GEOTECHNICAL ENGINEERING REPORT

DE BEQUE PROCESSING PLANT
DE BEQUE, COLORADO

PREPARED FOR
SUMMIT MIDSTREAM PARTNERS

PREPARED BY
OLSSON ASSOCIATES

MARCH 5, 2013

OA PROJECT NO. 013-0247

1802 East 123rd Street · Olathe, KS 66061 · (913) 829-0078 · FAX (913) 829-0258

OLSSON ASSOCIATES

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A. PROJECT UNDERSTANDING

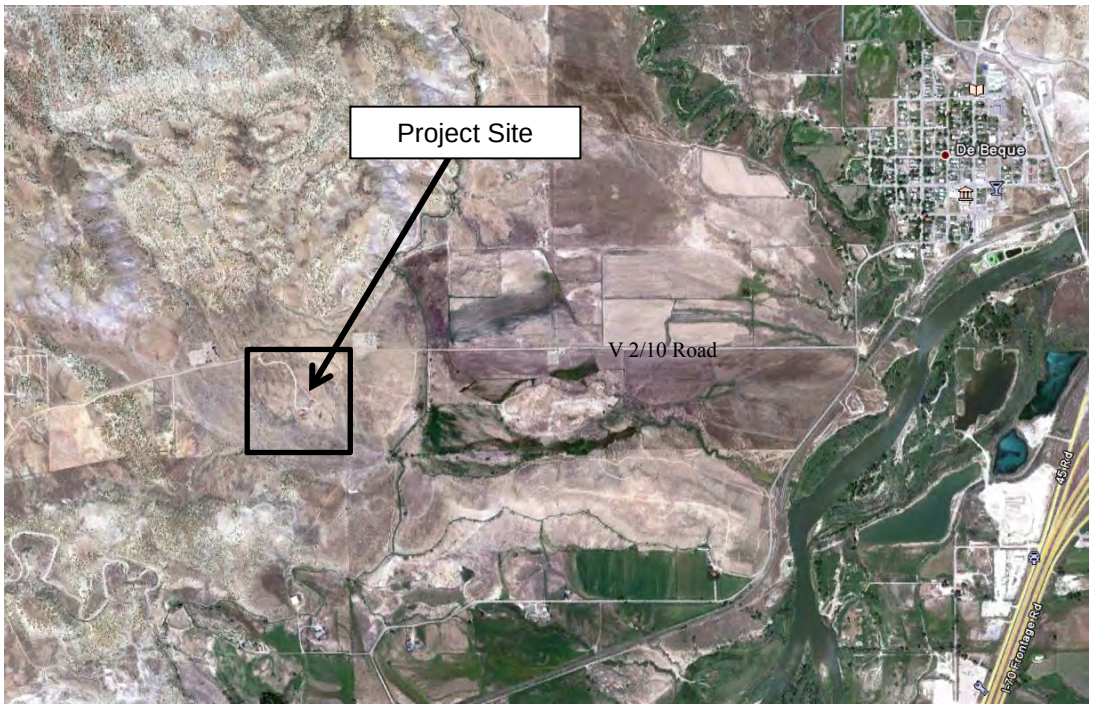
A.1. GEOTECHNICAL SCOPE

This Geotechnical Engineering Report presents the results of the subsurface exploration completed for the proposed processing plant in De Beque, Colorado. In general accordance with our January 18, 2013 Letter Agreement for Professional Services and the February 11, 2013 authorization for additional drilling, Olsson completed ten (10) borings at this site. The locations of the borings are shown on the Boring Location Plan in Appendix A and boring logs are provided in Appendix B. The purpose of this exploration was to evaluate the existing subsurface conditions encountered at the borings and provide geotechnical design recommendations for the design of foundations for the proposed processing plant.

A.2. PROJECT INFORMATION

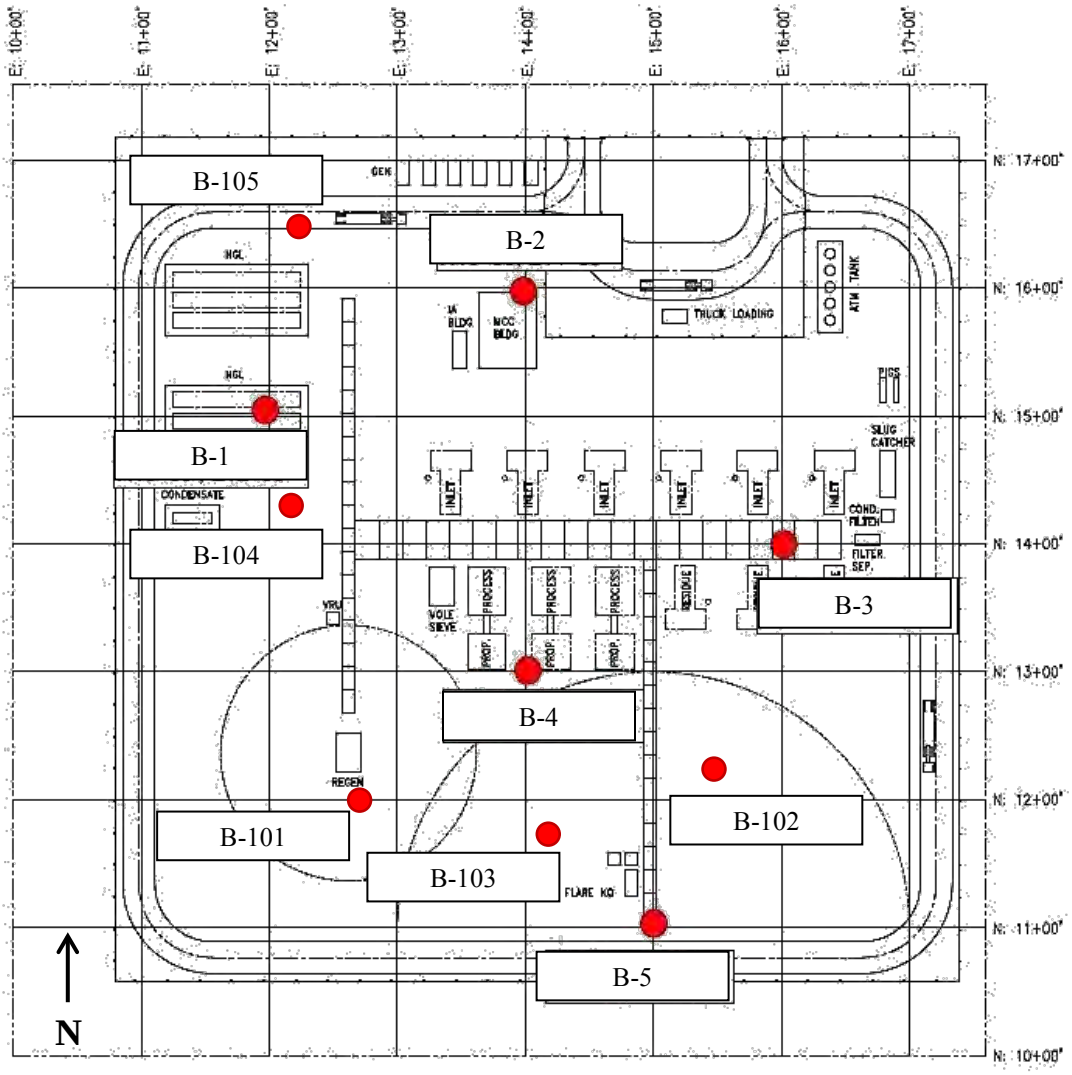
The proposed De Beque processing plant location encompasses approximately 36 acres on the south side of V 2/10 Road. The site location is approximately 3 miles west of De Beque, Colorado as shown in Figure 1. Two existing structures and two below ground tanks are present at the site. The site topography typically slopes down to the southeast across the site. Boring elevations ranged from a high of about 5,067 feet (USGS datum) on the northwest side of the site to a low of 5,040 feet (USGS datum) on the southeast side of the site.

