ENTECH
ENGINEERING, INC.

505 ELKTON DRIVE
COLORADO SPRINGS, CO 80907
PHONE (719) 531-5599
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March 24, 2020

Hammers Construction, Inc.
1411 Woolsey Heights
Colorado Springs, CO 80915

Attn: Jason Latham

Re: Soil, Geology and Geologic Hazard Evaluation
Mancave Storage/ Mini RV Storage
Bent Grass Meadows Drive
El Paso County, Colorado

Dear Mr. Latham:

GENERAL SITE CONDITIONS AND PROJECT DESCRIPTION

The site is located in a portion of the SW¼ of Section 1, Township 13 South, Range 65 West of the 6th Principal Meridian in El Paso County, Colorado. The site is located approximately 2 miles east of Colorado Springs city limits, northeast of Bent Grass Meadows Drive and Woodmen Frontage Road in El Paso County, Colorado. The location of the site is shown on the Vicinity Map, Figure 1.

The topography of the site is gradually sloping to the southeast. A minor drainage is located in the eastern portion of the site that flows in a southerly direction, and a man-made drainage channel is located along the northern side of the site. Water was not observed in the drainages at the time of this investigation. This drainage is in the mapped floodplain. The site boundaries are indicated on the USGS Map, Figure 2. Previous land uses have included undeveloped and agricultural grazing land. The site is currently vacant and vegetation consist of primarily field grasses and weeds. Site photographs, taken March 7, 2020, are included in Appendix A.

The site consists of a 17.35-acre parcel. Proposed development consists of a storage and mini RV storage facility with nine storage buildings, a club house and parking areas. The storage facility will be serviced by municipal water and sewer. The Development Plan is presented in Figure 3.

LAND USE AND ENGINEERING GEOLOGY

This site was found to be suitable for the proposed commercial development. Areas were encountered where the geologic conditions will impose some constraints on development and land use. These include areas of artificial fill, loose soils, potentially expansive soils and floodplain areas. Based on the proposed development plan, it appears that these areas will have some minor impacts on the development. These conditions will be discussed in greater detail in the report.

In general, it is our opinion that the development can be achieved if the observed geologic conditions on site are either avoided or properly mitigated. All recommendations are subject to the limitations discussed in the report.

SCOPE OF THE REPORT

The scope of the report will include the following:

- A general geologic analysis utilizing published geologic data. Detailed site-specific mapping will be conducted to obtain general information in respect to major geographic and geologic features, geologic descriptions and their effects on the development of the property.

PREVIOUS INVESTIGATIONS

The site was previously investigated Entech Engineering, Inc., *Soil, Geology, Geologic Hazard Study,* dated August, 28, 2002 (Reference 1), and a *Subsurface Soil Investigation,* dated November 11, 2019 (Reference 2). Information from these reports was used in preparing this report. Eight test borings were drilled across the site in the proposed building locations. The locations of the test borings are indicated on the Development Plan, Figure 3. Laboratory testing was also performed on some of the soils to classify and determine the soils engineering characteristics. Laboratory tests included grain-size analysis, ASTM D-422, and Atterberg Limits, ASTM D-4318. Test Boring Logs and Summary of Laboratory Testing Results are included in Appendix B.

FIELD INVESTIGATION

Our field investigation consisted of the preparation of a geologic map of bedrock features and significant surficial deposits. The Natural Resource Conservation Service (NRCS), previously the Soil Conservation Service (SCS) survey was also reviewed to evaluate the site. The position of mappable units within the subject site are shown on the Geologic Map. Our mapping procedures involved both field reconnaissance and measurements, and aerial photo reconnaissance and interpretation. The same mapping procedures have also been utilized to produce the Geology/Engineering Geology Map which identified pertinent geologic conditions affecting development. The field mapping was performed by personnel of Entech Engineering, Inc. on March 7, 2020.

SOIL AND GEOLOGIC CONDITIONS

Soil Survey

The Natural Resource Conservation Service (NRCS) (Reference 2, Figure 3), previously the Soil Conservation Service (Reference 3) has mapped two soil types on the site. Complete descriptions of the soils are presented in Appendix C. In general, the soils consist of gravelly sandy loam, loamy sand, and sand. The soils are described as follows:

Type	Description
9	Blakeland-Fluvaquentic Haplaquolls
19	Columbine Gravelly Sandy Loam, 0-3% Slopes

The soils have been described to have slow to rapid permeabilities. The soils are described as well suited for use as homesites. Possible hazards with soils erosion are present on the site. The erosion potential can be controlled with vegetation. The soils have been described to have moderate erosion hazards (Reference 2).

Soils

One soil type and two bedrock types were encountered in the test borings drilled for the subsurface investigation: Type 1: native slightly silty to very silty sand and clayey sand (SM-SW, SM, SC), Type 2: weathered to formational clayey to silty sandstone (SC, SM), and Type 3: weathered to formational sandy to very sandy claystone (CL). Bedrock was encountered in all of the test borings which were drilled to 20 feet. Each soil and bedrock type were classified in accordance with the Unified Soil Classification System (USCS) using the laboratory testing results and the observations made during drilling.

Soil Type 1: classified as native slightly silty to very silty sand and clayey sand (SM-SW, SM, SC). The native sand was encountered in all of the test borings at depths ranging from the existing ground surface/below topsoil and extending to depths of 8 to 18 feet below the ground surface (bgs). Standard Penetration Testing on the native sand resulted in N-values of 10 to 32 bpf, indicating medium dense to dense states. Water content and grain size testing resulted in a water content range of 2 to 18 percent with 10 to 41 percent of the soil size particles passing the No. 200 sieve. Atterberg limit testing resulted in liquid limits of 32 and no value and plastic indexes of 18 and non-plastic. Swell/Consolidation Testing resulted in a volume change of 0.2 percent, indicating the sand exhibits a low expansion potential. Sulfate testing resulted in less than 0.01 percent soluble sulfate by weight, indicating a negligible potential for below grade concrete degradation due to sulfate attack.

Soil Type 2: classified as weathered to formational clayey to silty sandstone (SC, SM). The sandstone was encountered in Test Boring Nos. 1, 2, 3, 6, 7, and 8 underlying Soil Type 1 at 9 to 18 feet bgs and extending to the termination of the test borings (20 feet). Standard Penetration Testing on the sandstone resulted in N-values of 34 to greater than 50 bpf, indicating dense to very dense states. Water content and grain size testing resulted in a water content range of 10 to 29 percent with 20 to 30 percent of the soil size particles passing the No.

200 sieve. Atterberg limit testing on a sample of clayey sandstone resulted in a liquid limit of 34 and a plastic index of 13. Sulfate testing resulted in 0.01 percent soluble sulfate by weight, indicating a negligible potential for below grade concrete degradation due to sulfate attack.

