GSH

REPORT
GEOTECHNICAL STUDY
PROPOSED AMERICA FIRST CREDIT UNION
SOUTHEAST CORNER OF CEDAR HILLS DRIVE
AND 4800 WEST STREET
CEDAR HILLS, UTAH

Submitted To:

America First Credit Union
4646 South 1500 West, Suite 110
Riverdale, Utah 84405

Submitted By:

GSH Geotechnical, Inc.
473 West 4800 South
Salt Lake City, Utah 84123

January 24, 2014

Job No. 1242-013-14

GSH

January 24, 2014
Job No. 1242-013-14

Mr. Casey Shaw
America First Credit Union
4646 South 1500 West, Suite 110
Riverdale, Utah 84405

Mr. Shaw

Re: Report
Geotechnical Study
Proposed America First Credit Union
Southeast Corner of Cedar Hills Drive and 4800 West Street
Cedar Hills, Utah
(40.4149 N, -111.7728 W)

1. INTRODUCTION

1.1 GENERAL

This report presents the results of our geotechnical study performed at the site of the proposed America First Credit Union (AFCU) located at the southeast corner of Cedar Hills Drive and 4800 West Street in Cedar Hills, Utah. The general location of the site with respect to major topographic features and existing facilities, as of 1994 and 1998, is presented on Figure 1, Vicinity Map. A more detailed layout of the site showing existing roadways and proposed facilities is presented on Figure 2, Site Plan. The locations of the 11 borings drilled in conjunction with this study are also presented on Figure 2.

1.2 OBJECTIVES AND SCOPE

The objectives and scope of the study were planned in discussions between Mr. Casey Shaw of America First Credit Union, Mr. Jeff Randall of Anderson Wahlen and Associates, and Mr. Mike Huber of GSH Geotechnical, Inc. (GSH).

In general, the objectives of this study were to:

1. Define and evaluate the subsurface soil and groundwater conditions at the site.

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2. Provide appropriate foundation, earthwork, pavement and geoseismic recommendations to be utilized in the design and construction of the proposed development

In accomplishing these objectives, our scope has included the following:

1. A field program consisting of the excavating, logging, and sampling of 8 exploration borings extending to depths of 5 to 16 feet below existing grade.

2. A laboratory testing program.

3. An office program consisting of correlation of available data, engineering analyses, and the preparation of this summary report.

1.3 AUTHORIZATION

Authorization was provided by returning a signed copy of our Proposal No. 14-0130rev1 dated January 17, 2014.

1.4 PROFESSIONAL STATEMENTS

Supporting data upon which our recommendations are based are presented in subsequent sections of this report. Recommendations presented herein are governed by the physical properties of the soils encountered in the exploration borings, projected groundwater conditions, and the layout and design data discussed in Section 2, Proposed Construction, of this report. If subsurface conditions other than those described in this report are encountered and/or if design and layout changes are implemented, GSH must be informed so that our recommendations can be reviewed and amended, if necessary.

Our professional services have been performed, our findings developed, and our recommendations prepared in accordance with generally accepted engineering principles and practices in this area at this time.

2. PROPOSED CONSTRUCTION

Three 1-level structures are planned for the approximately 2-acre parcel. The AFCU structure will have a footprint of 5,165 square feet with adjoining canopy-covered "drive-thru" lanes and will cover the western half of the parcel. Two commercial structures with footprints of 4,400 and 8,800 square feet will be constructed on the eastern half of the lot. All 3 structures are anticipated to be of light steel-frame and masonry construction. The at-grade floor slabs are projected to be established an estimated 1 to 2 feet above the existing ground surface to facilitate drainage.

Structural loads will be transmitted down through columns and bearing walls to the supporting foundations. Maximum column and wall loads are anticipated to be on the order of 20 to 40 kips and 2 to 4 kips per lineal foot, respectively. We project that the floor slab loads will be light (less than an average uniform load of 200 pounds per square foot). Traffic in the parking areas will consist of a light volume of automobiles and light trucks and occasional medium-weight trucks. In primary roadway areas, we project that the traffic will consist of a moderate volume of automobiles and light trucks and occasional medium- to heavy-weight trucks.

Maximum site grading cuts and fills are anticipated to be less than 2 to 3 feet.

3. SITE INVESTIGATIONS

3.1 FIELD PROGRAM

In order to define and evaluate the subsurface soil and groundwater conditions at the site, 11 borings were drilled to depths of 5 to 16 feet below existing grade. The borings were drilled using a truck-mounted drill rig and hollow-stem augers. Locations of the borings are presented on Figure 2.

The field portion of our study was under the direct control and continual supervision of an experienced member of our geotechnical staff. During the course of the drilling operations, a log of the subsurface conditions encountered was maintained. In addition, samples of the typical soils encountered were obtained for subsequent laboratory testing and examination. The soils were classified in the field based upon visual and textural examination. These classifications have been supplemented by subsequent inspection and testing in our laboratory. Detailed graphical representations of the subsurface conditions encountered are presented on Figures 3A through 3K, Boring Logs. Soils were classified in accordance with the nomenclature described on Figure 4, Key to Boring Log (USCS).

Following completion of excavation and logging, each boring was backfilled with auger cuttings.

Following completion of excavating operations, 1.25-inch diameter slotted PVC pipe was installed in some of the borings in order to provide a means of monitoring potential groundwater fluctuations.

3.2 LABORATORY TESTING

3.2.1 General

In order to provide data necessary for our engineering analyses, a laboratory testing program was completed. The program included partial gradation, pH and soluble sulfates, and percolation tests. The following paragraphs describe the tests and summarize the test data.

3.2.2 Partial Gradation Tests

To aid in classifying the granular soils, partial gradation tests were performed. Results of the tests are tabulated below:

Boring No.	Depth (feet)	Percent Passing No. 200 Sieve	Moisture Content (%)	Soil Classification
B-1	2.5	12.8	1.3	GM
B-3	5.0	9.5	7.9	GP/GM
B-5	2.5	10.6	2.5	GP/GM
B-6	5.0	12.8	1.7	GM

3.2.3 pH and Soluble Sulfates Tests

To determine if the site soils will react detrimentally with concrete, pH and soluble sulfates tests were performed on a representative sample of the natural near-surface soils. The results of those tests are tabulated below:

Boring No.	Depth (feet)	Soil Classification	pH	Water Soluble Sulfate (mg/kg-dry)
B-7	2.0	GPGM	9.1	<5.5

3.3 PERCOLATION TESTS

Two infiltration tests were performed at a depth of 5 feet within Borings B-4 and B-9. The measured infiltration rates were less than 1 minute per inch and reflect current natural site conditions at the test location. The infiltration rate measured during this test program is considered typical for the soil type. It is our experience that infiltration rate will decrease over the lifetime of the system due to siltation and the introduction of other materials. Accordingly, we recommend a design infiltration rate of 5 minutes per inch may be used for design purposes.

