenches, if not in conformance with this report, may adversely impact the integrity of the completed building pads, pathways, or parking and drive areas. This firm recommends that all utility trench backfill crossing these areas be inspected and tested to ensure full conformance with this report. Untested utility trench backfill will nullify any as-built grading report regarding the existence of controlled compacted fill beneath the proposed building foundations, parking and drive areas and place the owner at greater risk in terms of potential unwanted foundation, floor slab movement where applicable, or failures or pathways or brick pavers.

Compaction and Moisture Content Recommendations

Compaction of backfill, subgrade soil, subbase fill, and base course materials for slab or pavement support should be accomplished to the following density criteria:

Material	Required Degree of Compaction (ASTM D698)
On-site native soils and excavated mudstone bedrock materials:	
Building areas below foundation level	95 min.
Building areas above foundation level	95 min.
Below asphalt pavements	95 min.
Imported fill material:	
Building areas below foundation level	95 min.
Building areas above foundation level	95 min.
Below asphalt pavements	95 min.
Base course:	
Below concrete slabs	95 min.
Below asphalt pavements	95 min.

Increase the required degree of compaction to a minimum of 98 percent for fill materials greater than 5.0 feet below final grade.

During construction and prior to concrete placement, moisture contents should be controlled as follows:

Material	Compaction Moisture Content Range
On-site native soils and excavated mudstone bedrock materials:	
Below foundation level	optimum -2 to optimum +2%
Above foundation level	optimum -2 to optimum +2%
Below asphalt pavements	optimum -2 to optimum +2%
Imported fill material:	
Below foundation level	optimum -2 to optimum +2%
Above foundation level	optimum -2 to optimum +2%
Below asphalt pavements	optimum -2 to optimum +2%

Note: The recommendations previously tabulated under the heading entitled "Above Foundation Level" apply to the subgrade in exterior concrete, patio, pool deck, sidewalk, or driveway slab areas.

Any soil disturbed during construction shall be compacted to the applicable percent compaction as specified herein.

Natural undisturbed soils or compacted soils subsequently disturbed or removed by construction operations should be replaced with materials compacted as specified above.

All imported fill material to be used as structural-supporting fill, should be free of vegetation, debris, and other deleterious material and meet the following requirements:

Maximum Particle Size	3 inches
Maximum Plasticity Index	15
Maximum Passing #200 Sieve	60 percent
Maximum Expansion	1.5 %*

* - Performed on a sample remolded to 95 percent of the maximum ASTM D698 density at roughly 2.0 percent below the optimum moisture content, under a 100 PSF surcharge.

Water settling and/or slurry shall not be used, in any case, to compact or settle surface soils, fill material, or trench backfill within 10.0 feet of any proposed structure.

Shrinkage

Assuming the average degree of compaction will approximate 95 percent of the standard maximum density, the approximate shrinkage of the reworked site soils should be 5 to 15 percent based on the field investigation. This may result in a vertical elevation change of approximately 0.05 to 0.15 feet following the pre-compaction effort.

Excavating Conditions

Excavations into the site subsurface soils to depths ranging from 1.0 to 5.0 feet should be possible with conventional excavating equipment. Heavier excavating equipment may be required below depths ranging from 1.0 to 5.0 feet due to the presence of dense to very dense, clayey to silty gravel with sand soils, consisting of or red, highly weathered or hard mudstone bedrock (Supai Formation). Auger or backhoe refusal was encountered at depths ranging from 1.0 to 5.0 feet at the locations of the borings and test pits. Intermittent thin layers of hard bedrock are typically encountered in the mudstone bedrock encountered at the site. Difficult excavation should be assumed across the entire site at a very shallow depth. A trackhoe with a rock bucket or hoe ram attachment will likely be required for efficient excavation in some areas. The excavated bedrock will be platy and may need to be broken up or crushed to be utilized in fills on the site.

Excavations greater than 4.0 feet should be sloped or braced as required to provide personnel safety and satisfy local safety code regulations.

CONSTRUCTION OBSERVATION

ACS Services LLC should be retained to provide documentation that the recommendations set forth are met. These include but are not limited to documentation of site clearing activities, verification of fill suitability and compaction, and inspection of footing excavations. Relative to field density testing, a minimum of 1 field density test should be taken for every 2500 square feet of building area, per 6.0-inch layer of compacted fill.

Prior to construction, we recommend the following:

1. Consultation with the design team in all areas that concern soils and rocks to ensure a clear understanding of all key elements contained within this report.
2. Review of the General Structural Notes to confirm compliance to this report and determination of which allowable soil bearing capacity has been selected by the project structural engineer (this directly affects the extent of earthwork and foundation preparation at the site).
3. This firm be notified of all specific areas to be treated as special inspection items (designated by the architect, structural engineer or governmental agency).

Relative to the involvement of **ACS Services LLC** with the project during the course of construction, we offer the following recommendations:

1. The site or development owner should be directly responsible for the selection of the geotechnical consultant to provide testing and observation services during the course of construction.
2. **ACS Services LLC** should be contracted by the owner to provide the course of construction testing and observation services for this project, as we are most familiar with the interpretation of the methodology followed herein.
3. All parties concerned should understand that there exists a priority surrounding the testing and observation services completed at the site. From a geotechnical perspective, it is imperative to understand the following priority list, presented in order of decreasing priority.

    A. Fill control for building pads (verification of over-excavation depths and lateral extents, compaction testing, and the general monitoring of fill placement).
    B. Foundation observations (compliance with the General Structural Notes, depths, bearing strata, etc.).
    C. Basement, structural or retaining wall backfill testing.
    D. Utility trench backfill
    E. Special inspections as dictated by the local municipality.
    F. Concrete sampling and testing for footings, stem walls and floor slabs.
    G. Subgrade testing for proposed pathway and concrete paver areas.
    H. ABC testing for proposed pathway and concrete paver areas.
    I. Asphaltic concrete testing for proposed pavement areas.
    J. Subgrade preparation for on-site sidewalk areas
    K. Grout sampling and testing, where applicable.
    L. Mortar sampling and testing, where applicable.
    M. Off-site subgrade, ABC, asphalt, curb, gutter and sidewalk testing.

Please understand that Item A above is the only area where ACS Services LLC has control on-site (once it has started) to verify or deny compliance with applicable standards, without the need for any entity to schedule testing activities with this office. Other than Item A, it shall be another entity's responsibility to schedule all testing and

observation services, to coincide with the progress of construction. Since this firm is not a contributor to the construction schedule, we do not possess an inherent knowledge as to when our services shall be needed or required.

LIMITATIONS

Since our investigation is based upon review of background data, the site materials observed, selected laboratory testing and engineering analysis, the conclusions and recommendations are professional opinions. Our professional services have been performed using that degree and skill ordinarily exercised, under similar circumstances, by reputable geotechnical engineers practicing in this or similar localities. These opinions have been derived in accordance with current standards of practice and no other warranty, express or implied, is made.

This report is not intended as a bidding document, and any contractor reviewing this report must draw his own conclusions regarding specific construction techniques to be used on this project.

The scope of services carried out by **ACS Services LLC** does not include an evaluation pertaining to environmental issues. If these services are required by the lender, we would be most pleased to discuss the varying degrees of environmental site assessments.

The materials encountered on the subject site and utilized in our laboratory analysis are believed to be representative of the total area; however, soil and rock materials do vary in character between points of investigation. The recommendations contained in this report are based on the assumption that the soil conditions do not deviate appreciably from those disclosed by the investigation. Should unusual material or conditions be encountered during construction, the soil engineer must be notified so that he may make supplemental recommendations if they should be required.

This report is issued with the understanding that it is the responsibility of the owner to see that its provisions are carried out or brought to the attention of those concerned. In the event that any changes of the proposed project are planned, the conclusions and recommendations contained in this report shall be reviewed and the report shall be modified or supplemented as necessary.