Soil Type 3: classified as weathered to formational sandy to very sandy claystone (CL). The claystone was encountered in Test Boring Nos. 4 and 5 underlying Soil Type 1 at 8 to 9 feet bgs and extending to the termination of the test borings (20 feet). Standard Penetration Testing on the claystone resulted in N-values of 27 to greater than 50 bpf, indicating stiff to hard consistencies. Water content and grain size testing resulted in water contents of 11 to 17 percent with 59 to 85 percent of the soil size particles passing to No. 200 sieve. Atterberg limits testing resulted in a liquid limit of 44 and a plastic index of 23. FHA Swell Testing resulted in an expansion pressure of 610 psf. Swell/Consolidation Testing resulted in a volume change of 0.4 percent. These results indicated the claystone exhibits low expansion potential; however, claystone in the area is known to be highly expansive.

Groundwater

Groundwater was encountered in all of the test borings at depths ranging from 5.5 to 18.5 feet (Reference 2, Appendix B). Groundwater may affect the construction of shallow foundations proposed for this site and deeper excavations for utilities, depending on site grading and depths of excavation. Unstable conditions should be expected where excavations approach the groundwater level. Stabilization using shot rock or geo grids may be necessary. It should be noted that fluctuation in groundwater levels could change due to seasonal variations, changes in land runoff characteristics and future development of nearby areas. Isolated sand layers within the soil profile can carry water in the subsurface. Contractors should be cognizant of the potential for the occurrence of subsurface water features during construction.

Geology

Approximately 8 miles west of the site is a major structural feature known as the Rampart Range Fault. This fault marks the boundary between the Great Plains Physiographic Province and the Southern Rocky Mountain Province. The site exists within a large structural feature known as the Denver Basin. Bedrock in the area is typically gently dipping in a northerly direction. The bedrock underlying the site consists of the Dawson Formation of Cretaceous Age. The Dawson Formation typically consists of coarse-grained arkosic sandstone with interbedded layers siltstone or claystone. Overlying the Dawson Formation are deposits of man-made fill soils and soils associated with wind blown sands and water-deposited alluvial sands.

The geology of the site was evaluated using the *Geologic Map of the Elsmere Quadrangle,* by Madole and Thorson in 2003, (Reference 4, Figure 5). The Geology for the site is presented in Figure 5. Five mappable units were identified on this site which, are described as follows:

Qaf **Artificial Fill of Late Holocene Age:** These are man-made fill deposits associated with fill piles observed in the eastern portion of the site. Areas of fill other than those mapped may be encountered.

Qa_1 **Alluvium One of Late Holocene Age:** This deposit typically consists of water deposited silty sands and may have clay layers. This deposit is associated with recent alluvial deposits along the drainage in the eastern portion of the site within the mapped floodplain. This unit correlates with the Post-Piney Creek Alluvium in the Denver area.

Qa_2 **Alluvium Two of Early Holocene Age:** This is a stream-deposited material typically occurring as terrace deposits along the drainage in the eastern portion of the site. Alluvium Two typically consists of dark brown silty to clayey sands and may contain some silt and clay lenses. This unit correlates with the Piney Creek Alluvium in the Denver area.

Qa_3 **Alluvium Three of Late Pleistocene Age:** These materials consist of lower stream terrace deposits. Alluvium Three typically consists of silty to clayey gravelly sands. This deposit is usually highly stratified and may contain lenses of silt, clay or cobbles. This unit correlates with the Broadway Alluvium in the Denver area.

Qes **Eolian Sands of Holocene to Late Pleistocene Age:** These are wind-blown sands deposited by the action of prevailing winds. The materials typically consist of silty sands and may contain sandy silt layers.

The soils listed above were mapped from site-specific mapping, the *Geologic Map of the Falcon Quadrangle* distributed by the Colorado Geologic Survey in 2012 (Reference 4, Figure 5), and the *Geologic Map of the Pueblo 1° x 2° Quadrangle,* distributed by the US Geological Survey in 1978 (Reference 6). The test borings used in evaluating the site are included in Appendix B. The Geology Map prepared for the site is presented in Figure 6.

ENGINEERING GEOLOGIC HAZARDS

Mapping has been performed on this site to identify areas where various geologic conditions exist of which developers should be cognizant during the planning, design and construction stages should new construction be proposed. The engineering geologic hazards identified on this site include artificial fill, loose soils, potentially expansive soils and floodplain areas. These hazards and recommended mitigation techniques are discussed as follows:

Artificial Fill
Fill associated with an existing fill stockpile was observed in the eastern portion of the site.

Mitigation: It is anticipated that the fill piles will be removed during site grading. Areas of fill other than those encountered may be encountered. The fill piles are considered uncontrolled. Any uncontrolled fill encountered beneath foundations should be removed and recompacted at a minimum of 95% of its maximum Modified Proctor Dry Density, ASTM D-1557.

Loose Soils

Loose to soils were encountered in borings drilled on site (Reference 2). However, loose soils may be encountered in areas mapped as Eolian Sands in the eastern half of the site. Loose soils encountered beneath the foundation or floor slabs will require mitigation.

Mitigation: Should loose soils be encountered beneath the foundations or floor slabs; mitigation will be necessary. Overexcavation and recompaction at a minimum of 95% of its maximum Modified Proctor Dry Density, ASTM D-1557 is a suitable mitigation, which is common in the area. An overexcavation depth of 2 to 3 feet is anticipated.

Expansive Soils

Expansive soils were encountered in the test borings, but were encountered at depths not anticipated to affect the proposed shallow foundations. Isolated clay lenses may be encountered in the alluvial deposits across the site. These occurrences are typically sporadic; therefore, none have been indicated on the maps. These clays, if encountered beneath foundations, can cause differential movement in the structure foundation.

Mitigation: Should expansive soils be encountered beneath the foundation; mitigation will be necessary. Mitigation of expansive soils will require special foundation design. Overexcavation and replacement with non-expansive soils at a minimum of 95% of its maximum Modified Proctor Dry Density, ASTM D-1557 is a suitable mitigation, which is common in the area. Floor slabs on expansive soils should be expected to experience movement. Overexcavation and replacement has been successful in minimizing slab movements.

Floodplain Areas

The eastern portion of the site lies within a floodplain according to the FIRM Map, No. 08041CO553G (Reference 9, Figure 7). The proposed development is located at a higher elevation and away from the floodplain. Finished floors must be a minimum of one foot above the floodplain level. Any site grading considered should be modified to direct surface flows around the structures or roads, or carried off-site so as to not produce any areas of ponded water. Additionally, subsurface perimeter drains may be required. Specific drainage studies and exact floodplain locations are beyond the scope of this report.