4. SITE CONDITIONS

4.1 SURFACE

The site is located at the southeast corner of the intersection of Cedar Hills Drive and 4800 West Street in Cedar Hills, Utah. The lot is rectangular in shape and consists of vacant undeveloped land. The site is covered by a light growth of various weeds and grasses. The site slopes gently

downhill to the southwest with an overall relief on the order of 2 to 3 feet across the site. The site is bordered to the east and the west (beyond 4800 West Street) by similar undeveloped land, on the north by Cedar Hills Drive followed by Chase Bank and Walmart, and on the south by a gas station.

4.2 SUBSURFACE SOIL AND GROUNDWATER

The soil conditions encountered in the borings were relatively consistent. Topsoil with a major root zone was encountered to a depth of 3 to 4 inches in each of the borings. Underlying the topsoil and extending to the maximum explored depths of 5 to 16 feet is fine to coarse sandy gravel and fine to coarse gravelly sand with varying amounts of silt. The sand/gravel is medium dense to very dense, slightly moist to moist, gray to brown, and is anticipated to exhibit high strength and low compressibility characteristics under the anticipated loading range. Auger refusal due to cobbles was encountered at a depth of 7 feet in Boring B-1.

The lines designating the interface between soil types on the boring logs generally represent approximate boundaries. In-situ, the transition between soil types may be gradual.

During drilling operations, groundwater was not encountered at the maximum explored depth, 16 feet.

5. DISCUSSIONS AND RECOMMENDATIONS

5.1 SUMMARY OF FINDINGS

The results of our analyses indicate that the proposed structures may be supported upon conventional spread and/or continuous wall foundations established upon suitable natural soils or structural fill extending to suitable natural soils.

The most significant geotechnical issues at the site are the near-surface loose/disturbed soils that extend approximately 3 to 4 inches below the existing surface. These loose/disturbed soils are not suitable for the support of footings, floor slabs, or pavements.

GSH will need to observe foundation excavations to verify that all topsoil and loose/disturbed soils have been completely removed and to provide additional recommendations as required.

The on-site natural soils can be re-used as structural site grading fill, if they meet the requirements of such.

Detailed discussions pertaining to earthwork, foundations, floor slabs, lateral resistance, pavements, and the geoseismic setting of the site are discussed in the following sections.

5.2 EARTHWORK

5.2.1 Site Preparation

Initial site preparation will consist of the removal of surface vegetation, topsoil, loose/disturbed soils, non-engineered fills, and other deleterious materials from beneath an area extending out at least 5 feet from the perimeter of the proposed building, pavement, and exterior flatwork areas.

Subsequent to the above operations and prior to the placement of footings, structural site grading fill, or floor slabs, the exposed natural subgrade must be proofrolled by passing moderate-weight rubber tire-mounted construction equipment over the surface at least twice. If any loose, soft, or disturbed zones are encountered, they must be completely removed in footing and floor slab areas and replaced with granular structural fill. In pavement areas, unsuitable soils encountered during recompaction and proofrolling must be removed to a maximum depth of 2 feet and replaced with compacted granular structural fill.

5.2.2 Temporary Excavations

Temporary construction excavations in the site soils, not exceeding 4 feet in depth, may be constructed with sideslopes no steeper than one-quarter horizontal to one vertical (0.25H:1V). Temporary excavations up to 8 feet deep in the site soils shall be constructed with sideslopes no steeper than one horizontal to one vertical (1H:1V). Excavations deeper than 8 feet are not anticipated at the site. If excessive sloughing occurs or where extensive layers of clean granular soils are encountered, the sideslopes should be appropriately flattened and/or shoring/bracing utilized.

All excavations must be inspected periodically by qualified personnel. If any signs of instability are noted, immediate remedial action must be initiated.

5.2.3 Structural Fill

Structural fill will be required as site grading fill, as backfill over foundations and utilities, and potentially as replacement fill below footings. All structural fill must be free of sod, rubbish, construction debris, frozen soil, and other deleterious materials. Structural site grading fill is defined as fill placed over fairly large open areas to raise the overall site grade.

The maximum particle size within structural site grading fill should generally not exceed 4 inches; although, occasional particles up to 6 to 8 inches may be incorporated provided that they do not result in "honeycombing" or preclude the obtainment of the desired degree of compaction. In confined areas, the maximum particle size should generally be restricted to 2.5 inches.

The on-site soils may be re-utilized as structural site grading fill if they meet the requirements of such.

All imported granular structural fill should consist of a fairly well-graded mixture of sand and gravel with the maximum fines content (material passing the No. 200 sieve) not exceeding 18 percent. Only granular soils are recommended as structural fill below foundations and in confined areas, such as backfill around foundations or within utility trenches.

Non-structural site grading fill is defined as all fill material not designated as structural fill and may consist of any cohesive or granular soils not containing excessive amounts of degradable material.

5.2.4 Fill Placement and Compaction

All structural fill shall be placed in lifts not exceeding 8 inches in loose thickness. Structural fills shall be compacted in accordance with the percent of the maximum dry density as determined by the AASHTO[1] T-180 (ASTM[2] D-1557) compaction criteria in accordance with the table below:

Location	Total Fill Thickness (feet)	Minimum Percentage of Maximum Dry Density
Beneath an area extending at least 3 feet beyond the perimeter of the structure	0 to 8	95
Outside area defined above	0 to 5	90
Outside area defined above	5 to 8	95

Structural fills greater than 8 feet thick are not anticipated at the site.

Subsequent to stripping and prior to the placement of structural site grading fill, the subgrade shall be prepared as discussed in Section 5.2.1, Site Preparation, of this report. In confined areas, subgrade preparation should consist of the removal of all loose or disturbed soils.

Non-structural fill may be placed in lifts not exceeding 12 inches in loose thickness and compacted by passing construction, spreading, or hauling equipment over the surface at least twice.