April 23, 2021
Project 2101203 – Sedona Hotel Buildings
725 Highway 179
Sedona, Arizona 86336

DEFINITION OF TERMINOLOGY

Allowable Soil Bearing Capacity	The recommended maximum contact stress developed at the interface of the foundation element and the supporting material.
Aggregate Base Course (ABC)	A sand and gravel mixture of specified gradation, used for slab and pavement support.
Backfill	A specified material placed and compacted in a confined area.
Base Course	A layer of specified material placed on a subgrade or subbase.
Base Course Grade	Top of base course.
Bench	A horizontal surface in a sloped deposit.
Caisson	A concrete foundation element cased in a circular excavation, which may have an enlarged base. Sometimes referred to as a cast-in-place pier.
Concrete Slabs-on-Grade	A concrete surface layer cast directly upon a base, subbase, or subgrade.
Controlled Compacted Fill	Engineered Fill. Specific material placed and compacted to specified density and/or moisture conditions under observation of a representative of a soil engineer.
Differential Settlement	Unequal settlement between or within foundation elements of a structure.
Existing Fill	Materials deposited through the action of man prior to exploration of the site.
Expansive Potential	The potential of a soil to increase in volume due to the absorption of moisture.
Fill	Materials deposited by the action of man.
Finish Grade	The final grade created as a part of the project.
Heave	Upward movement due to expansion or frost action.
Native Grade	The naturally occurring ground surface.
Native Soil	Naturally occurring on-site soil.
Overexcavate	Lateral extent of subexcavation.
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.
Scarify	To mechanically loosen soil or break down the existing soil structure.
Settlement	Downward movement of the soil mass and structure due to vertical loading.
Soil	Any unconsolidated material composed of disintegrated 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 between the subgrade and base course.
Subexcavate	Vertical zone of soil removal and recompaction required for adequate foundation or slab support
Subgrade	Prepared native soil surface.

APPENDIX A

NORTH
N.T.S.

PROJECT NUMBER: 2001203

FIGURE 1

ACS SERVICES LLC
2235 W BROADWAY RD
MESA, ARIZONA 85202
(480) 968-0190
(480) 968-0156 FAX
WWW.ACSSERVICESLLC.COM

VICINITY MAP

Sedona Hotel Buildings
725 Highway 179
Sedona, AZ. 86336

NORTH
N.T.S.

PROJECT NUMBER: 2101203

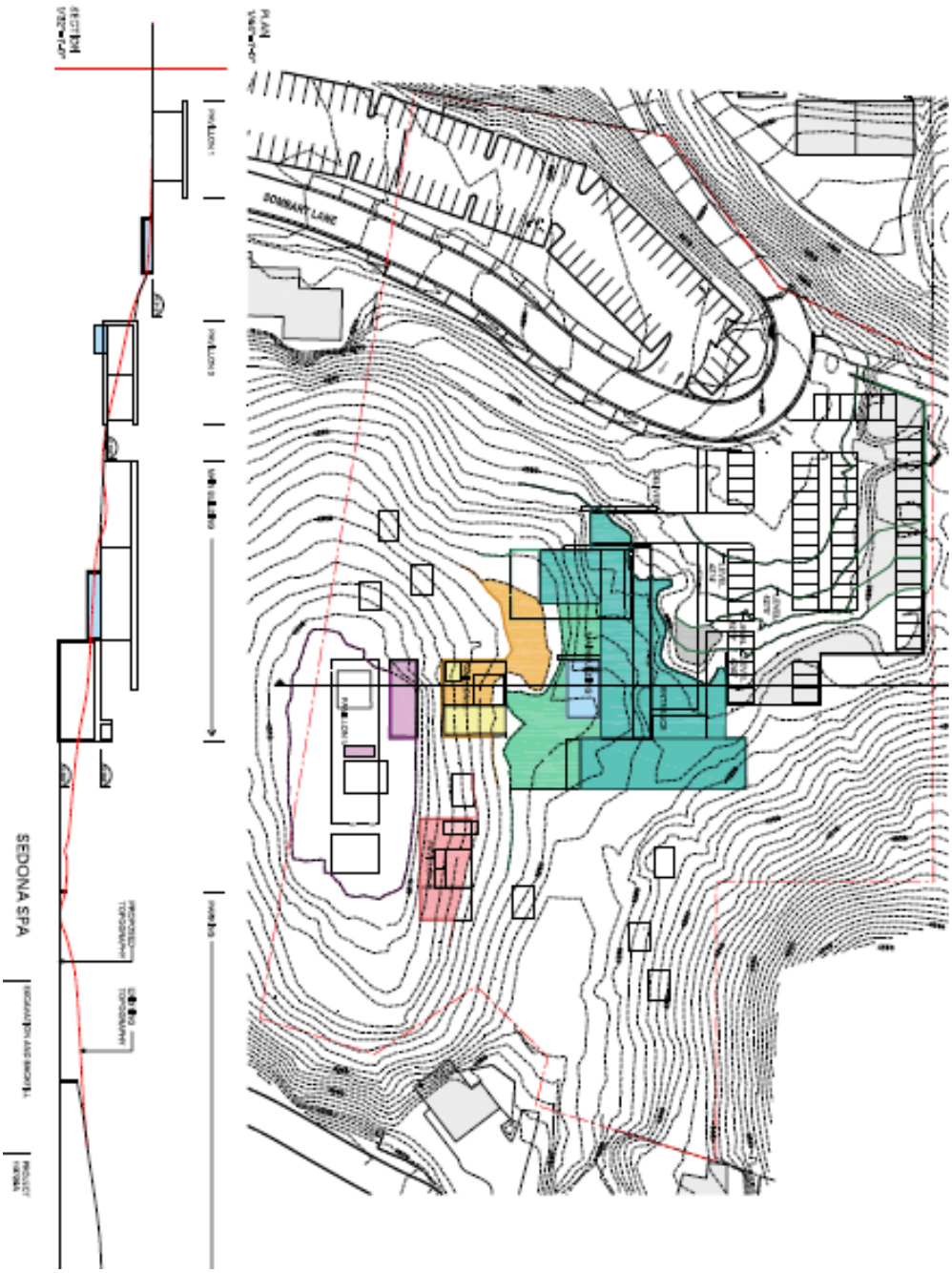
FIGURE 2

ACS SERVICES LLC

2235 W BROADWAY RD
MESA, ARIZONA 85202
(480) 968-0190
(480) 968-0156 FAX
WWW.ACSSERVICESLLC.COM

SITE PLAN & APPROXIMATE BORING LOCATIONS

Sedona Hotel Buildings
725 Highway 170
Sedona, AZ. 86336



NORTH
N.T.S.

PROJECT NUMBER: 2001203

FIGURE 3

ACS SERVICES LLC
2235 W BROADWAY RD
MESA, ARIZONA 85202
(480) 968-0190
(480) 968-0156 FAX
WWW.ACSSERVICESLLC.COM

TOPOGRAPHY AND SITE LAYOUT

Sedona Hotel Buildings
725 Highway 179
Sedona, AZ. 86336

APPENDIX B

ACS Services LLC

BORING B-1

For: Arabella Hotel Sedona
Project: Sedona Hotel Buildings
Location: 725 Highway 179
Sedona, AZ

Date: 3/31/2021 **Project No.** 2101203
Type of Boring: 6.625-inch HS Auger
Field Engineer: Christian Mayfield
Location: See Site Plan

Depth (Feet)	Blows per 6"	Moisture %	Dry Density (PCF)	USCS Soil Class	Note : Bulk sample obtained from 0.0 to 1.5 feet Description of Subsurface Conditions
1		2.1		GM	Red silty sandy GRAVEL, medium dense, slightly damp, PI of 1
2					Becomes very dense
3					
4					
5					
6					Terminated boring at a depth of 5.0 feet due to auger refusal on large cobbles and boulders - hard mudstone bedrock (Supai Formation)
7					
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17					

ACS Services LLC

BORING B-2

For: Arabella Hotel Sedona
Project: Sedona Hotel Buildings
Location: 725 Highway 179
Sedona, AZ

Date: 3/31/2021 **Project No.** 2101203
Type of Boring: 6.625-inch HS Auger
Field Engineer: Christian Mayfield
Location: See Site Plan