Figure 1: Site Location



This project consists of pre-engineered metal buildings, skidded process equipment, bullet storage tanks, a truck loading skid, a slug catcher, pipe rack, flare, reciprocating compressors and refrigeration systems. We have not been informed of any dynamic loading conditions. The foundation loading for these structures is anticipated to not exceed 3 ksf. Finished floor elevations (FFE) were not available at the time of this report; however, we anticipate the cut/fill at this site will be less than 10 feet. The proposed site layout is shown in Figure 2.

Figure 2: Site Plan



B. Exploratory and Test Procedures

B.1. Field Exploration

The drill crew used a truck mounted drill rig to complete 10 borings. The boring locations were selected and located in the field by Summit Midstream Partners. The ground surface elevations indicated on the boring logs were determined by Summit Midstream Partners and are reported to the nearest tenth of a foot. The approximate locations of the borings are shown on the *Boring Location Map* in Appendix A.

The geotechnical borings were drilled to a depth of 15 feet below the existing ground surface. The environmental borings were drilled to depths from 30.5 feet to 40 feet below the existing ground surface. Samples were obtained using split-barrel sampling procedures. In the split-barrel sampling procedure, a standard 2-inch (outside diameter) split-barrel sampling spoon is driven into the ground with a 140-pound hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration is recorded as the standard penetration resistance value (N). These "N" values are indicated on the boring logs at the depths of occurrence. The samples were sealed and returned to the laboratory for testing and classification.

The drill crew prepared a field log of the material encountered at each boring. The field logs also included the driller's interpretation of the conditions between samples and elevations of each stratum change. The boring logs in Appendix B represent the engineer's interpretation of the field logs based on visual classification and laboratory tests of the samples.

B.2. Laboratory Testing

The soil samples were visually classified using the Unified Soil Classification System (USCS). The moisture content of each sample was determined. Atterberg limits and P-200 tests were performed on representative samples across the site to aid in the classification of the soils under the Unified Soils Classification System. The respective test results are presented on the boring logs and a summary of the laboratory test results is presented in Appendix C.

C. SUBSURFACE CONDITIONS

C.1. SOIL STRATIGRAPHY

Soil stratification, as shown on the boring logs, represents soil conditions at the specific boring locations; however, variations may occur between or beyond the borings. The stratification lines represent the approximate boundary between soil and bedrock types but the actual transition between soil layers may be gradual.

The subsurface soil conditions encountered at the borings generally consisted of clayey sands and low plasticity (lean) clay soils with varying amounts of sand and gravel. Bedrock was encountered at greater depths. Borings B-1 and B-3 through B-5 terminated in the lean clay soils at depths of 15 feet. Borings B-101 and B-104 terminated in the clay soils at depths of 30.5 feet and 40 feet, respectively. The clay soils were generally stiff to hard and dry to moist. Boring B-2 terminated in clayey sand at a depth of 15 feet. The clayey sands were generally medium dense to dense and dry to moist. Borings B-102, B-103 and B-105 encountered shale bedrock at depths of 28 to 28.5 feet. These borings terminated in the shale at depths of 30.5 feet. The shale was generally hard and dry.

C.2. GROUNDWATER OBSERVATION

Water level observations were made at the boring locations during drilling and immediately upon completion. During these times, water was not observed at the boreholes. The lack of groundwater in the boreholes during the exploration program should not be construed to represent an absolute or permanent condition.

Variations and uncertainties exist with relatively short-term water level observations in boreholes. Water levels can and should be anticipated to vary between boring locations, as well as with time within specific borings. Groundwater levels may be expected to fluctuate with variations in precipitation, site grading, drainage and adjacent land use. Long term monitoring with piezometers generally provides a more representative indication of the potential range of groundwater conditions.

D. SITE PREPARATION RECOMMENDATIONS

D.1. GENERAL SITE PREPARATION

Site preparation should commence with stripping of all vegetation, root systems, and any loose, soft or otherwise unsuitable material. Two existing above ground structures and two existing below ground structures (cistern and propane tank) are located at the site. We understand these structures will be razed. All remnants of these structures (footings, slabs, utility lines and associated backfill) should be removed from the site and properly backfilled in accordance with *Section D.2* of this report.

Grading plans were not available at the time of this report. We anticipate cut and fill to be less than 10 feet at the site. Prior to placement of fill in areas below design grade and after rough grading is completed in other areas, the subgrade should be proofrolled. Proofrolling may be accomplished with a fully loaded, tandem-axle dump truck or other equipment with minimum gross weight of 25 tons. Proofrolling aids in providing a firm base for compaction of fill and delineating soft or undisturbed areas that may exist below subgrade level. Unsuitable areas observed at this time should be improved by compaction or by undercutting and placement of suitable compacted fill.

Once the evaluation and/or proofrolling is complete and prior to placement of fill, the upper 8 inches of exposed subgrade should be scarified, moisture conditioned and compacted to a minimum of 95 percent of the materials standard Proctor maximum dry density (ASTM Specification D-698) at a moisture content between 1 percent below optimum and 3 percent above optimum. Once the subgrade has been compacted, the excavated area should be filled in accordance with the recommendations presented in this report.