5.2.5 Utility Trenches

All utility trench backfill material below structurally loaded facilities (flatwork, floor slabs, roads, etc.) shall be placed at the same density requirements established for structural fill. If the surface of the backfill becomes disturbed during the course of construction, the backfill shall be

[1] American Association of State Highway and Transportation Officials
[2] American Society for Testing and Materials

proofrolled and/or properly compacted prior to the construction of any exterior flatwork over a backfilled trench. Proofrolling may be performed by passing moderately loaded rubber tire-mounted construction equipment uniformly over the surface at least twice. If excessively loose or soft areas are encountered during proofrolling, they shall be removed to a maximum depth of 2 feet below design finish grade and replaced with structural fill.

Most utility companies and City-County governments are now requiring that Type A-1 or A-1-a (AASHTO Designation – basically granular soils with limited fines) soils be used as backfill over utilities. These organizations are also requiring that in public roadways the backfill over major utilities be compacted over the full-depth of fill to at least 96 percent of the maximum dry density as determined by the AASHTO T-180 (ASTM D-1557) method of compaction. We recommend that as the major utilities continue onto the site that these compaction specifications are followed.

5.3 SPREAD AND CONTINUOUS WALL FOUNDATIONS

5.3.1 Design Data

The results of our analyses indicate that the proposed structure may be supported upon conventional spread and continuous wall foundations established upon natural suitable soils and/or granular structural fill extending to natural, suitable soils. For design, the following parameters are recommended:

Minimum Recommended Depth of Embedment for Frost Protection	- 30 inches
Minimum Recommended Depth of Embedment for Non-frost Conditions	- 15 inches
Recommended Minimum Width for Continuous Wall Footings	- 18 inches
Minimum Recommended Width for Isolated Spread Footings	- 24 inches
Recommended Net Bearing Pressure for Real Load Conditions	- 3,000 pounds per square foot
Bearing Pressure Increase for Seismic Loading	- 50 percent

The term "net bearing pressure" refers to the pressure imposed by the portion of the structure located above lowest adjacent final grade. Therefore, the weight of the footing and backfill to

lowest adjacent final grade need not be considered. Real loads are defined as the total of all dead plus frequently applied live loads. Total load includes all dead and live loads, including seismic and wind.

5.3.2 Installation

Under no circumstances shall the footings be established upon non-engineered fill, loose or disturbed soils, sod, rubbish, construction debris, other deleterious materials, frozen soils, or within ponded water. If unsuitable soils are encountered, they must be removed and replaced with compacted structural fill. If granular structural fills become loose or disturbed, they must be recompacted to the requirements for structural fill.

The width of structural fill, where placed below footings, should extend laterally at least 6 inches beyond the edges of the footings in all directions for each foot of fill thickness beneath the footings. For example, if the width of the footing is 2.0 feet and the thickness of the structural fill beneath the footing is 1.5 feet, the width of the structural fill at the base of the footing excavation would be a total of 3.5 feet, centered below the footing.

5.3.3 Settlements

Maximum settlements of foundations designed and installed in accordance with recommendations presented herein and supporting maximum anticipated loads as discussed in Section 2, Proposed Construction, are anticipated to be less than one inch. Approximately 50 percent of the quoted settlement should occur during construction.

5.4 LATERAL RESISTANCE

Lateral loads imposed upon foundations due to wind or seismic forces may be resisted by the development of passive earth pressures and friction between the base of the footings and the supporting soils. In determining frictional resistance, a coefficient of 0.40 should be utilized. Passive resistance provided by properly placed and compacted granular structural fill above the water table may be considered equivalent to a fluid with a density of 300 pounds per cubic foot. Below the water table, this granular soil should be considered equivalent to a fluid with a density of 150 pounds per cubic foot.

A combination of passive earth resistance and friction may be utilized provided that the friction component of the total is divided by 1.5.

5.5 FLOOR SLABS

Floor slabs may be established upon suitable natural soils and/or upon structural fill extending to suitable natural soils. Under no circumstances shall floor slabs be established over non-engineered fills, loose or disturbed soils, sod, rubbish, construction debris, other deleterious materials, frozen soils, or within ponded water.

In order to facilitate curing of the concrete, it is recommended that floor slabs be directly underlain by at least 4 inches of "free-draining" fill, such as "pea" gravel or 0.75-inch to 1.0-inch minus clean gap-graded gravel.

Settlement of lightly loaded floor slabs (average uniform pressure of 200 pounds per square foot or less) is anticipated to be less than 0.25 inch.

5.6 PAVEMENTS

The existing natural soils will exhibit moderate to poor pavement support characteristics when saturated or near saturated. All pavement areas must be prepared as previously discussed (see Section 5.2.1, Site Preparation). With the subgrade soils and the projected traffic as discussed in Section 2, Proposed Construction, the following pavement sections are recommended:

Parking Areas

(Light Volume of Automobiles and Light Trucks,
Occasional Medium-Weight Trucks,
and No Heavy-Weight Trucks)
[1 equivalent 18-kip axle load per day]

Flexible:

2.5 inches	Asphalt concrete
7.0 inches	Aggregate base
Over	Properly prepared natural subgrade soils, and/or structural site grading fill extending to suitable natural subgrade soils

Rigid:

5.0 inches	Portland cement concrete (non-reinforced)
4.0 inches	Aggregate base
Over	Properly prepared natural subgrade soils, and/or structural site grading fill extending to natural subgrade soils

Roadway Areas

(Moderate Volume of Automobiles and Light Trucks,
Light Volume of Medium-Weight Trucks
and Occasional Heavy-Weight Trucks)
[3 equivalent 18-kip axle loads per day]

Flexible:

3.0 inches	Asphalt concrete
8.0 inches	Aggregate base
Over	Properly prepared natural subgrade soils, and/or structural site grading fill extending to suitable natural subgrade soils

Rigid:

5.5 inches	Portland cement concrete (non-reinforced)
4.0 inches	Aggregate base
Over	Properly prepared natural subgrade soils, and/or structural site grading fill extending to natural subgrade soils

For dumpster pads, we recommend a pavement section consisting of 6.5 inches of Portland cement concrete, 4.0 inches of aggregate base, over properly prepared natural subgrade or site grading structural fills.

The above rigid pavement sections are for non-reinforced Portland cement concrete. Concrete should be designed in accordance with the American Concrete Institute (ACI) and joint details should conform to the Portland Cement Association (PCA) guidelines. The concrete should have a minimum 28-day unconfined compressive strength of 4,000 pounds per square inch, contain 6 percent ±1 percent air-entrainment, and meet the requirements given below in Section 5.7., Cement Types, of this report.