Note : Bulk sample obtained from 0.0 to 1.5 feet

Depth (Feet)	Blows per 6"	Moisture %	Dry Density (PCF)	USCS Soil Class	Description of Subsurface Conditions
1		12.4		GM	Red silty sandy GRAVEL, medium dense, damp, PI of 2
2					Terminated boring at a depth of 1.5 feet due to auger refusal on large cobbles and boulders - hard mudstone bedrock (Supai Formation)
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ACS Services LLC

TEST PIT TP-1

For: Arabella Hotel Sedona
Project: Sedona Hotel Buildings
Location: 725 Highway 179, Sedona, AZ

Date: 3/31/2021 **Project No.** 2101203
Type of Boring: Backhoe Test Pit
Field Engineer: Christian Mayfield
Location: See Site Plan

Note : Bulk sample obtained from 3.5 to 4.0 feet

Depth (Feet)	Blows per 6"	Moisture %	Dry Density (PCF)	USCS Soil Class	Description of Subsurface Conditions
1				ML	Red sandy gravelly SILT stiff, slightly damp, low to NP
2				GM	Red silty GRAVEL with sand and cobbles, dense, slightly damp, low PI (probable highly weathered Mudstone bedrock - Supai Formation)
3					
4		3.2		GM	Red silty GRAVEL with sand and cobbles, very dense, slightly damp, PI of 3
5					Terminated test pit at a depth of 4.0 feet due to backhoe refusal on large cobbles and boulders - hard mudstone bedrock (Supai Formation)
6					
7					
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14					
15					
16					
17					

ACS Services LLC

TEST PIT TP-2

For: Arabella Hotel Sedona
Project: Sedona Hotel Buildings
Location: 725 Highway 179
Sedona, AZ

Date: 3/31/2021 **Project No.** 2101203
Type of Boring: Backhoe Test Pit
Field Engineer: Christian Mayfield
Location: See Site Plan

Depth (Feet)	Blows per 6"	Moisture %	Dry Density (PCF)	USCS Soil Class	Note : Bulk sample obtained from 0.0 to 1.5 feet Description of Subsurface Conditions
1		6.0		GC-GM	Red clayey silty GRAVEL with cobbles, some sand, dense, damp, PI of 5 (probable highly weathered Mudstone bedrock - Supai Formation)
2					Terminated test pit at a depth of 1.5 feet due to backhoe refusal on large cobbles and boulders - hard mudstone bedrock (Supai Formation)
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ACS Services LLC

TEST PIT TP-3

For: Arabella Hotel Sedona
Project: Sedona Hotel Buildings
Location: 725 Highway 179, Sedona, AZ

Date: 3/31/2021 **Project No.** 2101203
Type of Boring: Backhoe Test Pit
Field Engineer: Christian Mayfield
Location: See Site Plan

Depth (Feet)	Blows per 6"	Moisture %	Dry Density (PCF)	USCS Soil Class	Note : Bulk sample obtained from 2.5 to 3.0 feet Description of Subsurface Conditions
1				GC-GM	Red clayey silty GRAVEL with cobbles, some sand, medium dense, damp, low PI
2					(probable highly weathered Mudstone bedrock - Supai Formation)
		4.9		GM	Red silty GRAVEL with cobbles, trace sand, dense, damp, PI of 2
3					Terminated test pit at a depth of 2.5 feet due to backhoe refusal on large cobbles and boulders - hard mudstone bedrock (Supai Formation)
4					
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ACS Services LLC

TEST PIT TP-4

For: Arabella Hotel Sedona
Project: Sedona Hotel Buildings
Location: 725 Highway 179
Sedona, AZ

Date: 3/31/2021 **Project No.** 2101203
Type of Boring: Backhoe Test Pit
Field Engineer: Christian Mayfield
Location: See Site Plan

Depth (Feet)	Blows per 6"	Moisture %	Dry Density (PCF)	USCS Soil Class	Note : Bulk sample obtained from 0.0 to 1.5 feet Description of Subsurface Conditions
1		6.4		GC-GM	Red clayey silty GRAVEL with sand and cobbles, medium dense, damp, PI of 5
2					
3					Terminated test pit at a depth of 2.0 feet due to backhoe refusal on hard mudstone bedrock (Supai Formation)
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ACS Services LLC

TEST PIT TP-5

For: Arabella Hotel Sedona
Project: Sedona Hotel Buildings
Location: 725 Highway 179
Sedona, AZ

Date: 3/31/2021 **Project No.** 2101203
Type of Boring: Backhoe Test Pit
Field Engineer: Christian Mayfield
Location: See Site Plan

Depth (Feet)	Blows per 6"	Moisture %	Dry Density (PCF)	USCS Soil Class	Note : Bulk sample obtained from 0.0 to 1.0 feet Description of Subsurface Conditions
1		5.1		GM	Red silty GRAVEL with sand and cobbles, medium dense, damp, PI of 2
2					Terminated test pit at a depth of 1.0 feet due to backhoe refusal on hard mudstone bedrock (Supai Formation)
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ACS Services LLC

TEST PIT TP-6

For: Arabella Hotel Sedona
Project: Sedona Hotel Buildings
Location: 725 Highway 179
Sedona, AZ

Date: 3/31/2021 **Project No.** 2101203
Type of Boring: Backhoe Test Pit
Field Engineer: Christian Mayfield
Location: See Site Plan

Depth (Feet)	Blows per 6"	Moisture %	Dry Density (PCF)	USCS Soil Class	Note : Bulk sample obtained from 0.0 to 1.0 feet Description of Subsurface Conditions
1		10.1		GC	Red clayey GRAVEL with sand and cobbles, medium dense, damp, PI of 10
2					Terminated test pit at a depth of 1.0 feet due to backhoe refusal on hard mudstone bedrock (Supai Formation)
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ACS Services LLC

TEST PIT TP-7

For: Arabella Hotel Sedona
Project: Sedona Hotel Buildings
Location: 725 Highway 179
Sedona, AZ

Date: 3/31/2021 **Project No.** 2101203
Type of Boring: Backhoe Test Pit
Field Engineer: Christian Mayfield
Location: See Site Plan

Depth (Feet)	Blows per 6"	Moisture %	Dry Density (PCF)	USCS Soil Class	Note : Bulk sample obtained from 0.0 to 1.0 feet Description of Subsurface Conditions
1		7.0		GC-GM	Red clayey silty sandy GRAVEL with cobbles, medium dense, damp, PI of 4
2					Terminated test pit at a depth of 1.0 feet due to backhoe refusal on hard mudstone bedrock (Supai Formation)
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ACS Services LLC

TEST PIT TP-8

For: Arabella Hotel Sedona
Project: Sedona Hotel Buildings
Location: 725 Highway 179, Sedona, AZ

Date: 3/31/2021 **Project No.** 2101203
Type of Boring: Backhoe Test Pit
Field Engineer: Christian Mayfield
Location: See Site Plan

Depth (Feet)	Blows per 6"	Moisture %	Dry Density (PCF)	USCS Soil Class	Note : Bulk sample obtained from 1.5 to 2.5 feet Description of Subsurface Conditions
1				GC-GM	Red clayey silty GRAVEL with cobbles, some sand, medium dense, damp, low PI
2		3.7		GC-GM	Red clayey silty GRAVEL with cobbles, some sand, dense, slightly damp, PI of 4 (highly weathered mudstone bedrock - Supai Formation)
3					Terminated test pit at a depth of 2.5 feet due to backhoe refusal on hard mudstone bedrock (Supai Formation)
4					
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ACS Services LLC

TEST PIT TP-9

For: Arabella Hotel Sedona
Project: Sedona Hotel Buildings
Location: 725 Highway 179, Sedona, AZ

Date: 3/31/2021 **Project No.** 2101203
Type of Boring: Backhoe Test Pit
Field Engineer: Christian Mayfield
Location: See Site Plan

Depth (Feet)	Blows per 6"	Moisture %	Dry Density (PCF)	USCS Soil Class	Note : Bulk sample obtained from 0.0 to 1.0 feet Description of Subsurface Conditions
1		21.3		GM	Red silty sandy GRAVEL with cobbles, loose, moist, NP
2				SC	Black layer of clayey sand with possible organics, high moisture content
3				GC-GM	Red clayey silty GRAVEL with cobbles, some sand, dense, slightly damp, low PI (highly weathered mudstone bedrock - Supai Formation)
4					Terminated test pit at a depth of 2.5 feet due to backhoe refusal on hard mudstone bedrock (Supai Formation)
5					
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ACS Services LLC