D.2. STRUCTURAL FILL

In our opinion, it would be possible to reuse on-site clayey and sandy soils at this site as structural fill. Structural fill soils should be relatively free of organic materials (less than about 5 percent by weight) or other unsuitable materials and should not contain particle sizes larger than 3 inches. Imported structural fill should consist of low plasticity clay soils similar to those encountered on the site and well-graded granular, non-expansive material such as pit run, crusher fines or CDOT Class 6 base course. Samples of all potential fill materials should be submitted to ***Olsson*** for review prior to use on the site.

Suitable fill materials should be placed in loose lifts of 8 inches or less. The soil should be compacted using equipment that is the appropriate type and properly sized for the job. Within small excavations, such as in footing trenches, utility trenches, or around manholes, vibrating

plate compactors, walk behind rollers or jumping jacks can be used to achieve the specified compaction. Lift thicknesses should be reduced to 4 inches in small fill areas requiring hand-operated equipment.

An ***Olsson*** field representative should regularly observe and monitor the excavation and grading operations and perform field density tests to document that moisture and compaction requirements are being achieved. Table 1 provides our recommended fill placement recommendations for the site.

Table 1: Fill Placement Guidelines

Areas of Fill Placement	Material	Compaction Recommendation (ASTM D698-Standard Proctor)	Moisture Content (% of Optimum)
Building and Mat Foundation Subgrade – 12 Inches below grade supported floor slabs	Well-Graded Gravel (such as CDOT Class 6)	95%	-2 to +2 percent
Structural fill placed as part of grading operations	On-site soils or imported cohesive soils with LL < 45 PI < 23 or Well-Graded Granular Material	95%	-1 to +3 percent (cohesive) As necessary to obtain density (granular)

The moisture content for imported and on-site soils at the time of compaction should generally be maintained between the ranges specified above. More stringent moisture limits may be necessary with certain soils and some adjustments to moisture contents may be necessary to achieve the specified compaction.

D.3. EXCAVATIONS AND SLOPES

All excavating must comply with applicable local, state, and federal safety regulations. ***The responsibility for excavation safety and stability of temporary construction slopes lies solely with the contractor.*** Construction slopes should be closely monitored for signs of mass movement (tension cracks, bulging, etc.)

Permanent slopes should be no steeper than 3H:1V. The crest or toe of cut or fill slopes should be no closer than 10 feet from any foundation and 5 feet from the edge of any pavement.

D.4. DRAINAGE CONSIDERATIONS

In general, water should not be allowed to collect near the surface of the foundation or floor slab areas of the structures during or after construction. Since soils generally tend to soften when exposed to free water, provisions should be made to remove seepage water from excavations, should it occur. Also, undercut or excavated areas should be sloped toward one corner to facilitate the collection and removal of rainwater or surface runoff.

Site grading should provide for efficient drainage of rainfall or surface runoff away from new structures and pavements. Roof run-off should be collected and transferred directly to the storm sewer system, if possible, or to a location well away from the building and pavements. Conventional downspout drainage leading to splash blocks, though not as desirable, may be used. External hose connections in unpaved areas should incorporate splash blocks to prevent accidental flooding of foundation bearing or backfill soils. External hose connections should have cut-off valves inside the building to prevent accidental or unauthorized use.

Below-slab utilities, drains, and utility conduits should be properly backfilled and compacted to prevent moisture infiltration of the subgrade soils. Backfill of underground utility trenches should be completed in accordance with the recommendations presented in *Section E.2* of this report.

E. GEOTECHNICAL CONSIDERATIONS

At the time of this report, the finished floor elevations, structural details and grading plans were not known. As such, the recommendations contained herein should be considered preliminary and should be reviewed by Olsson as details of the planned structural and grading plans are developed. The subsurface conditions at this site consisted of very stiff to hard silty to sandy clay and clayey sand soils. In our opinion, these soils are suitable to support the planned structures using mat foundations or shallow spread footings. Design recommendations for each of these foundation systems, as well as recommendations for general earthwork for the proposed *facility* are presented in the following sections.

F. FOUNDATION RECOMMENDATIONS

In our opinion, the proposed structures can be supported on either mat foundations or shallow foundations bearing on stiff, native clay soils or controlled engineered fill. Recommendations for both can be found in the following section.

F.1. SHALLOW FOUNDATION CONSIDERATIONS

Footings founded in the recommended materials may be proportioned for a maximum allowable net bearing pressure of 3,000 pounds per square foot (psf). The net bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. For short term, temporary loading conditions, the allowable bearing pressure may be increased by 33 percent.

For shallow spread footings, the exterior footings and footings in unheated areas should bear at a minimum depth of 3 feet below the lowest adjacent final ground surface. Footings should have a minimum foundation width of 18 inches for continuous footings and 30 inches for isolated column footings. Earth formed trench footings should have a minimum width of 12 inches. Continuous wall footings should be designed with sufficient structural reinforcement to span a minimum of 10 feet when acting as a continuous grade beam under the foundation loads.

After excavation, the foundation subgrade should be observed by an ***Olsson*** representative to evaluate that the soils are uniform and consistent with the soils encountered during this exploration. In the event that isolated areas of soft or unsuitable soils are identified, ***Olsson*** should be consulted to assist in determining appropriate corrective actions.

After foundation subgrades have been observed and evaluated by an ***Olsson*** representative, concrete should be placed as soon as possible to avoid subjecting the exposed soils to drying, wetting, or freezing conditions. If foundation subgrade soils are subjected to such conditions, ***Olsson*** should be contacted to reevaluate the foundation bearing materials.

Foundations designed and constructed as recommended above would be expected to experience post-construction total settlements less than 1 inch. Differential settlements of less than ½ inch between adjacent soil supported foundation elements would be expected.

F.2. FLOOR SLAB AND MAT FOUNDATION

We recommend that new grade supported concrete floor slabs and mat foundations be supported on the upper 12 inches of a well-graded crushed aggregate, such as CDOT Class 6

or equivalent. The aggregate should be placed and compacted to a minimum of 95 percent of the maximum dry density as determined by the standard Proctor test (ASTM Specification D698). The moisture content of cohesive crushed aggregate material should also be controlled between -2 and +2 percent of the materials optimum. The crushed aggregate subgrade should be tested by an ***Olsson*** representative.