5.7 CEMENT TYPES

The laboratory tests indicate that the natural soils tested contain a negligible amount of water soluble sulfates. Based on our test results, concrete in contact with the on-site soil will have a

low potential for sulfate reaction (ACI 318, Table 4.3.1). Therefore, all concrete which will be in contact with the site soils may be prepared using Type I or IA cement.

5.8 GEOSEISMIC SETTING

5.8.1 General

Utah municipalities have adopted the International Building Code (IBC) 2012. The IBC 2012 code determines the seismic hazard for a site based upon 2008 mapping of bedrock accelerations prepared by the United States Geologic Survey (USGS) and the soil site class. The USGS values are presented on maps incorporated into the IBC code and are also available based on latitude and longitude coordinates (grid points).

The structure must be designed in accordance with the procedure presented in Section 1613, Earthquake Loads, of the IBC 2012 edition.

5.8.2 Faulting

Based upon our review of available literature, no active faults are known to pass through or immediately adjacent to the site. The site is located outside fault investigation zones identified by Utah County. The nearest active fault is the Wasatch Fault, located approximately 0.6 miles northwest of the site.

5.8.3 Soil Class

For dynamic structural analysis, given the relatively small amount of liquefaction-induced settlements projected for this site, the Site Class D - Stiff Soil Profile as defined in Chapter 20 of ASCE 7 (per Section 1613.3.2, Site Class Definitions, of IBC 2012) can be utilized.

5.8.4 Ground Motions

The IBC 2012 code is based on 2008 USGS mapping, which provides values of short and long period accelerations for the Site Class B/C boundary for the Maximum Considered Earthquake (MCE). This Site Class B/C boundary represents average bedrock values for the Western United States and must be corrected for local soil conditions. The following table summarizes the peak ground and short and long period accelerations for the MCE event and incorporates the appropriate soil amplification factor for a Site Class D soil profile. Based on the site latitude and longitude (40.4149 degrees north and 111.7728 degrees west, respectively), the values for this site are tabulated on the following page.

Spectral Acceleration Value, T Seconds	Site Class B-C Boundary [mapped values] (% g)	Site Class D [adjusted for site class effects] (% g)
Peak Ground Acceleration	48.2	49.1
0.2 Seconds, (Short Period Acceleration)	$S_S = 120.5$	$S_{MS} = 122.7$
1.0 Seconds (Long Period Acceleration)	$S_1 = 43.8$	$S_{M1} = 68.5$

The IBC 2012 code site accelerations are based on taking the above short and long period accelerations for the Maximum Considered Earthquake Event and multiplying by two-thirds.

5.8.5 Liquefaction

The site is located in a boundary area that has been identified by Utah County as having a "very low" liquefaction potential. Liquefaction is defined as the condition when saturated, loose, finer-grained sand-type soils lose their support capabilities because of excessive pore water pressure which develops during a seismic event.

Due to the lack of a shallow groundwater table and the dense nature of the granular soils encountered, liquefaction is not anticipated to occur during the design seismic event.

5.9 SITE OBSERVATIONS

As stated previously, a geotechnical engineer from GSH must observe the foundation excavations prior to placing footings or structural fill to verify that any topsoil and/or disturbed soils have been removed and that suitable soils have been encountered.

If you have any questions or would like to discuss these items further, please feel free to contact us at (801) 685-9190.

Respectfully submitted,

GSH Geotechnical, Inc.

Patrick R. Emery, P.E.
State of Utah No. 7941710
Project Geotechnical Engineer

Reviewed by:

Michael S. Huber, P.E.
State of Utah No. 343650
Vice President/Senior Geotechnical Engineer