RELEVANCE OF GEOLOGIC CONDITIONS TO LAND USE PLANNING

The proposed development will be a commercial storage and mini RV storage facility with nine storage buildings, a club house and parking areas. The existing geologic and engineering geologic conditions will impose minor constraints on development and construction. The geologic conditions on the site include artificial fill, loose soils, potentially expansive soils and floodplain areas, which can be satisfactorily mitigated through proper engineering design and construction practices.

The upper granular soils in the borings drilled on the site were encountered at medium dense states. Loose or collapsible soils, if encountered beneath foundation or floor slabs, will require recompaction. Expansive layers may also be encountered in the soil on this site. Expansive soils, if encountered, will require special foundation design. These soils will not prohibit development. Overexcavation and replacement with non-expansive soils at a minimum of 95% of its maximum Modified Proctor Dry Density, ASTM D-1557 is a suitable mitigation, which is common in the area. Floor slabs on expansive soils should be expected to experience movement.

Fill exists on this site that is associated with a fill pile. Areas of fill, other than those mapped, may be encountered. All fill piles and debris within building areas should be completely removed prior to construction. Any uncontrolled fill encountered beneath new foundations and floor slabs will require removal and recompaction at a minimum of 95% of its maximum Modified Proctor Dry Density, ASTM D-1557.

Groundwater was encountered in all of the test borings at depths ranging from 5.5 to 18.5 feet (Reference 2, Appendix B). Areas where groundwater was shallow may affect the construction of foundations proposed for this site. Groundwater may also affect deeper excavations for utilities. Unstable conditions should be expected where excavations approach the groundwater level. Stabilization using shot rock or geo grids may be necessary. According to the FEMA FIRM Map No. 08041CO0553G (Reference 9, Figure 7) the eastern portion of the site is located in a floodplain. The proposed development is located at a higher elevation and away from the floodplain. Finished floors must be a minimum of one foot above the floodplain level. Specific drainage studies and exact floodplain locations are beyond the scope of this report.

In summary, the recompacted granular soils will likely provide suitable support for shallow foundations. The geologic conditions encountered on site can be mitigated with proper engineering and construction practices. Specific recommendations have been made in the Subsurface Soil Investigation (Reference 1).

Hammers Construction, LLC
Soil, Geology and Geologic Hazard Evaluation
Mancave Storage/ Mini RV Storage
Bent Grass Meadows Drive
El Paso County, Colorado

CLOSURE

It should be pointed out that because of the nature of data obtained by random sampling of such variable nonhomogeneous materials as soil and rock, it is important that we be informed of any differences observed between surface and subsurface conditions encountered in construction and those assumed in the body of this report. Any new construction considered on this site will require additional investigation. Construction and design personnel should be made familiar with the contents of this report. Specific construction and foundation recommendations will be provided when investigations are completed for any new construction.

This report has been prepared for Hammers Construction, LLC for application to the proposed development in accordance with generally accepted geologic, soil and engineering practices. No other warranty expresses or implied is made.

We trust that this report has provided you with all the information that you required. Should you have any questions or require additional information, please do not hesitate to contact us.

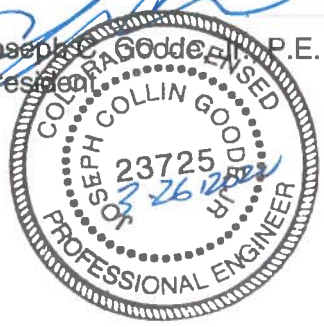
Respectfully Submitted,

ENTECH ENGINEERING, INC.

Logan L. Langford, P.G.
Geologist

Reviewed by:

Joseph C. Goddell II, P.E.
President



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Encl.

Entech Job No. 200337
AAprojects/2020/200337 sg&ghs

BIBLIOGRAPHY

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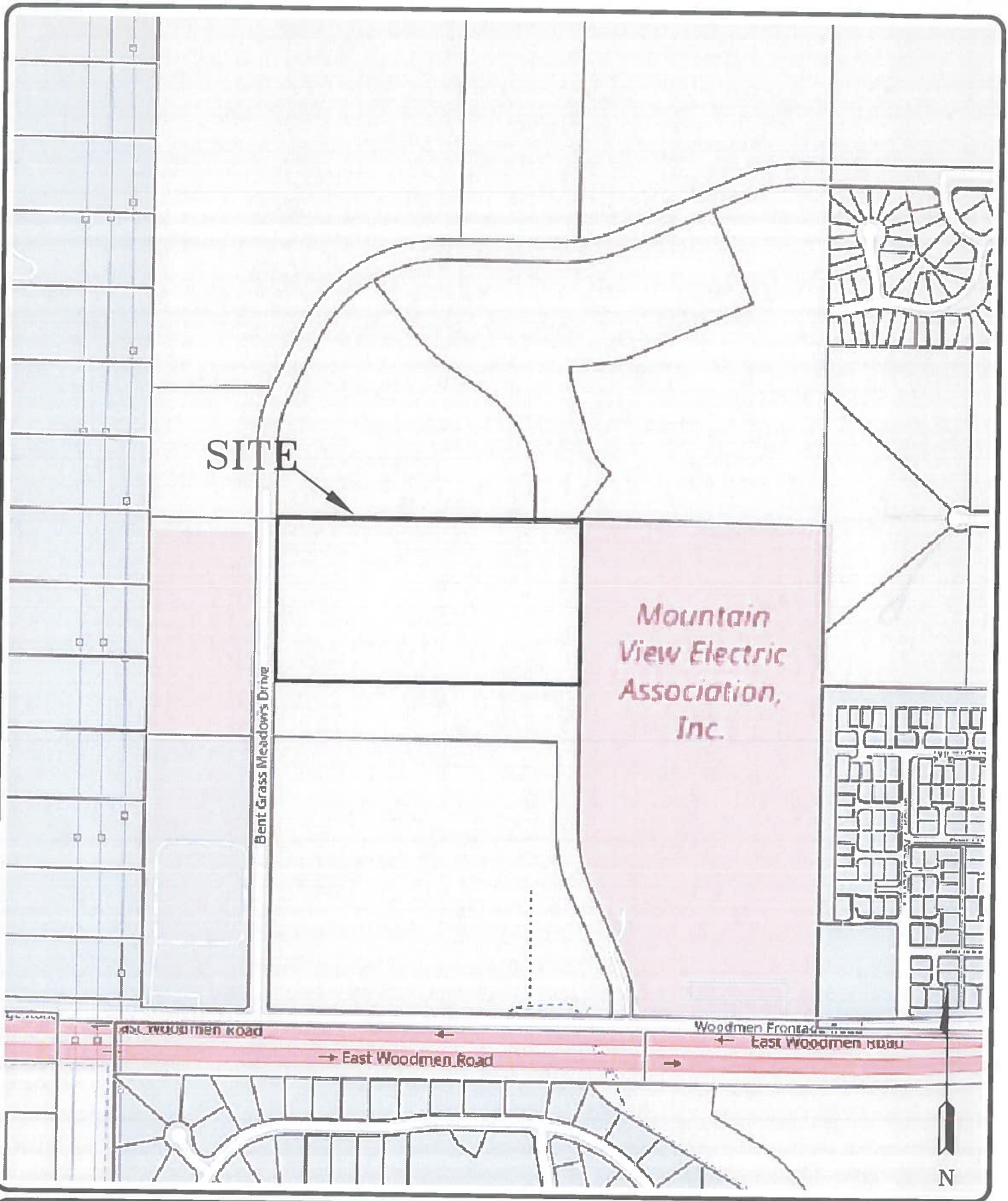
FIGURES