Mat foundations and floor slabs supported on approved subgrade as discussed above can be designed using a modulus of subgrade reaction of 150 pounds per square inch per inch (psi/in). This modulus value is correlated to a 1 foot square area and should be corrected to account for the actual size of the mat, as shown below:

$$k_b = \frac{k_v}{b}\left(\frac{m + 0.5}{1.5m}\right)$$

Where:

k_b = *Coefficient of subgrade reaction for foundation of width* b

k_v = *Coefficient of subgrade reaction for 1' x 1' plate*

b = *Width of foundation*

m = *Length of foundation*

The procedures recommended above may not eliminate all future subgrade volume change and resultant slab movement. Depending on many factors, including the size and shape of the floor area, the location of construction joints in the slab, the rigidity of the slab and foundation connection, and the magnitude of actual movement that occurs, cracks within the floor slab could occur and should be anticipated. Leaking utility lines or water allowed to accumulate beneath the slab could lead to significant movements of the slab.

F.3. SEISMIC CLASSIFICATION

According to the International Building Code (IBC), soils within the upper 100 feet determine the seismic structural design criteria for the project site. For this project site, we recommend using a Site Class "D" (Stiff Soil Profile) according to Table 1613.5.2 of the 2009 IBC. This recommendation is based on the soils encountered in the test borings and our understanding of the local geology.

F.4. LATERAL EARTH PRESSURES

The following soil parameters for retaining walls are provided for use in designing foundation or grade retaining walls subject to lateral earth pressures within newly placed and documented, cohesive structural fill. The parameters are based on the understanding that the retained soils will be similar in composition to the on-site, low plastic soils encountered during this exploration.

Walls which are rigidly restrained at the top and are essentially unable to deflect or rotate should be designed for "at rest" earth pressure conditions. Walls that are unrestrained at the top and are free to deflect or rotate slightly may be designed for "active" earth pressure conditions. The "passive" earth pressure condition should be used to evaluate the resistance of soil to lateral loads. The recommended earth pressure coefficients in Table 2 are based on our experience with soils in the area. Equivalent fluid densities are frequently used for the calculation of lateral earth pressures for the "at-rest" and "active" conditions and are also provided. The values provided assume that positive drainage is present to prevent hydrostatic forces from developing behind the wall. In addition, the equivalent fluid densities below do not include the effects of surcharge loading.

Table 2: Lateral Earth Pressures

Earth Pressure Coefficient (K)			Equivalent Fluid Density (G)	
			Drained	Undrained
At Rest (K_o)	Cohesive	0.60	70 pcf	95 pcf
	Granular*	0.45	60 pcf	---
Active (K_a)	Cohesive	0.42	50 pcf	85 pcf
	Granular*	0.33	40 pcf	---
Passive (K_p)	Cohesive	2.40	280 pcf	
	Granular*	3.00	350 pcf	

* Granular backfill should be permanently drained

These design recommendations are based on the following assumptions:

- For active earth pressure, wall must rotate about base, with top lateral movements 0.002 Z to 0.004 Z, where Z is wall height
- Wall must “move” horizontally to mobilize passive resistance
- Uniform surcharge, where S is surcharge pressure, in psf
- In-situ soil backfill weight a maximum of 120 pcf
- Horizontal backfill, compacted to 95% of Standard Proctor maximum dry density
- Heavy equipment and other concentrated load components not included
- No hydrostatic pressure acting on wall
- No safety factor included

- Ignore passive pressure in frost zone

Backfill placed against structures should consist of granular soils or low plasticity cohesive soils. For the granular values to be valid, the granular backfill must extend out from the base of the wall at an angle of at least 45 and 60 degrees from vertical for the active and passive cases, respectively. To calculate the resistance to sliding, an ultimate coefficient of friction value of 0.40 should be used where the footing bears on soil.

To intercept infiltrating surface water behind the wall, we recommend a perimeter drain be installed at the foundation level. The invert of a drain line around a below-grade building area should be below the finished subgrade elevation for the interior floor. The drain line should be sloped to provide positive gravity drainage and should be surrounded by free-draining granular material graded to prevent the intrusion of fines, or an alternative free-draining granular material encapsulated with suitable filter fabric,. At least a 2-foot wide section of free-draining granular fill should be used for backfill above the drain line and adjacent to the wall and should extend to within 2 feet of final grade. The granular backfill should be capped with compacted cohesive fill to minimize infiltration of surface water into the drain system.

G. PAVEMENTS

G.1. PAVEMENT SUBGRADE PREPARATION

Pavement subgrades should be prepared in accordance with the recommendations presented in the "Site Preparation" section of this report. Construction scheduling often involves grading and paving by separate contractors and can involve a time lapse between the end of grading operations and the commencement of paving. Disturbance, desiccation or wetting of the subgrade soils between grading and paving can result in deterioration of the previously completed subgrade. If soft areas are identified during the subgrade preparation or if the subgrade soils have been exposed to adverse weather conditions, frost, excessive construction traffic, standing water, or similar conditions, the ***Olsson*** should be consulted to determine if corrective action is necessary.

It is important that the pavement subgrade support be relatively uniform, with no abrupt changes in the degree of support. Non-uniform pavement support can occur at the transition from cut to fill areas, or as a result of varying soil moisture contents or soil types, or where improperly placed utility backfill has been placed across or through areas to be paved. Improper subgrade preparation such as inadequate vegetation or demolition debris removal, failure to identify soft or unstable areas by proofrolling, and inadequate or improper compaction can also produce non-uniform subgrade support.

We recommend that the prepared subgrade extend a minimum of 2-feet outside the pavements, where feasible. ***Olsson*** should be present during subgrade preparation to observe, document, and test compaction of the materials at the time of placement. As recommended for all prepared soil subgrades, heavy, repetitive construction traffic should be controlled, especially during periods of wet weather, to minimize disturbance. The final prepared subgrade should be proofrolled with a loaded dump truck or similar rubber-tired equipment with a total weight of at least 20-tons, immediately prior to placement of new pavements. Proofrolling operations should be observed and documented by ***Olsson***. Unstable or unsuitable soils revealed by proofrolling should be reworked to provide a stable subgrade or removed and replaced with structural fill.

H. PROJECT LIMITATIONS

The conclusions and recommendations presented in this report are based on the information available regarding the proposed construction, the results obtained from our soil test borings and sampling procedures, the results of the laboratory testing program, and our experience with similar projects. The soil test borings represent a very small statistical sampling of subsurface soils and it is possible that conditions may be encountered during construction that are substantially different from those indicated by the soil test borings. In these instances, adjustments to design and construction may be necessary. This geotechnical report is based on the site plan and information provided to ***Olsson*** and our understanding of the project as noted in this report. Changes in the location or design of new structures and/or pavements could significantly affect the conclusions and recommendations presented in this geotechnical report. ***Olsson*** should be contacted in the event of such changes to determine if the recommendations of this report remain appropriate for the revised site design.