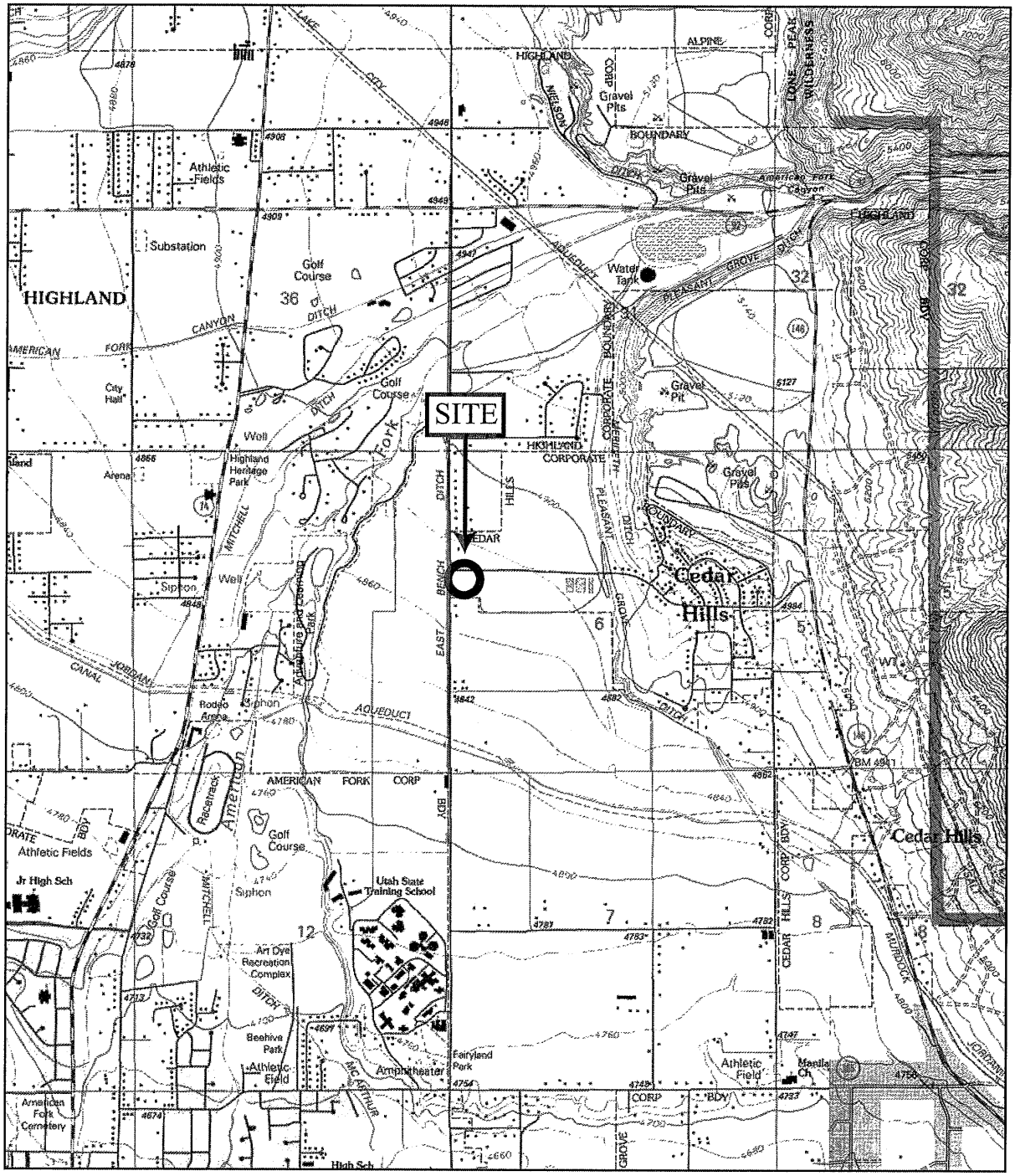
PRE/MSH:jlh

Encl. Figure 1, Vicinity Map
Figure 2, Site Plan
Figures 3A through 3K, Log of Borings
Figure 4, Key to Boring Log

Addressee (email)

cc: Mr. Jeff Randall (email)
Anderson Wahlen and Associates

AMERICA FIRST CREDIT UNIOIN
JOB NO. 1242-013-14



SCALE IN FEET
1000 0 1000 2000

FIGURE 1
VICINITY MAP

REFERENCE:
USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE MAP(S)
ENTITLED "LEHI, UTAH" DATED 1994 AND
"TIMPANOGOS CAVE, UTAH" DATED 1998

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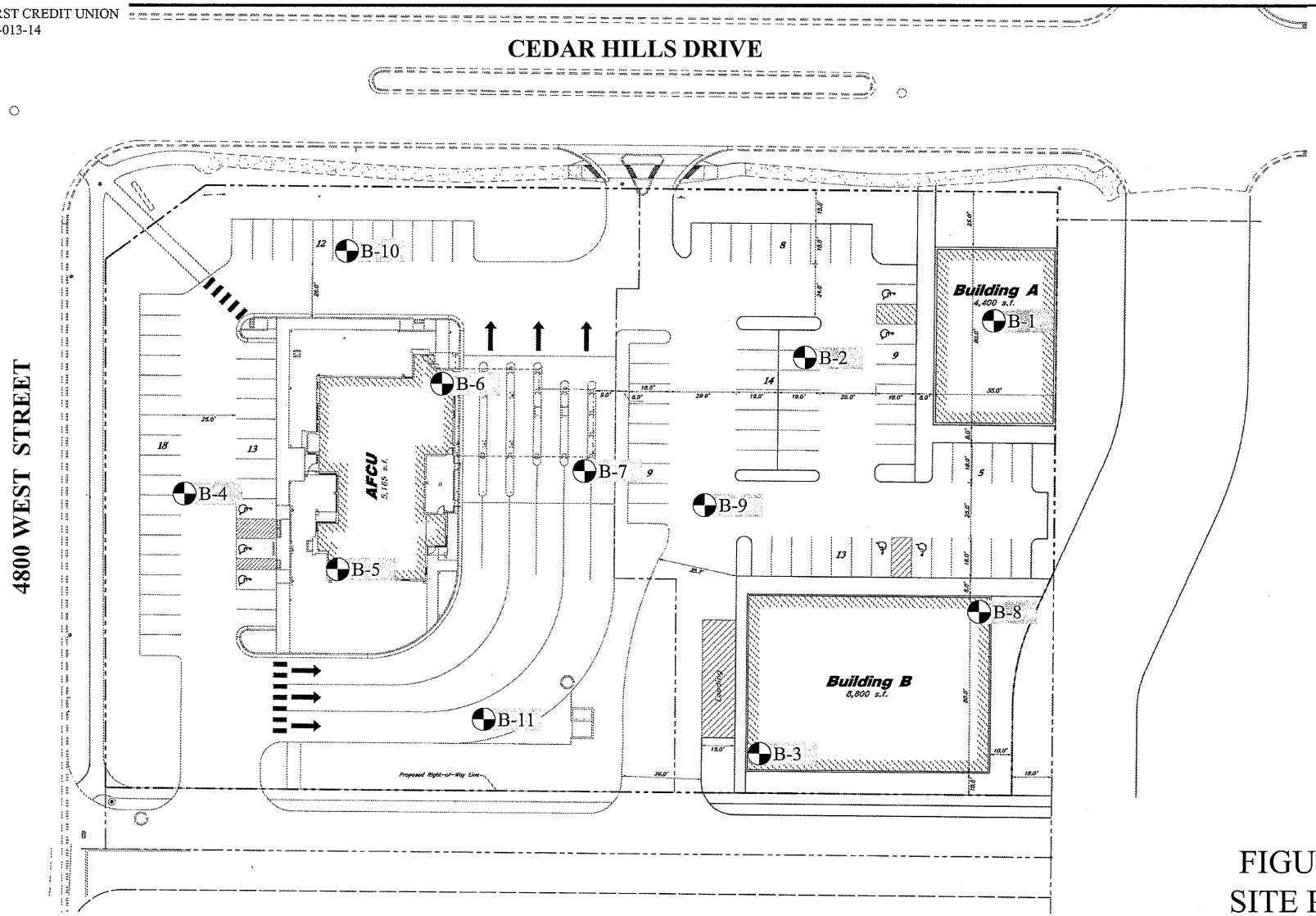
JOB NO. 1242-013-14



REFERENCE:
ADAPTED FROM DRAWING ENTITLED
"CONCEPTUAL SITE PLAN" BY GREAT BASIN ENGINEERING - SOUTH
DATED JANUARY 14, 2014

APPROXIMATE SCALE: 1" = 45'

FIGURE 2
SITE PLAN

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GSH	BORING LOG Page: 1 of 1	BORING: B-1

CLIENT: America First Credit Union **PROJECT NUMBER:** 1242-013-14

PROJECT: Proposed America First Credit Union **DATE STARTED:** 01/17/14 **DATE FINISHED:** 01/17/14

LOCATION: SEC of Cedar Hills Drive and 4800 West Street, Cedar Hills, Utah **GSH Field Rep.:** HRW

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger **HAMMER:** Automatic **WEIGHT:** 140 lbs **DROP:** 30"