TEST PIT TP-10

For: Arabella Hotel Sedona
Project: Sedona Hotel Buildings
Location: 725 Highway 179
Sedona, AZ

Date: 3/31/2021 **Project No.** 2101203
Type of Boring: Backhoe Test Pit
Field Engineer: Christian Mayfield
Location: See Site Plan

Depth (Feet)	Blows per 6"	Moisture %	Dry Density (PCF)	USCS Soil Class	Note : Bulk sample obtained from 1.5 to 2.0 feet Description of Subsurface Conditions
1				GM	Red silty sandy GRAVEL with cobbles, medium dense, damp, low PI
2		3.9		GC-GM	Red clayey silty GRAVEL with cobbles, some sand, dense, slightly damp, PI of 5 (highly weathered mudstone bedrock - Supai Formation)
3					Terminated test pit at a depth of 2.0 feet due to backhoe refusal on hard mudstone bedrock (Supai Formation)
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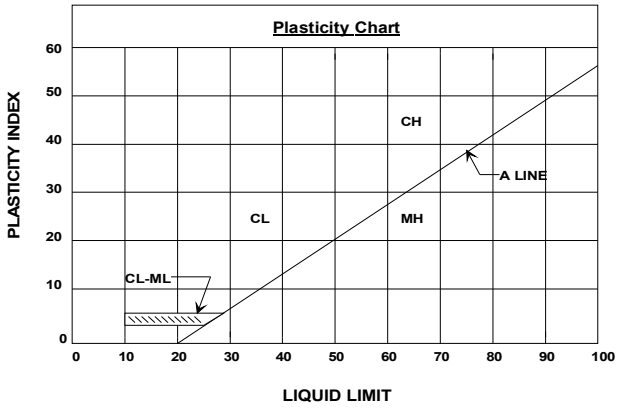
April 23, 2021
Project 2101203 – Sedona Hotel Buildings
725 Highway 179
Sedona, Arizona 86336

LEGEND

Major Divisions				Group Symbol	Typical Names
Coarse-Grained Soils (Less than 50% passes No. 200 sieve)	Gravels (50% or less or coarse fraction passes No. 4 sieve)	Clean Gravels (Less than 5% passes No. 200 sieve)		GW	Well graded gravels, gravel-sand mixtures, or sand-gravel-cobble mixtures.
				GP	Poorly graded gravels, gravel-sand mixtures, or sand-gravel-cobble mixtures.
		Gravels with Fines (More than 12% passes No. 200 sieve)	Limits plot below "A" line & hatched zone on Plasticity Chart.	GM	Silty gravels, gravel-sand-silt mixtures.
			Limits plots above "A" line & hatched zone on Plasticity Chart.	GC	Clayey gravels, gravel-sand-clay mixtures.
	Sands (More than 50% of coarse fraction passes No. 4 sieve)	Clean Sands (Less than 5% passes No. 200 sieve)		SW	Well graded sands, gravelly sands.
				SP	Poorly graded sands, gravelly sands.
		Sands with Fines (More than 12% passes No. 200 sieve)	Limits plots below "A" line & hatched zone on Plasticity Chart.	SM	Silty sands, sand-silt mixtures.
			Limits plots above "A" line & hatched zone on Plasticity Chart.	SC	Clayey sands, sand-clay mixtures.
Fine-Grained Soils (50% or more passes No. 200 sieve)	Silts-Plot below "A" line & hatched zone on Plasticity Chart	Silts of Low Plasticity (Liquid Limit Less Than 50)		ML	Inorganic silts, clayey silts with slight plasticity.
		Silts of High Plasticity (Liquid Limit More Than 50)		MH	Inorganic silts, micaceous or diatomaceous silty soils, elastic silts.
	Clays-Plot above "A" line & hatched zone on Plasticity Chart	Clays of Low Plasticity (Liquid Limit Less Than 50)		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
		Clays of High Plasticity (Liquid Limit More Than 50)		CH	Inorganic clays of high plasticity, fat clays, sandy clays of high plasticity.

Note: Coarse grained soils with between 5% & 12% passing the No. 200 sieve and fine grained soils with limits plotting in the hatched zone on the Plasticity Chart to have double symbol.



DEFINITIONS OF SOIL FRACTIONS

SOIL COMPONENT	PARTICLE SIZE RANGE
Cobbles	Above 3 in.
Gravel	3 in. to No. 4 sieve
Coarse gravel	3 in. to 3/4 in.
Fine gravel	3/4 in. to No. 4 sieve
Sand	No. 4 to No. 200
Coarse	No. 4 to No. 10
Medium	No. 10 to No. 40
Fine	No. 40 to No. 200
Fines (silt or clay)	Below No. 200 sieve

April 23, 2021
Project 2101203 – Sedona Hotel Buildings
725 Highway 179
Sedona, Arizona 86336

TEST DRILLING EQUIPMENT & PROCEDURES

Drilling Equipment

ACS SERVICES LLC uses a CME-45 drill-rig capable of auger drilling to depths of 50 feet in southwestern soils. The drill is truck-mounted for rapid, low cost mobilization to the jobsite and on the jobsite. Drilling through soil or softer rock is performed with 6.625 inch O.D. hollow-stem auger. Carbide insert teeth are normally used on the auger bits so they can often penetrate rock or very strongly cemented soils that require blasting or very heavy equipment for excavation. The operation of well-maintained equipment by an experienced crew allows **ACS SERVICES LLC** to complete drilling jobs to a depth of 50 feet with minimum downtime and maximum efficiency.

Sampling Procedures

Dynamically driven tube samples are usually obtained at selected intervals in the borings by the ASTM D1586 procedure. In many cases, 2 inch O.D., $1^3/_8$-inch I.D. samplers are used to obtain the standard penetration resistance. Undisturbed" samples of firmer soils are often obtained with 3 inch O.D. samplers lined with 2.42 inch I.D. brass rings. The driving energy is generally recorded as a number of blows of a 140-pound hammer, utilizing a 30-inch free fall drop, per six inches of penetration. However, in stratified soils, driving resistance is sometimes recorded in 2 or 3-inch increments so that soil changes and the presence of scattered gravel or cemented layers can be readily detected and the realistic penetration values obtained for consideration in design. These values are expressed in blows per six inches on the logs. Undisturbed sampling of softer soils is sometimes performed with thin-walled Shelby tubes (ASTM D1587). Tube samples are labeled and placed in watertight containers to maintain field moisture contents for testing from auger cuttings.

Continuous Penetration Tests

Continuous penetration tests are performed by driving a 2-inch O.D. bullnose penetrometer adjacent to or in the bottom of test borings. The penetrometer is attached to $1^5/_8$-inch O.D. drill rods to provide clearance and thus minimize side friction so that penetration values are as nearly as possible a measure of end resistance. Penetration values are recorded as the number of blows of a 140 pound hammer, utilizing a 30 inch drop required to advance the penetrometer in six-inch increments or less.

Boring Records

Drilling operations are directed by our field engineer or geologist who examines soil recovery and prepares boring logs. Soils are visually classified in accordance with the Unified Soil Classification System (ASTM D2487) with appropriate group symbols being shown on the logs.