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VICINITY MAP
MANCAVE STORAGE/ MINI RV STORAGE
BENT GRASS MEADOWS DRIVE
EL PASO COUNTY, CO.
FOR: HAMMERS CONSTRUCTION, INC.

DRAWN:	DATE:	CHECKED:	DATE:
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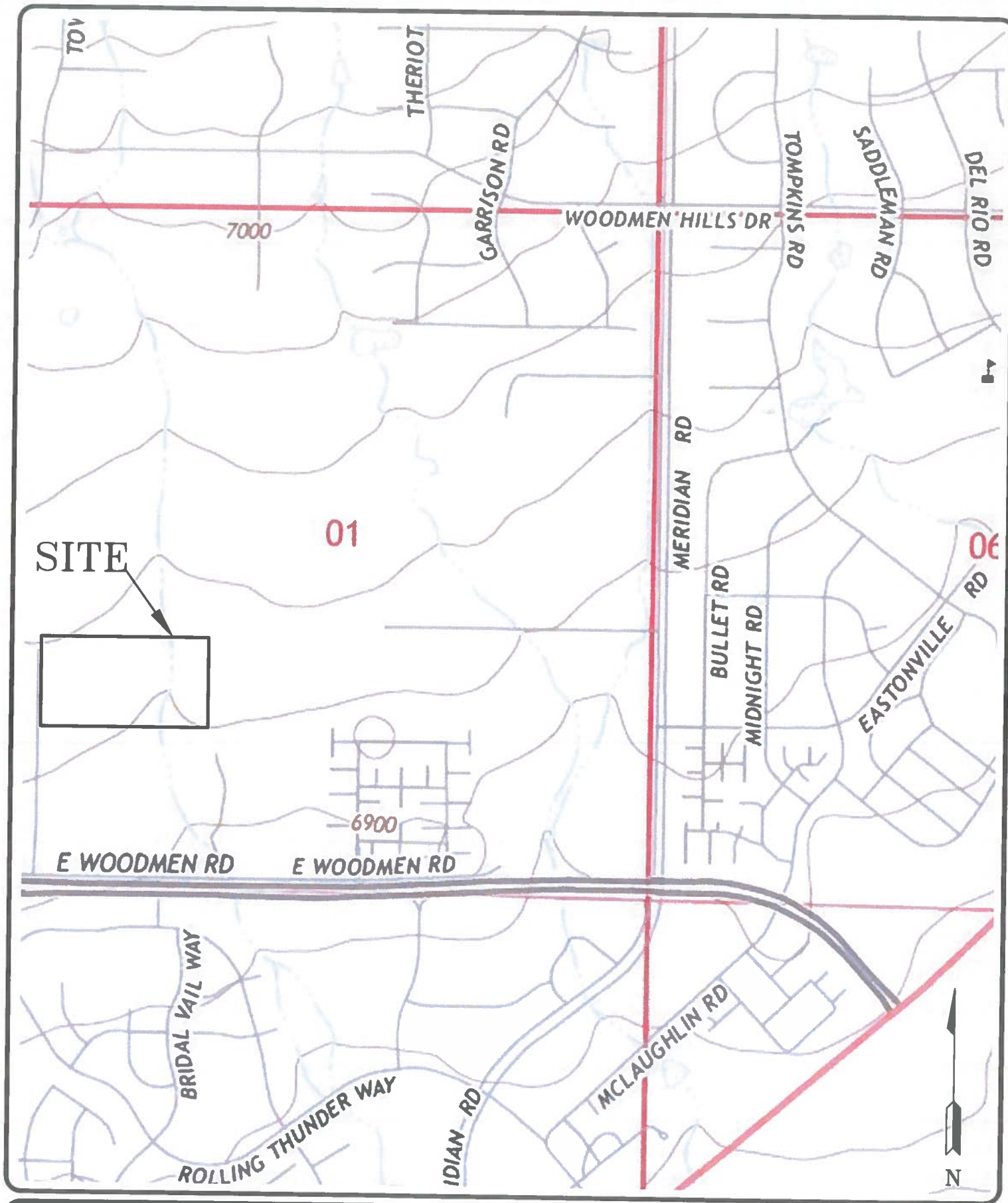
JOB NO.: 200337

FIG NO.: 1



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USGS TOPOGRAPHY MAP
MANCAVE STORAGE/ MINI RV STORAGE
BENT GRASS MEADOWS DRIVE
EL PASO COUNTY, CO.
FOR: HAMMERS CONSTRUCTION, INC.