GROUNDWATER DEPTH: No groundwater encountered (01/17/14) **ELEVATION:** ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	GM	**SILTY FINE TO COARSE SANDY FINE AND COARSE GRAVEL** with some cobbles; major roots (topsoil) to 3"; gray/brown		100+		1.3		12.8			slightly moist very dense
			5	90							
		Auger refusal due to cobbles at 7.0'. No groundwater encountered at time of drilling.	10								
			15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3A

GSH	BORING LOG Page: 1 of 1	BORING: B-2

CLIENT: America First Credit Union **PROJECT NUMBER:** 1242-013-14

PROJECT: Proposed America First Credit Union **DATE STARTED:** 01/17/14 **DATE FINISHED:** 01/17/14

LOCATION: SEC of Cedar Hills Drive and 4800 West Street, Cedar Hills, Utah **GSH Field Rep.:** HRW

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger **HAMMER:** Automatic **WEIGHT:** 140 lbs **DROP:** 30"

GROUNDWATER DEPTH: No groundwater encountered (01/17/14) **ELEVATION:** ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	GP/GM	**FINE TO COARSE SANDY FINE AND COARSE GRAVEL** with some silt and occasional cobbles; major roots (topsoil) to 4"; gray/brown									slightly moist very dense
			5								
		End of exploration at 5.0'. No groundwater encountered at time of drilling. Installed 1-1/4" diameter slotted PVC pipe to 5.0'.	10 15 20 25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3B

GSH BORING LOG

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BORING: B-3

CLIENT: America First Credit Union **PROJECT NUMBER:** 1242-013-14

PROJECT: Proposed America First Credit Union **DATE STARTED:** 01/17/14 **DATE FINISHED:** 01/17/14

LOCATION: SEC of Cedar Hills Drive and 4800 West Street, Cedar Hills, Utah **GSH Field Rep.:** HRW

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger **HAMMER:** Automatic **WEIGHT:** 140 lbs **DROP:** 30"

GROUNDWATER DEPTH: No groundwater encountered (01/17/14) **ELEVATION:** ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	GP/GM	**FINE TO COARSE SANDY FINE AND COARSE GRAVEL** with some silt and some cobbles; major roots (topsoil) to 4"; gray/brown									slightly moist very dense
			5	49		7.9	9.5				dense
			10	66							
	SP/SM	**FINE AND COARSE GRAVELLY FINE TO COARSE SAND** with some silt and some cobbles; gray/brown	15	29							slightly moist medium dense
		End of exploration at 16.0'. No groundwater encountered at time of drilling. Installed 1-1/4" diameter slotted PVC pipe to 16.0'.	20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3C

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BORING LOG

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BORING: B-4

CLIENT: America First Credit Union **PROJECT NUMBER:** 1242-013-14

PROJECT: Proposed America First Credit Union **DATE STARTED:** 01/17/14 **DATE FINISHED:** 01/17/14

LOCATION: SEC of Cedar Hills Drive and 4800 West Street, Cedar Hills, Utah **GSH Field Rep.:** HRW

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger **HAMMER:** Automatic **WEIGHT:** 140 lbs **DROP:** 30"

GROUNDWATER DEPTH: No groundwater encountered (01/17/14) **ELEVATION:** ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	GP/ GM	**FINE TO COARSE SANDY FINE AND COARSE GRAVEL** with some silt and occasional cobbles; major roots (topsoil) to 3"; gray/brown									slightly moist dense
			5								
		End of exploration at 5.0'. No groundwater encountered at time of drilling.	10								
			15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3D

GSH BORING LOG

Page: 1 of 1

BORING: B-5

CLIENT: America First Credit Union **PROJECT NUMBER:** 1242-013-14

PROJECT: Proposed America First Credit Union **DATE STARTED:** 01/17/14 **DATE FINISHED:** 01/17/14

LOCATION: SEC of Cedar Hills Drive and 4800 West Street, Cedar Hills, Utah **GSH Field Rep.:** HRW

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger **HAMMER:** Automatic **WEIGHT:** 140 lbs **DROP:** 30"

GROUNDWATER DEPTH: No groundwater encountered (01/17/14) **ELEVATION:** ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	GP/ GM	**FINE TO COARSE SANDY FINE AND COARSE GRAVEL** with some silt and occasional cobbles; major roots (topsoil) to 3"; gray/brown		50+		2.5		10.6			slightly moist very dense
			5	77							
			10	84							
			15	50+							
		End of exploration at 16.0'. No groundwater encountered at time of drilling.	20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3E

GSH

BORING LOG

Page: 1 of 1

BORING: B-6

CLIENT: America First Credit Union **PROJECT NUMBER:** 1242-013-14

PROJECT: Proposed America First Credit Union **DATE STARTED:** 01/17/14 **DATE FINISHED:** 01/17/14

LOCATION: SEC of Cedar Hills Drive and 4800 West Street, Cedar Hills, Utah **GSH Field Rep.:** HRW

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger **HAMMER:** Automatic **WEIGHT:** 140 lbs **DROP:** 30"

GROUNDWATER DEPTH: No groundwater encountered (01/17/14) **ELEVATION:** ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	GM	**SILTY FINE TO COARSE SANDY FINE AND COARSE GRAVEL** with occasional cobbles; major roots (topsoil) to 3"; gray/brown		85							slightly moist very dense
			5	46		1.7	12.8				dense
			10								very dense
			15	90							
		End of exploration at 16.0'. No groundwater encountered at time of drilling.	20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3F

GSH

BORING LOG

Page: 1 of 1

BORING: B-7

CLIENT: America First Credit Union **PROJECT NUMBER:** 1242-013-14

PROJECT: Proposed America First Credit Union **DATE STARTED:** 01/17/14 **DATE FINISHED:** 01/17/14

LOCATION: SEC of Cedar Hills Drive and 4800 West Street, Cedar Hills, Utah **GSH Field Rep.:** HRW

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger **HAMMER:** Automatic **WEIGHT:** 140 lbs **DROP:** 30"

GROUNDWATER DEPTH: No groundwater encountered (01/17/14) **ELEVATION:** ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	GP/GM	**FINE TO COARSE SANDY FINE AND COARSE GRAVEL** with some silt and occasional cobbles; major roots (topsoil) to 3"; gray/brown									hard drilling
											slightly moist very dense
			5	58							
		End of exploration at 6.0'. No groundwater encountered at time of drilling.	10								
			15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3G

GSH

BORING LOG

Page: 1 of 1

BORING: B-8

CLIENT: America First Credit Union **PROJECT NUMBER:** 1242-013-14

PROJECT: Proposed America First Credit Union **DATE STARTED:** 01/17/14 **DATE FINISHED:** 01/17/14