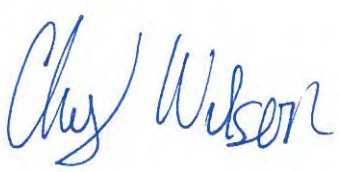
This report was prepared under the direction and supervision of a Professional Engineer registered in the State of Colorado with the firm of Olsson Associates. The conclusions and recommendations contained herein are based on generally accepted, professional geotechnical engineering practices at the time of this report, within this geographic area. No other warranty is expressed or implied. This report has been prepared for the exclusive use of Summit Midstream Partners, and their authorized representatives for specific application to the proposed project.

I. CLOSING

Olsson appreciates the opportunity to provide our services on this project and look forward to working with you during construction. Should you have any questions, please do not hesitate to contact us.

Respectfully submitted,

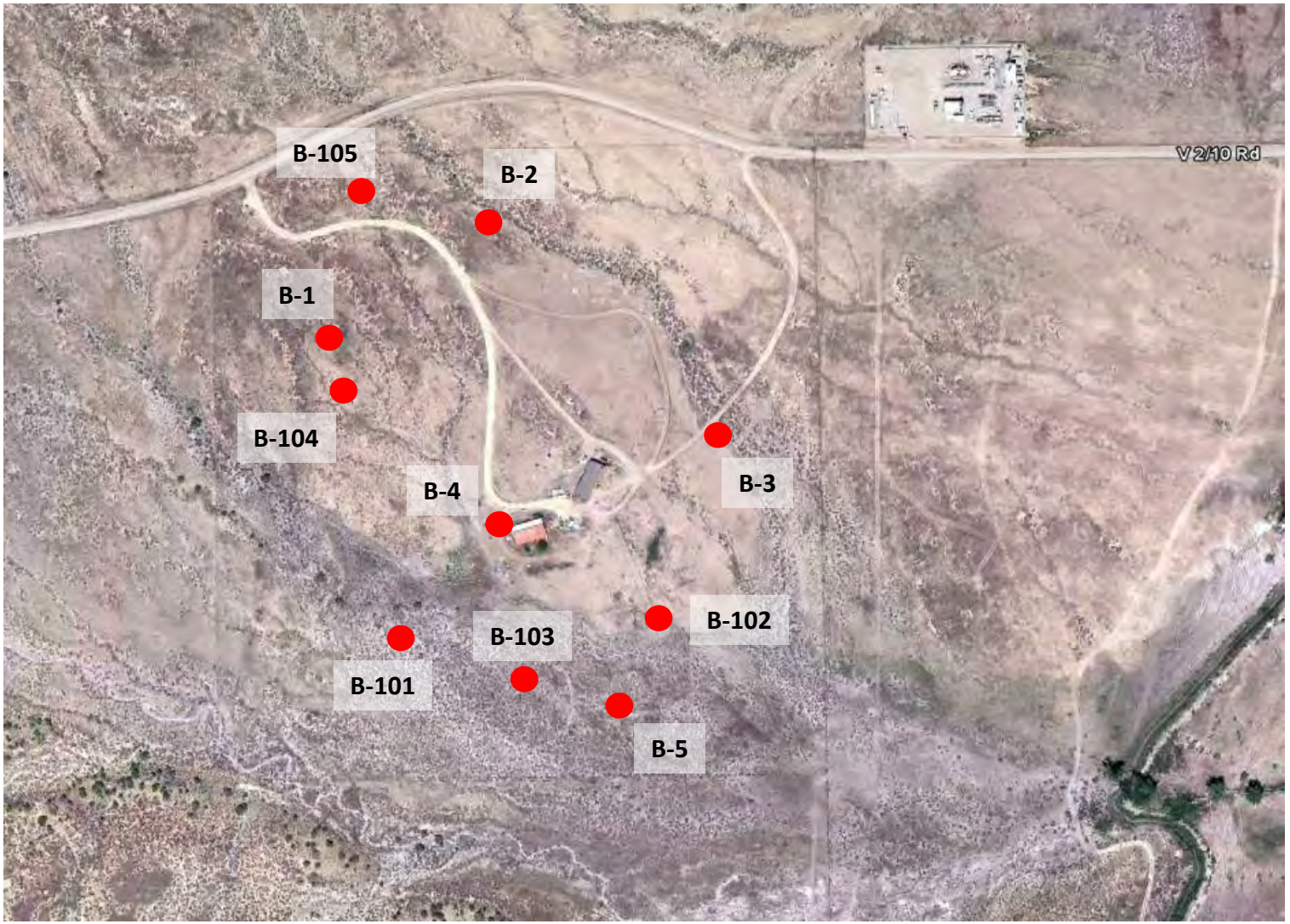
Olsson Associates



Christy Wilson, EI

James M. Landrum, PE

APPENDIX A
Boring Location Plan



North

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Boring Location Plan

Scale: n.t.s.	**De Beque Processing Plant**
Project No. 013-0247	**De Beque, Colorado**
Approved by: CLW	
Date: 3/4/13	

APPENDIX B

Symbols and Nomenclature
Soil Test Boring Logs

SYMBOLS AND NOMENCLATURE

DRILLING NOTES

DRILLING AND SAMPLING SYMBOLS

SS:	Split-Spoon Sample
ST:	Thin-walled Tube Sample
GB:	Grab Sample
PP:	Pocket Penetrometer
% Rec:	Percentage of Thin-walled Tube sample recovered
SPT Blow Counts:	Standard Penetration Test blows per 6" penetration
HSA:	Hollow Stem Auger
CFA:	Continuous Flight Auger
N.E.:	Not Encountered
N.A.:	Not Available
N.P.:	Not Performed

DRILLING PROCEDURES

Soil sampling and standard penetration testing performed in accordance with ASTM D 1586. The standard penetration resistance (SPT) N value is the number of blows of a 140 pound hammer falling 30 inches to drive a 2 inch O.D., 1.4 inch I.D. split-spoon sampler one foot. The thin-walled tube sampling procedure is described by ASTM specification D 1587.

WATER LEVEL MEASUREMENTS

Water levels indicated on the boring logs are levels measured in the borings at the times indicated. In relatively high permeable materials, the indicated levels may reflect the location of groundwater. In low permeability soils, the accurate determination of groundwater levels is not possible with only short-term observations.

SOIL PROPERTIES & DESCRIPTIONS

Soil descriptions are based on the Unified Soil Classification System (USCS) as outlined in ASTM Designations D-2487 and D-2488. The USCS group symbol shown on the boring logs correspond to the group names listed below.