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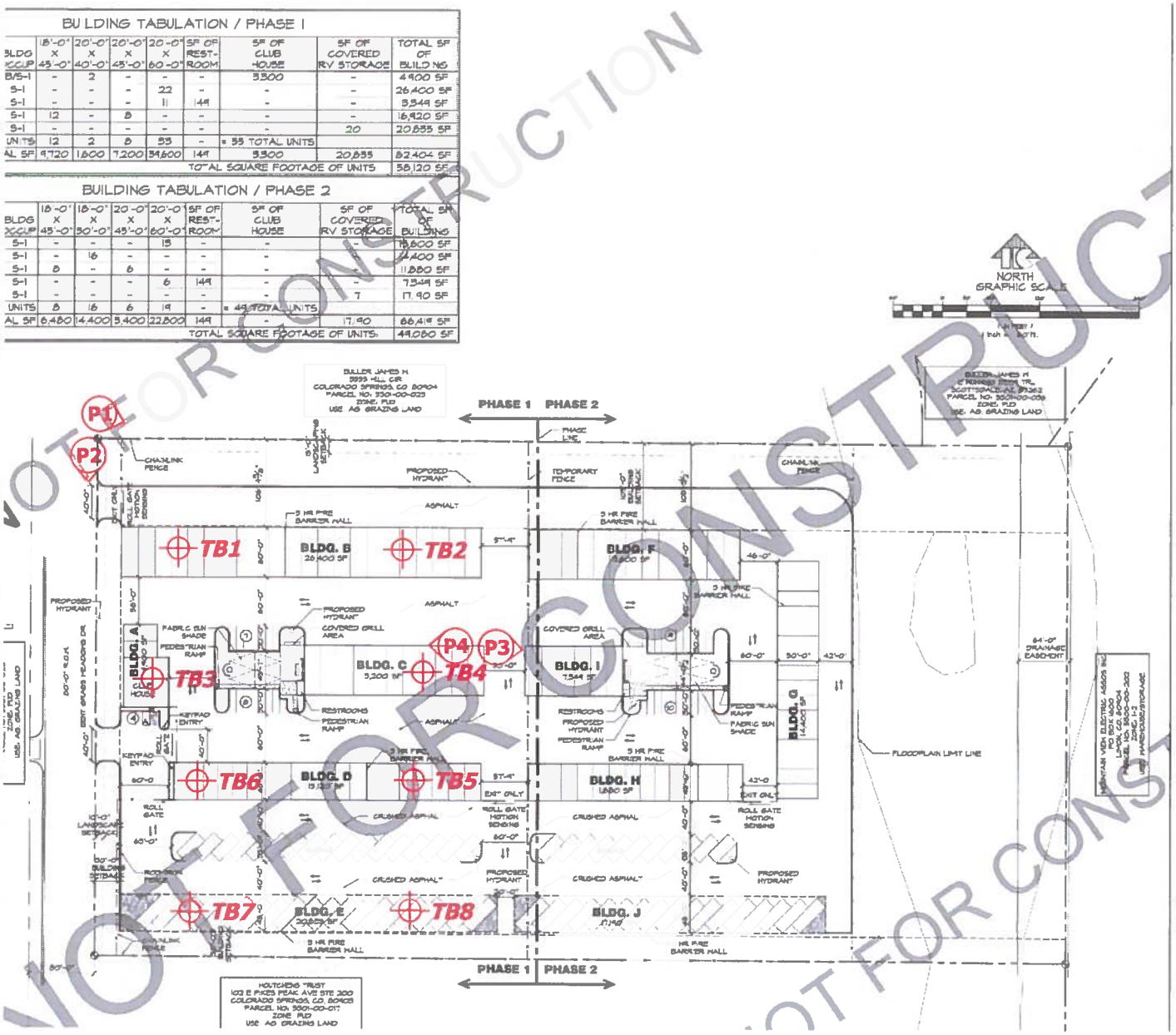
FIG NO.: 2

BUILDING TABULATION / PHASE 1

BLDG OCCUP	18'-0" X 45'-0"	20'-0" X 40'-0"	20'-0" X 45'-0"	20'-0" X 60'-0"	SF OF REST-ROOM	SF OF CLUB HOUSE	SF OF COVERED RV STORAGE	TOTAL SF OF BUILDING
B/S-1	-	2	-	-	-	3300	-	4900 SF
S-1	-	-	-	22	-	-	-	26400 SF
S-1	-	-	-	11	144	-	-	3,544 SF
S-1	12	-	8	-	-	-	-	16,920 SF
S-1	-	-	-	-	-	-	20	20,835 SF
UNITS	12	2	8	33	-	= 55 TOTAL UNITS		
AL SF	9720	1800	7200	34600	144	3300	20,835	82404 SF
					TOTAL SQUARE FOOTAGE OF UNITS			58,120 SF

BUILDING TABULATION / PHASE 2

BLDG OCCUP	18'-0" X 45'-0"	18'-0" X 30'-0"	20'-0" X 45'-0"	20'-0" X 60'-0"	SF OF REST-ROOM	SF OF CLUB HOUSE	SF OF COVERED RV STORAGE	TOTAL SF OF BUILDING
S-1	-	-	-	15	-	-	-	15,600 SF
S-1	-	16	-	-	-	-	-	11,400 SF
S-1	8	-	6	-	-	-	-	11,880 SF
S-1	-	-	-	6	144	-	-	7,344 SF
S-1	-	-	-	-	-	-	7	17,90 SF
UNITS	8	16	6	19	-	= 49 TOTAL UNITS		
AL SF	6,480	4,400	5,400	22,800	144	-	17,90	66,419 SF
					TOTAL SQUARE FOOTAGE OF UNITS			49,080 SF



⊕ TB- approximate test boring location and number

(P2) - approximate location and number of photograph

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SITE PLAN
MANCAVE STORAGE/ MINI RV STORAGE
BENT GRASS MEADOWS DRIVE
EL PASO COUNTY, CO.
FOR: HAMMERS CONSTRUCTION, INC.

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FIG NO.: 3

N

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SOIL SURVEY MAP
MANCAVE STORAGE/ MINI RV STORAGE
BENT GRASS MEADOWS DRIVE
EL PASO COUNTY, CO.
FOR: HAMMERS CONSTRUCTION, INC.