LOCATION: SEC of Cedar Hills Drive and 4800 West Street, Cedar Hills, Utah **GSH Field Rep.:** HRW

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger **HAMMER:** Automatic **WEIGHT:** 140 lbs **DROP:** 30"

GROUNDWATER DEPTH: No groundwater encountered (01/17/14) **ELEVATION:** ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	GP/ GM	**FINE TO COARSE SANDY FINE AND COARSE GRAVEL** with some silt and some cobbles; major roots (topsoil) to 3"; gray/brown		50+							hard drilling very dense
			5	92							
			10	73							
			15								
		End of exploration at 16.0'. No groundwater encountered at time of drilling.	20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3H

GSH BORING LOG

Page: 1 of 1

BORING: B-9

CLIENT: America First Credit Union **PROJECT NUMBER:** 1242-013-14

PROJECT: Proposed America First Credit Union **DATE STARTED:** 01/17/14 **DATE FINISHED:** 01/17/14

LOCATION: SEC of Cedar Hills Drive and 4800 West Street, Cedar Hills, Utah **GSH Field Rep.:** HRW

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger **HAMMER:** Automatic **WEIGHT:** 140 lbs **DROP:** 30"

GROUNDWATER DEPTH: No groundwater encountered (01/17/14) **ELEVATION:** ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	GP/GM	**FINE TO COARSE SANDY FINE AND COARSE GRAVEL** with some silt and occasional cobbles; major roots (topsoil) to 3"; gray/brown		50+							slightly moist
			5	92							
		End of exploration at 6.0'. No groundwater encountered at time of drilling.	10 15 20 25								

See Subsurface Conditions section in the report for additional information.

FIGURE 31

GSH	BORING LOG Page: 1 of 1	BORING: B-10

CLIENT: America First Credit Union **PROJECT NUMBER:** 1242-013-14

PROJECT: Proposed America First Credit Union **DATE STARTED:** 01/17/14 **DATE FINISHED:** 01/17/14

LOCATION: SEC of Cedar Hills Drive and 4800 West Street, Cedar Hills, Utah **GSH Field Rep.:** HRW

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger **HAMMER:** Automatic **WEIGHT:** 140 lbs **DROP:** 30"

GROUNDWATER DEPTH: No groundwater encountered (01/17/14) **ELEVATION:** ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	GP/GM	**FINE TO COARSE SANDY FINE AND COARSE GRAVEL** with some silt and some cobbles; major roots (topsoil) to 3"; gray/brown		50+							slightly moist
			5	92							
		End of exploration at 6.0'. No groundwater encountered at time of drilling.	10 15 20 25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3J

GSH	BORING LOG Page: 1 of 1	BORING: B-11

CLIENT: America First Credit Union **PROJECT NUMBER:** 1242-013-14

PROJECT: Proposed America First Credit Union **DATE STARTED:** 01/17/14 **DATE FINISHED:** 01/17/14

LOCATION: SEC of Cedar Hills Drive and 4800 West Street, Cedar Hills, Utah **GSH Field Rep.:** HRW

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger **HAMMER:** Automatic **WEIGHT:** 140 lbs **DROP:** 30"

GROUNDWATER DEPTH: No groundwater encountered (01/17/14) **ELEVATION:** ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	GP/GM	**FINE TO COARSE SANDY FINE AND COARSE GRAVEL** with some silt and some cobbles; major roots (topsoil) to 3"; gray/brown									
			5								
		End of exploration at 6.0'. No groundwater encountered at time of drilling.	10								
			15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3K

PROJECT: Proposed America First Credit Union
PROJECT LOCATION: SEC of Cedar Hills Drive and 4800 West Street, Cedar Hills, Utah
PROJECT NUMBER: 1242-013-14

KEY TO BORING LOG

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
1	2	3	4	5	6	7	8	9	10	11	12

COLUMN DESCRIPTIONS

1. **Water Level**: Depth to measure groundwater table. See symbol below.
2. **USCS**: Graphic depiction of subsurface material encountered; typical symbols are explaned below.
3. **Description**: Description of material encountered; may include color, moisture, grain size, and density/consistency.
4. **Depth (ft.)**: Depth in feet below the ground surface.
5. **Blow Count**: Number of blows required to advance sampler (12 inches) beyond first. using a 140-lb hammer with a 30 inch drop.
6. **Sample Symbol**: Type of soil sample collected at depth interval shown; sampler symbols are explained below.
7. **Moisture (%)**: Water content of soil sample measured in laboratory; expressed as percentage of dry weight of specimen.
8. **Dry Density (pcf)**: The density of a soil measured in laboratory; expressed as pounds per cubic foot.
9. **% Passing 200**: Fines content of soil sample passing a No. 200 sieve measured in laboratory, expressed as a percentage.
10. **Liquid Limit (%)**: Water content at which a soil changes from plastic to liquid behavior.
11. **Placsticity Index (%)**: Range of water content at which a soil exhibits plastic properties.
12. **Remarks**: Comments and observations regarding drilling or sampling made by driller or field personnel. Other field and laboratory test results; using the following abbreviations:

CEMENTATION	MODIFIERS	MOISTURE CONTENT (FIELD TEST)
Weakly: Crumbles or breaks with handling of slight finger pressure.	Trace <5 %	**Dry:** Absence of moisture, dusty, dry to the touch.
Moderately: Crumbles or breaks with considerable finger pressure.	Some 5 - 12%	**Moist:** Damp but no visible water.
Strongly: Will not crumble or break with finger pressure.	With >12%	**Saturated:** Visible water, usually soil below water table.

Descriptions and stratum lines are interpretive; field descriptions may have been modified to reflect lab test results. Descriptions on the logs apply only at the specific boring locations and at the time the borings were advanced; they are not warranted to be representative of subsurface conditions at other locations or times.