Group Symbol	***Group Name***	***Group Symbol***	***Group Name***
GW	Well Graded Gravel	CL	Lean Clay
GP	Poorly Graded Gravel	ML	Silt
GM	Silty Gravel	OL	Organic Clay or Silt
GC	Clayey Gravel	CH	Fat Clay
SW	Well Graded Sand	MH	Elastic Silt
SP	Poorly Graded Sand	OH	Organic Clay or Silt
SM	Silty Sand	PT	Peat
SC	Clayey Sand		

PARTICLE SIZE

Boulders	12 in. +	Coarse Sand	4.75mm-2.0mm	Silt	0.075mm-0.005mm
Cobbles	12 in.-3 in.	Medium Sand	2.0mm-0.425mm	Clay	<0.005mm
Gravel	3 in.-4.75mm	Fine Sand	0.425mm-0.075mm		

COHESIVE SOILS

Consistency	**Unconfined Compressive Strength (Qu) (psf)**
Very Soft	<500
Soft	500 - 1000
Firm	1001 - 2000
Stiff	2001 - 4000
Very Stiff	4001 - 8000
Hard	> 8000

COHESIONLESS SOILS

Relative Density	**Blows per Foot**
Very Loose	0 - 3
Loose	4 - 9
Medium Dense	10 - 29
Dense	30 - 49
Very Dense	$\geq$ 50

LOG OF BOREHOLE NO. B-1

CLIENT: **Summit Midstream Partners LLC**

PROJECT NO.: **013-0247**

LOCATION: **De Beque, Colorado**

PROJECT NAME: **Summit Midstream - De Beque CO Processing**

APPROX. SURFACE ELEV. (ft): 5061.7

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" N-VALUE	UNC. STR. (PP) (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	SANDY CLAY		0								
5060	*Hard, with silt, dry, grayish brown*			SS 1	CL	11-15-19 N=34		7.7			P-200 = 55.7%
	3.0'										
	Hard, silty, dry, dark grayish brown		5	SS 2	CL	17-22-25 N=47		8.5		44/32	
5055	***7.0'***										
	Hard, with silt, trace gravel, dry, dark grayish brown		10	SS 3	CL	14-14-17 N=31		6.8			P-200 = 61.9%
	11.0'										
5050	***GRAVELLY CLAY***										
	Very stiff, with sand, dry, brown mottled with gray and yellowish brown		15	SS 4		7-12-15 N=27		8.5			
	15.0'										

BASE OF BORING AT 15.0 FEET

WATER LEVEL OBSERVATIONS	
WD	Not Encountered
AB	Not Encountered
AD	Not Performed

OLSSON ASSOCIATES
1802 East 123rd Street
Olathe, KS 66061
Telephone: (913) 829-0078
Fax: (913) 829-0258

STARTED	2/14/13	FINISHED	2/14/13
DRILL CO.	HCSI	DRILL RIG	CME-55
DRILLER	MEM	LOGGED BY	JAM
METHOD	Solid Stem Auger 4"		

LOG OF BOREHOLE NO. B-2

CLIENT: **Summit Midstream Partners LLC**

PROJECT NO.: **013-0247**

LOCATION: **De Beque, Colorado**

PROJECT NAME: **Summit Midstream - De Beque CO Processing**

APPROX. SURFACE ELEV. (ft): 5052.3

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" N-VALUE	UNC. STR. (PP) (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	SANDY CLAY		0								
	Hard, silty, dry, grayish brown			SS 1	CL	11-14-19 N=33		9.6		39/26	
5050											
				SS 2	CL	15-15-15 N=30		9.4			P-200 = 63.0%
	4.5'		5								
	CLAYEY SAND										
	Dense, silty, dry, grayish brown										
	7.0'										
5045	***SILTY CLAY***										
	Hard, with sand, trace gravel, dry, grayish brown			SS 3		13-14-16 N=30		8.0			
	11.0'		10								
	CLAYEY SAND										
5040	*Dense, gravelly, dry to moist, grayish brown*										
				SS 4	SC	11-17-25 N=42		10.9			P-200 = 42.4%
	15.0'		15								

BASE OF BORING AT 15.0 FEET

WATER LEVEL OBSERVATIONS	
WD	Not Encountered
AB	Not Encountered
AD	Not Performed

OLSSON ASSOCIATES
1802 East 123rd Street
Olathe, KS 66061
Telephone: (913) 829-0078
Fax: (913) 829-0258

STARTED	2/14/13	FINISHED	2/14/13
DRILL CO.	HCSI	DRILL RIG	CME-55
DRILLER	MEM	LOGGED BY	JAM
METHOD	Solid Stem Auger 4"		

LOG OF BOREHOLE NO. B-3

CLIENT: **Summit Midstream Partners LLC**

PROJECT NO.: **013-0247**

LOCATION: **De Beque, Colorado**

PROJECT NAME: **Summit Midstream - De Beque CO Processing**

APPROX. SURFACE ELEV. (ft): 5053.1

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" N-VALUE	UNC. STR. (PP) (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	LEAN CLAY		0								
	Hard, with silt and sand, dry to moist, dark grayish brown			SS 1	CL	12-16-18 N=34		10.4			P-200 = 81.0%
5050	***3.0'***										
	SANDY CLAY										
	Stiff, with silt, dry to moist, grayish brown		5	SS 2		8-7-5 N=12		9.5			
5045											
			10	SS 3	CL	6-5-5 N=10		13.7			P-200 = 66.4%
5040	***13.0'***										
	GRAVELLY CLAY										
	Stiff, sandy, dry to moist, dark brown		15	SS 4		5-5-8 N=13		13.9			
	15.0'										

BASE OF BORING AT 15.0 FEET

WATER LEVEL OBSERVATIONS	
WD	Not Encountered
AB	Not Encountered
AD	Not Performed

OLSSON ASSOCIATES
1802 East 123rd Street
Olathe, KS 66061
Telephone: (913) 829-0078
Fax: (913) 829-0258

STARTED	2/14/13	FINISHED	2/14/13
DRILL CO.	HCSI	DRILL RIG	CME-55
DRILLER	MEM	LOGGED BY	JAM
METHOD	Solid Stem Auger 4"		

LOG OF BOREHOLE NO. B-4

CLIENT: **Summit Midstream Partners LLC**

PROJECT NO.: **013-0247**

LOCATION: **De Beque, Colorado**

PROJECT NAME: **Summit Midstream - De Beque CO Processing**

APPROX. SURFACE ELEV. (ft): 5049.0

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" N-VALUE	UNC. STR. (PP) (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	CLAYEY SAND		0								
	Medium dense, silty, trace gravel, dry, grayish brown			SS 1	SC	5-5-11 N=16		6.6			P-200 = 42.5%
	3.0'										
5045	***SANDY CLAY***										
	Very stiff, with silt, dry, brownish gray		5	SS 2		8-9-10 N=19		9.7			
5040			10	SS 3	CL	12-21-25 N=46		8.5			P-200 = 64.7%
	12.0'										
	LEAN CLAY										
5035	*Very stiff, trace sand, dry to moist, light olive gray*			SS 4		10-18-26 N=44		14.5			
	14.5'										
	GRAVELLY CLAY ***15.0'***		15								