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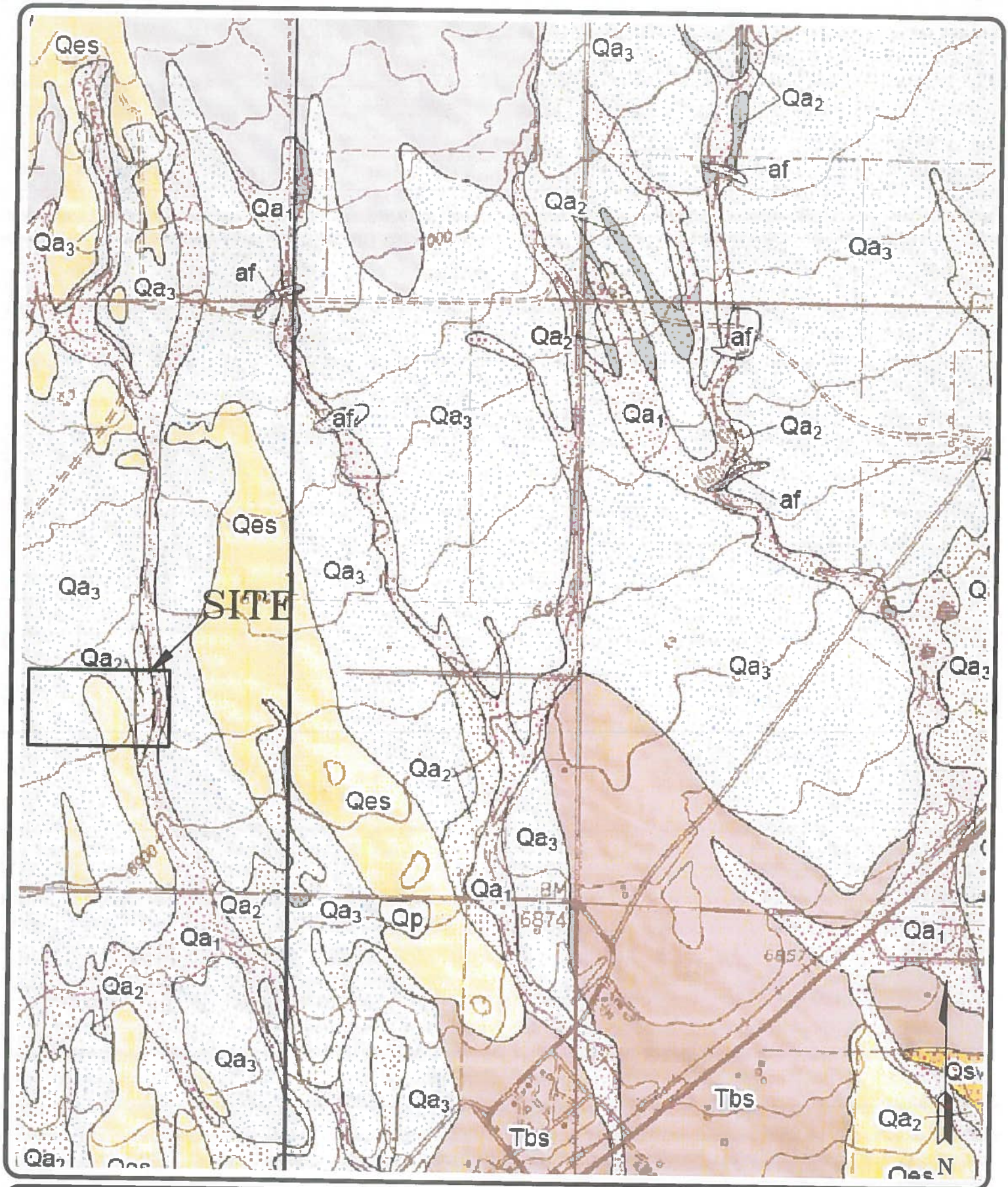
JOB NO.: 200337

FIG NO.: 4



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FALCON QUADRANGLE GEOLOGY MAP
MANCAVE STORAGE/ MINI RV STORAGE
BENT GRASS MEADOWS DRIVE
EL PASO COUNTY, CO.
FOR: HAMMERS CONSTRUCTION, INC.

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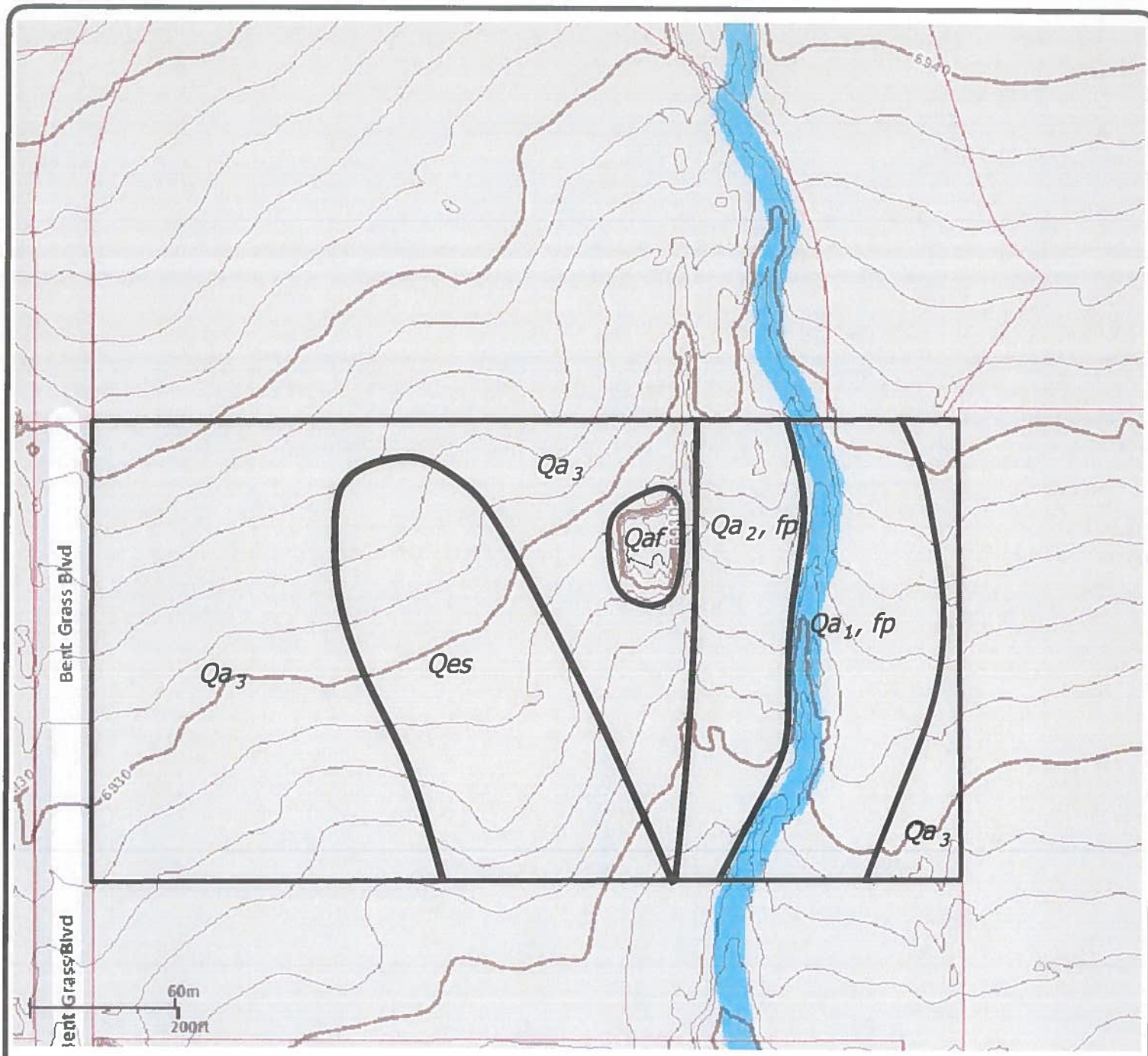
FIG NO.: 5



Legend:

Qaf - **Artificial Fill Deposits of Holocene Age:**
man-made fill deposits associated a fill stockpile

Qa_1 - **Alluvium One of Late Holocene Age:**
recent water deposited materials along the drainage on-site

Qa_2 - **Alluvium Two of Early Holocen Age:**
stream terrace deposited sands and clays

Qa_3 - **Alluvium Three of Late Pleistocene Age:**
stream terrace deposited sands

fp- floodplain

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ENGINEERING GEOLOGY/ GEOLOGY MAP
MANCAVE STORAGE/ MINI RV STORAGE
BENT GRASS MEADOWS DRIVE
EL PASO COUNTY, CO.
FOR: HAMMERS CONSTRUCTION, INC.