APPENDIX C

ACS Services LLC

Laboratory Soil Test Results

ACS PROJECT #	2101203	Material Type:	Native
ACS Lab #	21-2104-1	Supplier:	
Client:	Arabella Hotel Sedona	Sample Date:	3/31/2021
Project Name:	Sedona Hotel Buildings	Sampled By:	Christian Mayfield
Project Address:	725 Highway 179	Test Date:	4/16/2021
Project City	Sedona, AZ	Tested By:	Fernando Montero
Sample Location:	B - 1 @ 0.0'-1.5'	Reviewed By:	Gene Hansen

Sieve Analysis (ASTM C-139 / AASHTO T-27)

Sieve Size	% Retained	% Passed	Specs
6"	0	100	
3"	0	100	
2 1/2"	0	100	
2"	21	79	
1 1/2"	1	78	
1"	5	72	
3/4"	6	67	
1/2"	9	57	
3/8"	5	53	
1/4"	6	47	
#4	3	44	
#8	4	40	
#10	2	38	
#16	4	35	
#30	3	31	
#40	1	30	
#50	1	29	
#100	3	26	
#200	4	22.2	

Liquid Limit (AASHTO T-89)	18
Plastic Limit (AASHTO T-90)	17
Plasticity Index (AASHTO T-90)	1
Moisture Content (AASHTO T-255)	2.1
Fractured Faces (ARIZ 212)	
Soluble Salts (ARIZ 237)	
USCS Soil Classification	GM

Gene Hansen
Project Manager

Gene Hansen
Signature

ACS Services LLC

Laboratory Soil Test Results

ACS PROJECT #	2101203	Material Type:	Native
ACS Lab #	21-2104-3	Supplier:	
Client:	Arabella Hotel Sedona	Sample Date:	3/31/2021
Project Name:	Sedona Hotel Buildings	Sampled By:	Christian Mayfield
Project Address:	725 Highway 179	Test Date:	4/16/2021
Project City	Sedona, AZ	Tested By:	Fernando Montero
Sample Location:	B - 2 @ 0.0'-1.5'	Reviewed By:	Gene Hansen

Sieve Analysis (ASTM C-139 / AASHTO T-27)

Sieve Size	% Retained	% Passed	Specs
6"	0	100	
3"	0	100	
2 1/2"	0	100	
2"	0	100	
1 1/2"	10	90	
1"	8	82	
3/4"	4	79	
1/2"	6	73	
3/8"	4	69	
1/4"	8	61	
#4	4	57	
#8	6	52	
#10	1	50	
#16	3	47	
#30	3	44	
#40	1	43	
#50	1	42	
#100	2	40	
#200	5	34.9	

Liquid Limit (AASHTO T-89)	22
Plastic Limit (AASHTO T-90)	20
Plasticity Index (AASHTO T-90)	2
Moisture Content (AASHTO T-255)	12.4
Fractured Faces (ARIZ 212)	
Soluble Salts (ARIZ 237)	
USCS Soil Classification	GM

Gene Hansen
Project Manager

Gene Hansen
Signature

ACS Services LLC

Laboratory Soil Test Results

ACS PROJECT #	2101203	Material Type:	Native
ACS Lab #	21-2104-4	Supplier:	
Client:	Arabella Hotel Sedona	Sample Date:	3/31/2021
Project Name:	Sedona Hotel Buildings	Sampled By:	Christian Mayfield
Project Address:	725 Highway 179	Test Date:	4/16/2021
Project City	Sedona, AZ	Tested By:	Fernando Montero
Sample Location:	TP - 1 @ 3.5'-4.0'	Reviewed By:	Gene Hansen

Sieve Analysis (ASTM C-139 / AASHTO T-27)

Sieve Size	% Retained	% Passed	Specs
6"	0	100	
3"	0	100	
2 1/2"	0	100	
2"	8	92	
1 1/2"	1	91	
1"	9	82	
3/4"	8	74	
1/2"	12	62	
3/8"	7	55	
1/4"	9	46	
#4	4	42	
#8	2	40	
#10	0	40	
#16	1	39	
#30	1	37	
#40	1	36	
#50	1	36	
#100	2	34	
#200	5	28.4	

Liquid Limit (AASHTO T-89)	23
Plastic Limit (AASHTO T-90)	20
Plasticity Index (AASHTO T-90)	3
Moisture Content (AASHTO T-255)	3.2
Fractured Faces (ARIZ 212)	
Soluble Salts (ARIZ 237)	
USCS Soil Classification	GM

Gene Hansen
Project Manager

Gene Hansen
Signature

ACS Services LLC

Laboratory Soil Test Results

ACS PROJECT #	2101203	Material Type:	Native
ACS Lab #	21-2104-5	Supplier:	
Client:	Arabella Hotel Sedona	Sample Date:	3/31/2021
Project Name:	Sedona Hotel Buildings	Sampled By:	Christian Mayfield
Project Address:	725 Highway 179	Test Date:	4/16/2021
Project City	Sedona, AZ	Tested By:	Fernando Montero
Sample Location:	TP - 2 @ 0.0'-1.5'	Reviewed By:	Gene Hansen

Sieve Analysis (ASTM C-139 / AASHTO T-27)

Sieve Size	% Retained	% Passed	Specs
6"	0	100	
3"	8	92	
2 1/2"	0	92	
2"	7	85	
1 1/2"	6	79	
1"	8	72	
3/4"	6	65	
1/2"	10	55	
3/8"	4	51	
1/4"	6	45	
#4	2	43	
#8	3	40	
#10	0	40	
#16	1	39	
#30	1	38	
#40	0	37	
#50	0	37	
#100	1	36	
#200	3	33.2	

Liquid Limit (AASHTO T-89)	25
Plastic Limit (AASHTO T-90)	20
Plasticity Index (AASHTO T-90)	5
Moisture Content (AASHTO T-255)	6.0
Fractured Faces (ARIZ 212)	
Soluble Salts (ARIZ 237)	
USCS Soil Classification	GC-GM

Gene Hansen
Project Manager

Gene Hansen
Signature

ACS Services LLC

Laboratory Soil Test Results

ACS PROJECT #	2101203	Material Type:	Native
ACS Lab #	21-2104-6	Supplier:	
Client:	Arabella Hotel Sedona	Sample Date:	3/31/2021
Project Name:	Sedona Hotel Buildings	Sampled By:	Christian Mayfield
Project Address:	725 Highway 179	Test Date:	4/20/2021
Project City	Sedona, AZ	Tested By:	Fernando Montero
Sample Location:	TP - 3 @ 2.5'-3.0'	Reviewed By:	Gene Hansen

Sieve Analysis (ASTM C-139 / AASHTO T-27)

Sieve Size	% Retained	% Passed	Specs
6"	0	100	
3"	0	100	
2 1/2"	0	100	
2"	9	91	
1 1/2"	4	88	
1"	10	78	
3/4"	7	71	
1/2"	10	61	
3/8"	5	56	
1/4"	7	49	
#4	3	46	
#8	1	45	
#10	0	45	
#16	1	44	
#30	1	43	
#40	0	43	
#50	0	42	
#100	1	41	
#200	2	39.1	

Liquid Limit (AASHTO T-89)	28
Plastic Limit (AASHTO T-90)	26
Plasticity Index (AASHTO T-90)	2
Moisture Content (AASHTO T-255)	4.6
Fractured Faces (ARIZ 212)	
Soluble Salts (ARIZ 237)	
USCS Soil Classification	GM

Gene Hansen
Project Manager

Gene Hansen
Signature

ACS Services LLC

Laboratory Soil Test Results

ACS PROJECT #	2101203	Material Type:	Native
ACS Lab #	21-2104-7	Supplier:	
Client:	Arabella Hotel Sedona	Sample Date:	3/31/2021
Project Name:	Sedona Hotel Buildings	Sampled By:	Christian Mayfield
Project Address:	725 Highway 179	Test Date:	4/20/2021
Project City	Sedona, AZ	Tested By:	Fernando Montero
Sample Location:	TP - 4 @ 0.0'-1.5'	Reviewed By:	Gene Hansen

Sieve Analysis (ASTM C-139 / AASHTO T-27)

Sieve Size	% Retained	% Passed	Specs
6"	0	100	
3"	0	100	
2 1/2"	0	100	
2"	6	94	
1 1/2"	3	90	
1"	3	88	
3/4"	4	84	
1/2"	11	73	
3/8"	9	64	
1/4"	13	51	
#4	5	46	
#8	2	44	
#10	0	44	
#16	1	42	
#30	2	40	
#40	1	40	
#50	1	39	
#100	2	37	
#200	5	31.8	

Liquid Limit (AASHTO T-89)	24
Plastic Limit (AASHTO T-90)	19
Plasticity Index (AASHTO T-90)	5
Moisture Content (AASHTO T-255)	6.4
Fractured Faces (ARIZ 212)	
Soluble Salts (ARIZ 237)	
USCS Soil Classification	GC-GM