BASE OF BORING AT 15.0 FEET

WATER LEVEL OBSERVATIONS	
WD	Not Encountered
AB	Not Encountered
AD	Not Performed

OLSSON ASSOCIATES
1802 East 123rd Street
Olathe, KS 66061
Telephone: (913) 829-0078
Fax: (913) 829-0258

STARTED	2/15/13	FINISHED	2/15/13
DRILL CO.	HCSI	DRILL RIG	CME-55
DRILLER	MEM	LOGGED BY	JAM
METHOD	Solid Stem Auger 4"		

LOG OF BOREHOLE NO. B-5

CLIENT: **Summit Midstream Partners LLC**

PROJECT NO.: **013-0247**

LOCATION: **De Beque, Colorado**

PROJECT NAME: **Summit Midstream - De Beque CO Processing**

APPROX. SURFACE ELEV. (ft): 5042.5

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" N-VALUE	UNC. STR. (PP) (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	SILTY CLAY		0								
	Very stiff, with sand, dry, dark brown			SS 1		12-14-15 N=29		8.3			
5040	***2.5'***										
	SANDY CLAY										
	Stiff, silty, dry, brown			SS 2	CL	7-5-6 N=11		7.0			P-200 = 50.1%
			5								
5035	***8.0'***										
	GRAVELLY CLAY										
	Hard, with sand, dry, brown with gray			SS 3		14-21-26 N=47		6.0			
			10								
	12.0'										
5030	***LEAN CLAY***										
	Hard, with gravel, trace sand, dry, light olive gray			SS 4	CL	16-31-45 N=76		8.4			P-200 = 87.0%
	15.0'		15								

BASE OF BORING AT 15.0 FEET

WATER LEVEL OBSERVATIONS	
WD	Not Encountered
AB	Not Encountered
AD	Not Performed

OLSSON ASSOCIATES
1802 East 123rd Street
Olathe, KS 66061
Telephone: (913) 829-0078
Fax: (913) 829-0258

STARTED	2/15/13	FINISHED	2/15/13
DRILL CO.	HCSI	DRILL RIG	CME-55
DRILLER	MEM	LOGGED BY	JAM
METHOD	Solid Stem Auger 4"		

LOG OF BOREHOLE NO. B-101

CLIENT: **Summit Midstream Partners LLC**

PROJECT NO.: **013-0247**

LOCATION: **De Beque, Colorado**

PROJECT NAME: **Summit Midstream - De Beque CO Processing**

APPROX. SURFACE ELEV. (ft): 5048.5

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" N-VALUE	UNC. STR. (PP) (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	SANDY CLAY *Hard, with silt, dry, dark grayish brown*		0								
5045			5	SS 1	CL	13-20-22 N=42		9.9		45/32	P-200 = 64.8%
	8.0'										
5040	*Very stiff, with silt and sandstone fragments, dry, grayish brown*		10	SS 2		9-13-14 N=27		8.1			
	11.5'										
	GRAVELLY CLAY *Hard, with sand, dry, brown mottled with reddish brown and gray*										
5035			15	SS 3		10-12-22 N=34		6.4			
	18.0'										
5030	***LEAN CLAY*** *Hard, with silt and sand, dry, brown*		20	SS	CL	20-33-46		8.3			P-200 = 85.5%

CONTINUED NEXT PAGE

WATER LEVEL OBSERVATIONS	
WD	Not Encountered
AB	Not Encountered
AD	Not Performed

OLSSON ASSOCIATES
1802 East 123rd Street
Olathe, KS 66061
Telephone: (913) 829-0078
Fax: (913) 829-0258

STARTED	2/14/13	FINISHED	2/14/13
DRILL CO.	HCSI	DRILL RIG	CME-55
DRILLER	MEM	LOGGED BY	JAM
METHOD	Solid Stem Auger 4"		

LOG OF BOREHOLE NO. B-101

CLIENT: **Summit Midstream Partners LLC**

PROJECT NO.: **013-0247**

LOCATION: **De Beque, Colorado**

PROJECT NAME: **Summit Midstream - De Beque CO Processing**

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" N-VALUE	UNC. STR. (PP) (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	20										
	LEAN CLAY *Hard, with silt and sand, dry, brown (continued)* ***22.0'***			4		N=79					
5025	***SILTY CLAY*** *Hard, dry to moist, light olive gray mottled with yellowish brown and purple*		25	SS 5		16-31-48 N=79		10.8			
	27.5'										
5020	*Hard, shaley, with gravel, dry to moist, olive gray*		30	SS 6		26-24-50 N=74		11.7			
	30.5'										

BASE OF BORING AT 30.5 FEET

WATER LEVEL OBSERVATIONS	
WD	Not Encountered
AB	Not Encountered
AD	Not Performed

OLSSON ASSOCIATES
1802 East 123rd Street
Olathe, KS 66061
Telephone: (913) 829-0078
Fax: (913) 829-0258

STARTED	2/14/13	FINISHED	2/14/13
DRILL CO.	HCSI	DRILL RIG	CME-55
DRILLER	MEM	LOGGED BY	JAM
METHOD	Solid Stem Auger 4"		

LOG OF BOREHOLE NO. B-102

CLIENT: **Summit Midstream Partners LLC**

PROJECT NO.: **013-0247**

LOCATION: **De Beque, Colorado**

PROJECT NAME: **Summit Midstream - De Beque CO Processing**

APPROX. SURFACE ELEV. (ft): 5039.6

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" N-VALUE	UNC. STR. (PP) (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	SILTY CLAY *Stiff, with sand, dry, brown*		0								
5035			5	SS 1		9-6-6 N=12		8.9			
	7.0'										
	CLAYEY SAND *Medium dense, with gravel, dry, brown*										
5030			10	SS 2	SC	9-13-15 N=28		7.1			P-200 = 46.4%
	12.5'										
	GRAVELLY CLAY *Hard, dry, brown mottled with gray*										
5025			15	SS 3		13-21-31 N=52		7.8			
	18.0'										
	LEAN CLAY *Hard, trace silt and sand, dry, light grayish brown*										
5020			20	SS		15-25-30		9.8			