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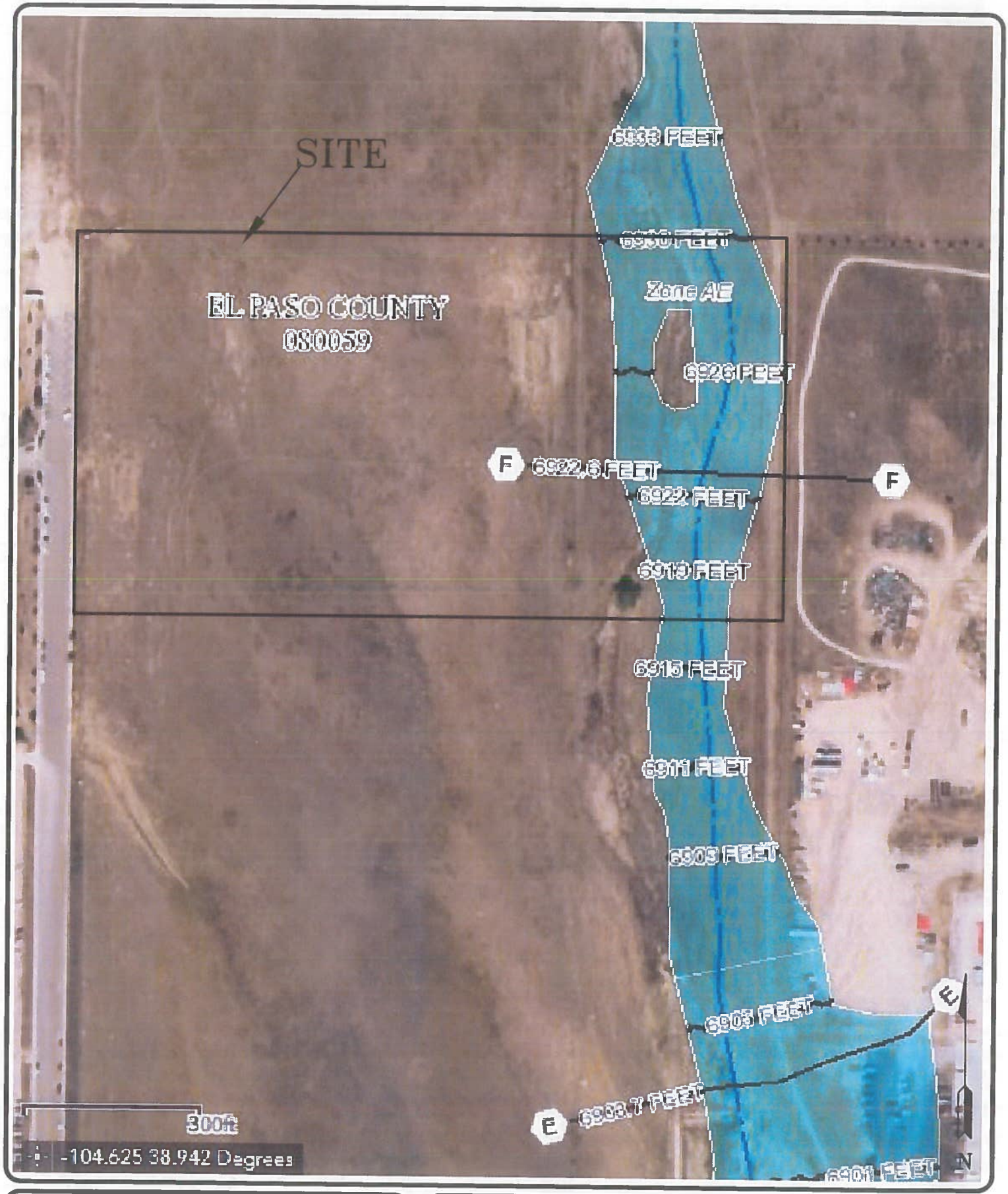
FIG NO.: 6



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FEMA FLOODPLAIN MAP
MANCAVE STORAGE/ MINI RV STORAGE
BENT GRASS MEADOWS DRIVE
EL PASO COUNTY, CO.
FOR: HAMMERS CONSTRUCTION, INC.

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JOB NO.: 200337

FIG NO.: 7

APPENDIX A: Site Photographs

1

Looking east from the northwest corner of the site.

March 7, 2020

2

Looking south from the northwestern corner of the site.

March 7, 2020

Job No. 200337

3

Looking east from the central portion of the site.

March 7, 2020

4

Looking west from the central portion of the site.

March 7, 2020

Job No. 200337

APPENDIX B: Test Boring Logs and Summary of Laboratory Testing Results, Entech Job No. 191685

TABLE 1

SUMMARY OF LABORATORY TEST RESULTS

CLIENT HAMMERS CONSTRUCTION
PROJECT BENTGRASS MEADOWS
JOB NO. 191685

SOIL TYPE	TEST BORING NO.	DEPTH (FT)	WATER (%)	DRY DENSITY (PCF)	PASSING NO. 200 SIEVE (%)	LIQUID LIMIT (%)	PLASTIC INDEX (%)	SULFATE (WT %)	FHA SWELL (PSF)	SWELL/ CONSOL (%)	UNIFIED CLASSIFICATION	SOIL DESCRIPTION
1	1	2-3			18.1	NV	NP	<0.01			SM	SAND, SILTY
1	3	5			10.0						SM-SW	SAND, SLIGHTLY SILTY
1	5	5			41.4						SM	SAND, VERY SILTY
1	6	10	13.2	124.0	28.2	32	18			0.2	SC	SAND, CLAYEY
1	8	2-3			38.0						SM	SAND, SILTY
2	2	10			29.8	34	13	0.01			SC	SANDSTONE, CLAYEY
2	7	20			20.0						SC	SANDSTONE, CLAYEY
3	5	10			58.9				610		CL	CLAYSTONE, VERY SANDY
3	4	15	18.6	112.0	84.5	44	23			0.4	CL	CLAYSTONE, SANDY

TEST BORING NO. 1
DATE DRILLED 10/7/2019
Job # 191685

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
WATER @ 10.5', 10/16/19						
SAND, SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE TO VERY DENSE, MOIST TO WET				21	3.0	1
	5			10	5.9	1
	10			32	7.8	1
WEATHERED TO FORMATIONAL SANDSTONE, SILTY, FINE TO COARSE GRAINED, TAN, DENSE TO VERY DENSE, WET	15			42	13.9	2
	20			50/6"	14.5	2