Gene Hansen
Project Manager

Gene Hansen
Signature

ACS Services LLC

Laboratory Soil Test Results

ACS PROJECT #	2101203	Material Type:	Native
ACS Lab #	21-2104-8	Supplier:	
Client:	Arabella Hotel Sedona	Sample Date:	3/31/2021
Project Name:	Sedona Hotel Buildings	Sampled By:	Christian Mayfield
Project Address:	725 Highway 179	Test Date:	4/20/2021
Project City	Sedona, AZ	Tested By:	Fernando Montero
Sample Location:	TP - 5 @ 0.0'-1.0'	Reviewed By:	Gene Hansen

Sieve Analysis (ASTM C-139 / AASHTO T-27)

Sieve Size	% Retained	% Passed	Specs
6"	0	100	
3"	0	100	
2 1/2"	0	100	
2"	5	95	
1 1/2"	9	85	
1"	12	73	
3/4"	10	63	
1/2"	13	51	
3/8"	5	45	
1/4"	7	38	
#4	10	28	
#8	3	24	
#10	1	24	
#16	2	22	
#30	2	20	
#40	1	19	
#50	1	19	
#100	2	16	
#200	3	13.0	

Liquid Limit (AASHTO T-89)	23
Plastic Limit (AASHTO T-90)	21
Plasticity Index (AASHTO T-90)	2
Moisture Content (AASHTO T-255)	5.1
Fractured Faces (ARIZ 212)	
Soluble Salts (ARIZ 237)	
USCS Soil Classification	GM

Gene Hansen
Project Manager

Gene Hansen
Signature

ACS Services LLC

Laboratory Soil Test Results

ACS PROJECT #	2101203	Material Type:	Native
ACS Lab #	21-2104-9	Supplier:	
Client:	Arabella Hotel Sedona	Sample Date:	3/31/2021
Project Name:	Sedona Hotel Buildings	Sampled By:	Christian Mayfield
Project Address:	725 Highway 179	Test Date:	4/20/2021
Project City	Sedona, AZ	Tested By:	Fernando Montero
Sample Location:	TP - 6 @ 0.0'-1.0'	Reviewed By:	Gene Hansen

Sieve Analysis (ASTM C-139 / AASHTO T-27)

Sieve Size	% Retained	% Passed	Specs
6"	0	100	
3"	0	100	
2 1/2"	0	100	
2"	21	79	
1 1/2"	3	77	
1"	8	69	
3/4"	6	63	
1/2"	7	56	
3/8"	3	52	
1/4"	5	47	
#4	2	45	
#8	2	42	
#10	1	42	
#16	2	40	
#30	2	39	
#40	1	38	
#50	1	36	
#100	3	33	
#200	6	26.9	

Liquid Limit (AASHTO T-89)	28
Plastic Limit (AASHTO T-90)	18
Plasticity Index (AASHTO T-90)	10
Moisture Content (AASHTO T-255)	10.3
Fractured Faces (ARIZ 212)	
Soluble Salts (ARIZ 237)	
USCS Soil Classification	GC

Gene Hansen
Project Manager

Gene Hansen
Signature

ACS Services LLC

Laboratory Soil Test Results

ACS PROJECT #	2101203	Material Type:	Native
ACS Lab #	21-2104-10	Supplier:	
Client:	Arabella Hotel Sedona	Sample Date:	3/31/2021
Project Name:	Sedona Hotel Buildings	Sampled By:	Christian Mayfield
Project Address:	725 Highway 179	Test Date:	4/20/2021
Project City	Sedona, AZ	Tested By:	Fernando Montero
Sample Location:	TP - 7 @ 0.0'-1.0'	Reviewed By:	Gene Hansen

Sieve Analysis (ASTM C-139 / AASHTO T-27)

Sieve Size	% Retained	% Passed	Specs
6"	0	100	
3"	0	100	
2 1/2"	0	100	
2"	3	97	
1 1/2"	1	96	
1"	7	89	
3/4"	5	84	
1/2"	9	75	
3/8"	4	71	
1/4"	6	65	
#4	3	62	
#8	2	60	
#10	1	59	
#16	2	57	
#30	2	55	
#40	1	55	
#50	1	54	
#100	4	49	
#200	9	40.6	

Liquid Limit (AASHTO T-89)	22
Plastic Limit (AASHTO T-90)	18
Plasticity Index (AASHTO T-90)	4
Moisture Content (AASHTO T-255)	7.0
Fractured Faces (ARIZ 212)	
Soluble Salts (ARIZ 237)	
USCS Soil Classification	GC-GM

Gene Hansen
Project Manager

Gene Hansen
Signature

ACS Services LLC

Laboratory Soil Test Results

ACS PROJECT #	2101203	Material Type:	Native
ACS Lab #	21-2104-11	Supplier:	
Client:	Arabella Hotel Sedona	Sample Date:	3/31/2021
Project Name:	Sedona Hotel Buildings	Sampled By:	Christian Mayfield
Project Address:	725 Highway 179	Test Date:	4/20/2021
Project City	Sedona, AZ	Tested By:	Fernando Montero
Sample Location:	TP - 8 @ 1.5'-2.5'	Reviewed By:	Gene Hansen

Sieve Analysis (ASTM C-139 / AASHTO T-27)

Sieve Size	% Retained	% Passed	Specs
6"	0	100	
3"	0	100	
2 1/2"	0	100	
2"	14	86	
1 1/2"	9	77	
1"	10	67	
3/4"	7	60	
1/2"	10	50	
3/8"	5	45	
1/4"	7	38	
#4	3	35	
#8	2	34	
#10	0	33	
#16	1	32	
#30	1	31	
#40	0	31	
#50	1	30	
#100	2	28	
#200	4	24.2	

Liquid Limit (AASHTO T-89)	23
Plastic Limit (AASHTO T-90)	19
Plasticity Index (AASHTO T-90)	4
Moisture Content (AASHTO T-255)	3.7
Fractured Faces (ARIZ 212)	
Soluble Salts (ARIZ 237)	
USCS Soil Classification	GC-GM

Gene Hansen
Project Manager

Gene Hansen
Signature

ACS Services LLC

Laboratory Soil Test Results

ACS PROJECT #	2101203	Material Type:	Native
ACS Lab #	21-2104-12	Supplier:	
Client:	Arabella Hotel Sedona	Sample Date:	3/31/2021
Project Name:	Sedona Hotel Buildings	Sampled By:	Christian Mayfield
Project Address:	725 Highway 179	Test Date:	4/19/2021
Project City	Sedona, AZ	Tested By:	Fernando Montero
Sample Location:	TP - 9 @ 0.0'-1.5'	Reviewed By:	Gene Hansen

Sieve Analysis (ASTM C-139 / AASHTO T-27)

Sieve Size	% Retained	% Passed	Specs
6"	0	100	
3"	0	100	
2 1/2"	0	100	
2"	9	91	
1 1/2"	2	89	
1"	4	85	
3/4"	3	82	
1/2"	5	77	
3/8"	3	74	
1/4"	5	69	
#4	3	66	
#8	2	64	
#10	1	63	
#16	3	60	
#30	5	56	
#40	2	53	
#50	2	51	
#100	5	46	
#200	8	37.7	

Liquid Limit (AASHTO T-89)	
Plastic Limit (AASHTO T-90)	
Plasticity Index (AASHTO T-90)	NP
Moisture Content (AASHTO T-255)	21.3
Fractured Faces (ARIZ 212)	
Soluble Salts (ARIZ 237)	
USCS Soil Classification	GM

Gene Hansen
Project Manager

Gene Hansen
Signature

ACS Services LLC

Laboratory Soil Test Results

ACS PROJECT #	2101203	Material Type:	Native
ACS Lab #	21-2104-13	Supplier:	
Client:	Arabella Hotel Sedona	Sample Date:	3/31/2021
Project Name:	Sedona Hotel Buildings	Sampled By:	Christian Mayfield
Project Address:	725 Highway 179	Test Date:	4/19/2021
Project City	Sedona, AZ	Tested By:	Fernando Montero
Sample Location:	TP - 10 @ 1.5'-2.0'	Reviewed By:	Gene Hansen