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			SYMBOLS Graph	SYMBOLS Letter	TYPICAL DESCRIPTIONS
COARSE-GRAINED SOILS: More than 50% of No. 200 sieve size.	GRAVELS: More than 50% of coarse fraction retained in No. 4 sieve.	CLEAN GRAVELS (little or no fines)		GW	Well-Graded Gravels, Gravel-Sand Mixtures, Little or No Fines
				GP	Poorly Graded Gravel, Gravel-Sand Mixtures, Little or No Fines
		GRAVELS WITH FINES (appreciable amount of fines)		GM	Silty Gravels, Gravel-Sand-Silt Mixtures
				GC	Clayey Gravels, Gravel-Sand-Clay Mixtures
	SANDS: More than 50% of coarse fraction passing through No. 4 sieve.	CLEAN SANDS (little or no fines)		SW	Well-Graded Sands, Gravelly Sands, Little or No Fines
				SP	Poorly Graded Sands, Gravelly Sands, Little or No Fines
		SANDS WITH FINES (appreciable amount of fines)		SM	Silty Sands, Sand-Silt Mixtures
				SC	Clayey Sands, Sand-Clay Mixtures
FINE-GRAINED SOILS: More than 50% of material is smaller than No. 200 sieve size.	SILTS AND CLAYS: Liquid limit less than 50%			ML	Inorganic Silts and Very Fine Sands, Rock Flour, Silty or Clayey Fine Sands or Clayey Silts with Slight Plasticity
				CL	Inorganic Clays of Low to Medium Plasticity, Gravelly Clays, Sandy Clays, Silty Clays, Lean Clays
				OL	Organic Silts and Organic Silty Clays of Low Plasticity
	SILTS AND CLAYS: Liquid limit greater than 50%			MH	Inorganic Silts, Micacious or Diatomacious Fine Sand or Silty Soils
				CH	Inorganic Clays of High Plasticity, Fat Clays
				OH	Organic Clays of Medium to High Plasticity, Organic Silts
HIGHLY ORGANIC SOILS				PT	Peat, Humus, Swamp Soils with High Organic Contents

Note: Dual Symbols are used to indicate borderline soil classifications

STRATIFACTION

DESCRIPTION	THICKNESS
Seam	up to 1/8"
Layer	1/8" - 12"

STRATIFACTION

Occasional: One or less per 6" of thickness.
Numerous: More than one per 6" of thickness.

TYPICAL SAMPLER GRAPHIC SYMBOLS

- Bulk/Bag Sample
- Standard Penetration Split Spoon Sampler
- Rock Core
- No Recovery
- 3.25" OD 2.42" ID D&M Sampler
- 3.0" OD 2.42" ID D&M Sampler
- California Sampler
- Thin Wall

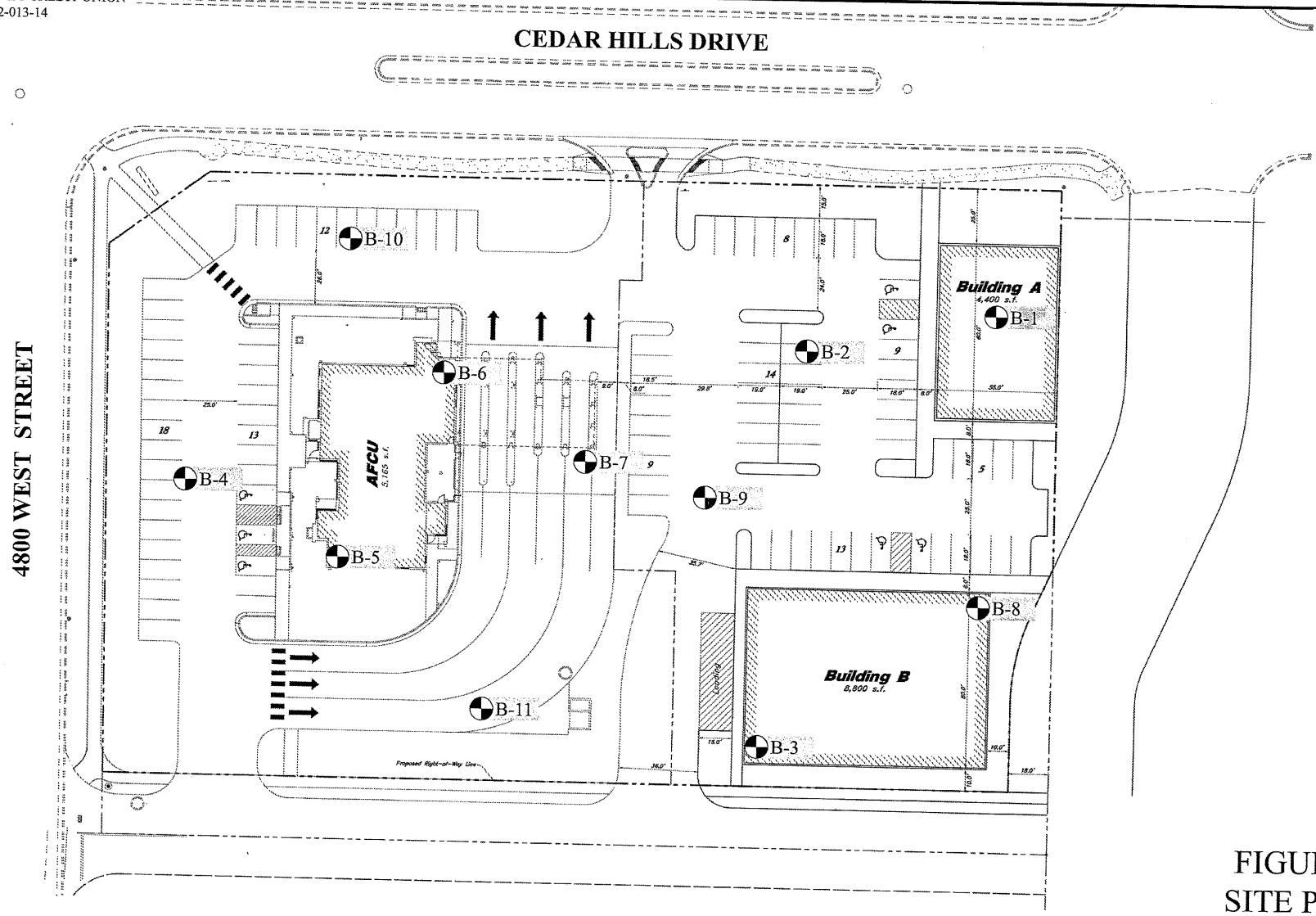
LOG KEY SYMBOLS

- Water Level

FIGURE 4

GSH

AMERICA FIRST CREDIT UNION
JOB NO. 1242-013-14



REFERENCE:
ADAPTED FROM DRAWING ENTITLED
"CONCEPTUAL SITE PLAN" BY GREAT BASIN ENGINEERING - SOUTH
DATED JANUARY 14, 2014

APPROXIMATE SCALE: 1" = 45'

FIGURE 2
SITE PLAN

GSH