TEST BORING NO. 2
DATE DRILLED 10/7/2019
CLIENT HAMMERS CONSTRUCTION
LOCATION BENTGRASS MEADOWS

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
WATER @ 14', 10/16/19						
SAND, SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, MOIST				21	8.2	1
CLAYEY LENSES	5			17	11.2	1
SANDSTONE, CLAYEY, FINE TO COARSE GRAINED, GRAY BROWN, VERY DENSE, MOIST	10			50	12.0	2
SANDSTONE, SILTY, FINE TO COARSE GRAINED, TAN, VERY DENSE TO DENSE, WET	15			50/7"	10.5	2
WEATHERED ZONE	20			34	12.8	2

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TEST BORING LOG

DRAWN	DATE	CHECKED:	DATE:
			10/21/19

JOB NO 191685
FIG NO A- 1

TEST BORING NO. 3
DATE DRILLED 10/9/2019
Job # 191685

REMARKS

WATER @ 7.5', 10/16/19

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	Description
			28	2.4	1	6" TOPSOIL, SAND, SLIGHTLY SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE TO VERY DENSE, DRY TO WET
5			28	2.6	1	
10			25	17.5	1	
15			28	10.9	1	
						SANDSTONE, SILTY, CLAYEY,
20			50/8"	16.4	2	FINE TO MEDIUM GRAINED, GRAY BROWN, VERY DENSE, WET

TEST BORING NO. 4
DATE DRILLED 10/9/2019
CLIENT HAMMERS CONSTRUCTION
LOCATION BENTGRASS MEADOWS

REMARKS

WATER @ 18.5', 10/16/19

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	Description
			10	3.9	1	6" TOPSOIL, SAND, SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, MOIST
5			13	6.3	1	
10			35	14.7	3	WEATHERED CLAYSTONE, SANDY, GRAY BROWN, VERY STIFF, MOIST
15			50/8"	16.5	3	CLAYSTONE, SANDY TO VERY SANDY, GRAY BROWN, HARD, MOIST
20			50/6"	10.7	3	

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TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
		DS	11/21/19

JOB NO. 191685
FIG NO. A- 2

TEST BORING NO. 5
DATE DRILLED 10/9/2019
Job # 191685

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
WATER @ 7.5', 10/16/19						
6" TOPSOIL, SAND, SILTY TO VERY SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, DRY TO MOIST				29	1.6	1
FINE GRAINED, VERY SILTY LENSES	5			10	9.2	1
WEATHERED CLAYSTONE, VERY SANDY, BROWN, STIFF, MOIST	10			27	13.3	3
	15			*	15.5	3
* - BULK SAMPLE TAKEN	20					

TEST BORING NO. 6
DATE DRILLED 10/9/2019
CLIENT HAMMERS CONSTRUCTION
LOCATION BENTGRASS MEADOWS

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
WATER @ 6.5', 10/16/19						
6" TOPSOIL, SAND, SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, DRY				21	2.8	1
	5			23	1.7	1
SAND, CLAYEY, FINE TO COARSE GRAINED, GRAY BROWN, MEDIUM DENSE, WET	10			20	13.2	1
SANDSTONE, SILTY, FINE TO COARSE GRAINED, BROWN, VERY DENSE, WET	15			50/6"	11.2	2
* - BULK SAMPLE TAKEN	20			*	16.3	2

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TEST BORING LOG

DRAWN:	DATE	CHECKED:	DATE:
		DS	11/14/19

JOB NO. 191685
FIG NO. A- 3

TEST BORING NO. 7
DATE DRILLED 10/9/2019
Job # 191685

REMARKS

WATER @ 6', 10/16/19

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
			22	1.8	1	6" TOPSOIL, SAND, SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, DRY TO WET
5			24	3.4	1	
10			22	10.1	1	
15			50/11"	11.8	2	SANDSTONE, CLAYEY, FINE TO COARSE GRAINED, GRAY BROWN, VERY DENSE, MOIST
20			50/3"	10.4	2	

TEST BORING NO. 8
DATE DRILLED 10/9/2019
CLIENT HAMMERS CONSTRUCTION
LOCATION BENTGRASS MEADOWS

REMARKS

WATER @ 5.5', 10/16/19

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
			14	16.7	1	6" TOPSOIL, SAND, SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, VERY MOIST
5			20	11.1	1	
10			50/6"	11.0	2	SANDSTONE, SILTY, FINE TO COARSE GRAINED, BROWN TO TAN, VERY DENSE, WET
15			50/8"	29.3	2	
20			50/4"	11.7	2	

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TEST BORING LOG

DRAWN:	DATE	CHECKED	DATE
		DS	4/24/19

JOB NO.: 191685
FIG NO. A- 4

APPENDIX C: Soil Survey Descriptions

El Paso County Area, Colorado

9—Blakeland-Fluvaquentic Haplaquolls

Map Unit Setting

National map unit symbol: 36b6
Elevation: 3,500 to 5,800 feet
Mean annual precipitation: 13 to 17 inches
Mean annual air temperature: 46 to 55 degrees F
Frost-free period: 110 to 165 days
Farmland classification: Not prime farmland

Map Unit Composition

Blakeland and similar soils: 60 percent
Fluvaquentic haplaquolls and similar soils: 38 percent
Minor components: 2 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Blakeland

Setting

Landform: Hills, flats
Landform position (three-dimensional): Side slope, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy alluvium derived from arkose and/or eolian deposits derived from arkose

Typical profile

A - 0 to 11 inches: loamy sand
AC - 11 to 27 inches: loamy sand
C - 27 to 60 inches: sand

Properties and qualities

Slope: 1 to 9 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Available water storage in profile: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: Sandy Foothill (R049BY210CO)

Hydric soil rating: No

Description of Fluvaquentic Haplaquolls

Setting

Landform: Swales
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

H1 - 0 to 12 inches: variable

Properties and qualities

Slope: 1 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 6.00 in/hr)
Depth to water table: About 0 to 24 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)

Interpretive groups

Land capability classification (irrigated): 6w
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: D
Hydric soil rating: Yes

Minor Components

Other soils

Percent of map unit: 1 percent
Hydric soil rating: No

Pleasant

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 17, Sep 13, 2019

El Paso County Area, Colorado

19—Columbine gravelly sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 367p
Elevation: 6,500 to 7,300 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

Map Unit Composition

Columbine and similar soils: 97 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Columbine

Setting

Landform: Flood plains, fan terraces, fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

A - 0 to 14 inches: gravelly sandy loam
C - 14 to 60 inches: very gravelly loamy sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: Gravelly Foothill (R049BY214CO)
Hydric soil rating: No

Minor Components

Fluvaquentic haplaquolls

Percent of map unit: 1 percent

Landform: Swales
Hydric soil rating: Yes

Other soils
Percent of map unit: 1 percent
Hydric soil rating: No

Pleasant
Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 17, Sep 13, 2019