Sieve Analysis (ASTM C-139 / AASHTO T-27)

Sieve Size	% Retained	% Passed	Specs
6"	0	100	
3"	0	100	
2 1/2"	0	100	
2"	6	94	
1 1/2"	5	89	
1"	5	85	
3/4"	7	77	
1/2"	32	45	
3/8"	3	42	
1/4"	8	34	
#4	4	31	
#8	1	29	
#10	0	29	
#16	1	28	
#30	1	27	
#40	1	26	
#50	1	26	
#100	1	24	
#200	4	21.0	

Liquid Limit (AASHTO T-89)	22
Plastic Limit (AASHTO T-90)	17
Plasticity Index (AASHTO T-90)	5
Moisture Content (AASHTO T-255)	3.9
Fractured Faces (ARIZ 212)	
Soluble Salts (ARIZ 237)	
USCS Soil Classification	GC-GM

Gene Hansen
Project Manager

Gene Hansen
Signature

ACS Services LLC

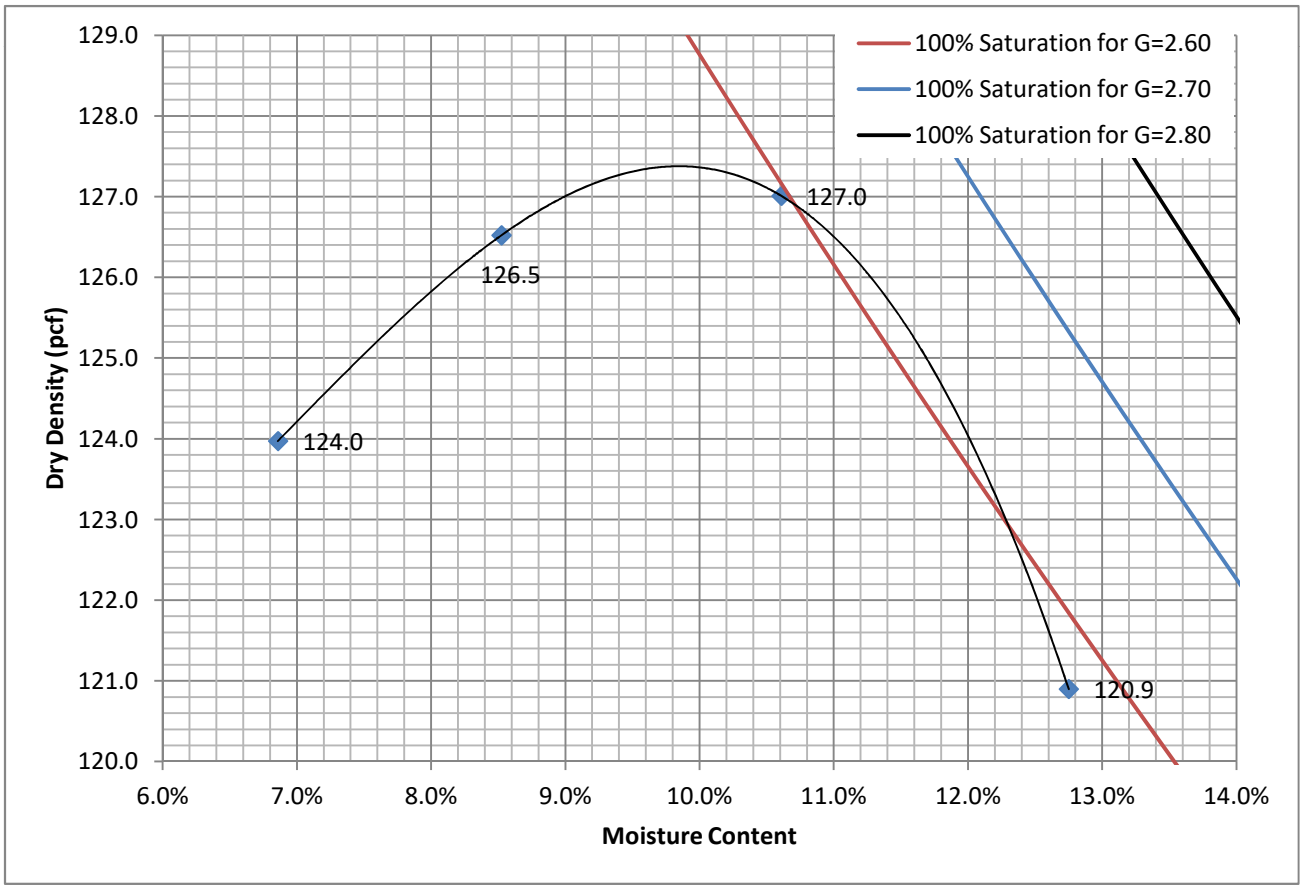
Maximum Dry Density & Optimum Moisture

☐ AASHTO T-99 | ☐ AASHTO T-180 | ☑ ASTM D-698 | ☐ ASTM D-1557

ACS Project #	2101203	Material Type:	Native
ACS Lab #	21-2104-1	Material Supplier:	-
Client Name:	Arabella Hotel Sedona	Sample Date:	3/31/2021
Project Name:	Sedona Hotel Buidlings	Sampled By:	Christian Mayfield
Project Address:	725 Highway 179	Date Tested:	4/19/2021
Project City:	Sedona, AZ	Tested By:	Brett Rotenberger
		Reviewed By:	Gene Hansen
Sample Location:	B-1 @ 0.0'-1.5'	Method:	☑ A ☐ B ☐ C ☐ D

Dry Density	124.0	126.5	127.0	120.9
Moisture Content	6.9%	8.5%	10.6%	12.8%

Uncorrected Dry Density	127.4	Uncorrected Moisture Content	9.8
% Rock	49	% Passing	51
Rock Corrected Dry Density	**143.7**	Rock Corrected Moisture Content	**5.9**
Specific Gravity of Oversize Aggregate	**2.650**		



Gene Hansen

Project Manager

ACS Services LLC

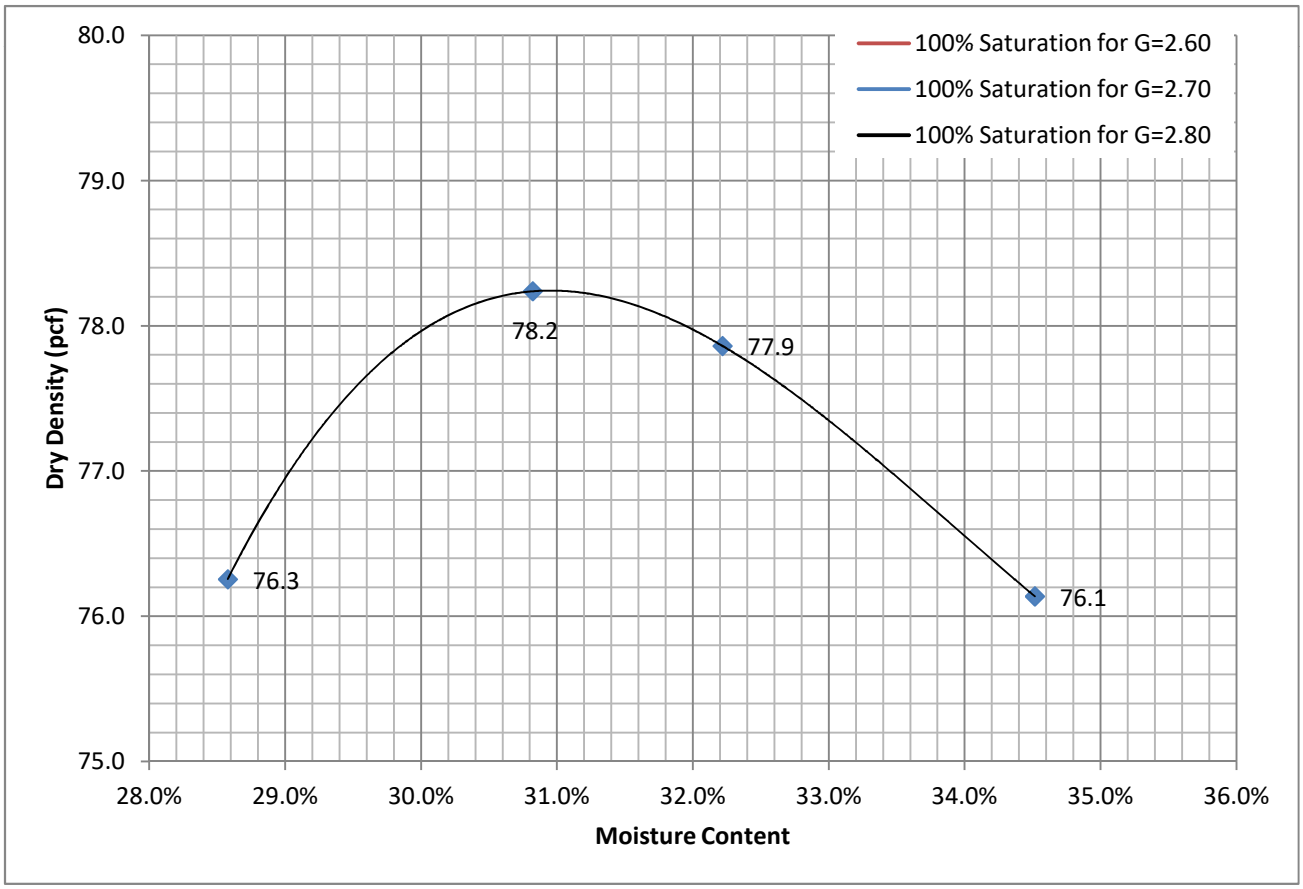
Maximum Dry Density & Optimum Moisture

☐ AASHTO T-99 | ☐ AASHTO T-180 | ☑ ASTM D-698 | ☐ ASTM D-1557

ACS Project #	2101203	Material Type:	Native
ACS Lab #	21-2104-12	Material Supplier:	-
Client Name:	Arabella Hotel Sedona	Sample Date:	3/31/2021
Project Name:	Sedona Hotel Buidlings	Sampled By:	Christian Mayfield
Project Address:	725 Highway 179	Date Tested:	4/13/2021
Project City:	Sedona, AZ	Tested By:	Brett Rotenberger
		Reviewed By:	Jill Bryant
Sample Location:	TP-9 @ 0.0'-1.5'	Method:	☑ A ☐ B ☐ C ☐ D

Dry Density	76.3	78.2	77.9	76.1
Moisture Content	28.6%	30.8%	32.2%	34.5%

Uncorrected Dry Density	78.3	Uncorrected Moisture Content	30.9
% Rock	37	% Passing	63
Rock Corrected Dry Density	**97.1**	Rock Corrected Moisture Content	**20.3**
Specific Gravity of Oversize Aggregate	**2.650**		



Gene Hansen

Project Manager

APPENDIX D

April 23, 2021
Project 2101203 – Sedona Hotel Buildings
725 Highway 179
Sedona, Arizona 86336

Photo 1 – Excavated Test Pit 1. Test Pit 1 was terminated at a depth of 4.0 feet due to backhoe refusal on hard mudstone bedrock. The soils encountered to a depth of 1.5 feet consist of red sandy gravelly silt, stiff, slightly damp, low PI. From 1.5 to 4.0 feet, the soils became lighter in color and dense, probable highly weathered mudstone bedrock.

Photo 2 – View of material excavated from Test Pit 1 over the depth range of 0.0 to 4.0 feet.

Photo 3 – Excavated Test Pit 2. Test Pit 2 was terminated at a depth of 1.5 feet due to backhoe refusal on hard mudstone bedrock – Supai Formation. . The upper 1.5 feet of red clayey silty gravel with cobbles, some sand is dense, probable highly weathered mudstone bedrock.

Photo 4 – View of material excavated from Test Pit 2 over the depth range of 0.0 to 1.5 feet, which appears to be primarily excavated mudstone bedrock.

Photo 5 – Excavated Test Pit 3. Test Pit 3 was terminated at a depth of 2.5 feet due to backhoe refusal on hard mudstone bedrock. The soils encountered to a depth of 1.0 feet consist of red clayey silty gravel with cobbles, some sand, medium dense, damp, low PI. From 1.0 to 2.5 feet, the soils became lighter in color and dense, probable highly weathered mudstone bedrock.

Photo 6 – View of material excavated from Test Pit 3 over the depth range of 0.0 to 2.5 feet, which appears to be primarily excavated mudstone bedrock.

Photo 7 – Excavated Test Pit 4. Test Pit 4 was terminated at a depth of 2.0 feet due to backhoe refusal on hard mudstone bedrick – Supai Formation. . The upper 2.0 feet of red clayey silty gravel with sand and cobbles are medium dense, damp, PI of 5.

Photo 8 – View of material excavated from Test Pit 4 over the depth range of 0.0 to 2.0 feet, which appears to primarily native soils over the mudstone bedrock.

Photo 9 – Excavated Test Pit 5. Test Pit 5 was terminated at a depth of 1.0 feet due to backhoe refusal on hard mudstone bedrock – Supai Formation. . The upper 1.0 feet of red silty gravel with sand and cobbles is medium dense, damp, PI of 2 .

Photo 10 – View of material excavated from Test Pit 5 over the depth range of 0.0 to 1.0 feet, which appears to be primarily native soil and mudstone bedrock. Fragments of excavated mudstone bedrock can be seen in the

Photo 11 – Excavated Test Pit 6. Test Pit 6 was terminated at a depth of 1.0 feet due to backhoe refusal on hard mudstone bedrick – Supai Formation. . The upper 1.0 feet of red clayey gravel with sand and cobbles is medium dense, damp, PI of 10.

Photo 12 – View of material excavated from Test Pit 6 over the depth range of 0.0 to 1.0 feet, which appears to be primarily excavated mudstone bedrock.

Photo 13 – Excavated Test Pit 7. Test Pit 7 was terminated at a depth of 1.0 feet due to backhoe refusal on hard mudstone bedrock – Supai Formation. . The upper 1.0 feet of red clayey silty sandy gravel with cobbles is medium dense, damp, PI of 4.

Photo 14 – View of material excavated from Test Pit 7 over the depth range of 0.0 to 1.0 feet, which appears to be primarily excavated native soil over the mudstone bedrock.

Photo 15 – Excavated Test Pit 8. Test Pit 8 was terminated at a depth of 2.5 feet due to backhoe refusal on hard mudstone bedrock. The soils encountered to a depth of 1.5 feet consist of red clayey silty gravel with cobbles, some sand, medium dense, damp, low PI. From 1.5 to 2.5 feet, the soils became lighter in color and dense, probable highly weathered mudstone bedrock.

Photo 16 – View of material excavated from Test Pit 8 over the depth range of 0.0 to2.5 feet, which appears to be primarily excavated native soils and mudstone bedrock.

Photo 17 – Excavated Test Pit 9. Test Pit 9 was terminated at a depth of 2.5 feet due to backhoe refusal on hard mudstone bedrick – Supai Formation. . The upper 1.0 feet of red silty sandy gravel with cobbles is loose, moist, NP. A black layer of clayey sand with possible organics was encountered from 1.0 to 1.5 feet. Below 1.5 feet the soils became lighter in color, dense, and slightly damp, probable highly weathered mudstone bedrock.

Photo 18 – View of material excavated from Test Pit 9 over the depth range of 0.0 to 2.5 feet.

Photo 19 – Excavated Test Pit 10. Test Pit 10 was terminated at a depth of 2.0 feet due to backhoe refusal on hard mudstone bedrock. The red soils encountered to a depth of 1.0 feet consist of red silty sandy gravel with cobbles, medium dense, damp, low PI. From 1.0 to 2.0 feet, the soils became lighter in color, clayey silty gravel with cobbles, some sand, dense, slightly damp, PI of 5, probable highly weathered mudstone bedrock.

Photo 20 – View of material excavated from Test Pit 10 over the depth range of 0.0 to 2.0 feet.