CONTINUED NEXT PAGE

WATER LEVEL OBSERVATIONS	
WD	Not Encountered
AB	Not Encountered
AD	Not Performed

OLSSON ASSOCIATES
1802 East 123rd Street
Olathe, KS 66061
Telephone: (913) 829-0078
Fax: (913) 829-0258

STARTED	2/14/13	FINISHED	2/14/13
DRILL CO.	HCSI	DRILL RIG	CME-55
DRILLER	MEM	LOGGED BY	JAM
METHOD	Solid Stem Auger 4"		

LOG OF BOREHOLE NO. B-102

CLIENT: **Summit Midstream Partners LLC**

PROJECT NO.: **013-0247**

LOCATION: **De Beque, Colorado**

PROJECT NAME: **Summit Midstream - De Beque CO Processing**

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" N-VALUE	UNC. STR. (PP) (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	20										
	LEAN CLAY *Hard, trace silt and sand, dry, light grayish brown (continued)*			4		N=55					
	23.5'										
	SANDY CLAY										
5015	*Hard, trace silt, dry, pale gray*		25	SS 5	CL	30-50 N=80		7.9			P-200 = 69.6%
	28.5'										
	WEATHERED SHALE										
5010	*Hard, dry, pale olive*		30	SS 6		50 N=50		7.4			
	30.5'										

BASE OF BORING AT 30.5 FEET

WATER LEVEL OBSERVATIONS	
WD	Not Encountered
AB	Not Encountered
AD	Not Performed

OLSSON ASSOCIATES
1802 East 123rd Street
Olathe, KS 66061
Telephone: (913) 829-0078
Fax: (913) 829-0258

STARTED	2/14/13	FINISHED	2/14/13
DRILL CO.	HCSI	DRILL RIG	CME-55
DRILLER	MEM	LOGGED BY	JAM
METHOD	Solid Stem Auger 4"		

LOG OF BOREHOLE NO. B-103

CLIENT: **Summit Midstream Partners LLC**

PROJECT NO.: **013-0247**

LOCATION: **De Beque, Colorado**

PROJECT NAME: **Summit Midstream - De Beque CO Processing**

APPROX. SURFACE ELEV. (ft): 5042.9

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" N-VALUE	UNC. STR. (PP) (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	0										
5040	***SILTY CLAY*** *Stiff, with sand, dry, brown*		5	SS 1		4-4-5 N=9		9.2			
	7.0'										
5035	***SANDY CLAY*** *Firm, with silt, dry to moist, brown*		10	SS 2	CL	4-4-4 N=8		11.3			P-200 = 66.4%
	12.5'										
5030	***CLAYEY SAND*** *Medium dense, gravelly, dry to moist, dark brown with grayish brown*		15	SS 3	SC	7-11-11 N=22		12.4			P-200 = 41.3%
	17.0'										
5025	***LEAN CLAY*** *Very stiff, trace silt, moist, olive brown mottled with grayish brown and yellowish brown*		20	SS		5-9-16		18.5			

CONTINUED NEXT PAGE

WATER LEVEL OBSERVATIONS	
WD	Not Encountered
AB	Not Encountered
AD	Not Performed

OLSSON ASSOCIATES
1802 East 123rd Street
Olathe, KS 66061
Telephone: (913) 829-0078
Fax: (913) 829-0258

STARTED	2/14/13	FINISHED	2/14/13
DRILL CO.	HCSI	DRILL RIG	CME-55
DRILLER	MEM	LOGGED BY	JAM
METHOD	Solid Stem Auger 4"		

LOG OF BOREHOLE NO. B-103

CLIENT: **Summit Midstream Partners LLC**

PROJECT NO.: **013-0247**

LOCATION: **De Beque, Colorado**

PROJECT NAME: **Summit Midstream - De Beque CO Processing**

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" N-VALUE	UNC. STR. (PP) (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
			20	4		N=25					
	LEAN CLAY *Very stiff, trace silt, moist, olive brown mottled with grayish brown and yellowish brown (continued)*										
	22.0'										
5020	*Hard, with silt, dry to moist, gray with olive brown*		25	SS 5		21-29-50 N=79		10.6			
5015	***28.0'***										
	WEATHERED SHALE *Hard, dry, pale olive brown*		30	SS 6		50 N=50		5.8			
	30.5'										

BASE OF BORING AT 30.5 FEET

WATER LEVEL OBSERVATIONS	
WD	Not Encountered
AB	Not Encountered
AD	Not Performed

OLSSON ASSOCIATES
1802 East 123rd Street
Olathe, KS 66061
Telephone: (913) 829-0078
Fax: (913) 829-0258

STARTED	2/14/13	FINISHED	2/14/13
DRILL CO.	HCSI	DRILL RIG	CME-55
DRILLER	MEM	LOGGED BY	JAM
METHOD	Solid Stem Auger 4"		

LOG OF BOREHOLE NO. B-104

CLIENT: **Summit Midstream Partners LLC**

PROJECT NO.: **013-0247**

LOCATION: **De Beque, Colorado**

PROJECT NAME: **Summit Midstream - De Beque CO Processing**

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" N-VALUE	UNC. STR. (PP) (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
5060	**APPROX. SURFACE ELEV. (ft):** 5060.0		0								
	CLAYEY SAND *Medium dense, with gravel, dry, brown*										
5055			5	SS 1	SC	8-11-12 N=23		3.5			P-200 = 20.9%
	6.0'										
	LEAN CLAY *Hard, trace sand and gravel, dry, grayish brown*										
5050			10	SS 2		10-18-20 N=38		7.9			
	13.0'										
	Hard, with sand, dry, grayish brown										
5045			15	SS 3		9-18-27 N=45		4.3			
	17.0'										
	Hard, with sand, dry, light olive gray										
5040			20	SS	CL	18-50		6.9			P-200 = 76.1%

CONTINUED NEXT PAGE

WATER LEVEL OBSERVATIONS	
WD	▽ Not Encountered
AB	▼ Not Encountered
AD	▼ Not Performed

OLSSON ASSOCIATES
1802 East 123rd Street
Olathe, KS 66061
Telephone: (913) 829-0078
Fax: (913) 829-0258

STARTED	2/15/13	FINISHED	2/15/13
DRILL CO.	HCSI	DRILL RIG	CME-55
DRILLER	MEM	LOGGED BY	JAM
METHOD	Solid Stem Auger 4"		

LOG OF BOREHOLE NO. B-104

CLIENT: **Summit Midstream Partners LLC**

PROJECT NO.: **013-0247**

LOCATION: **De Beque, Colorado**

PROJECT NAME: **Summit Midstream - De Beque CO Processing**

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" N-VALUE	UNC. STR. (PP) (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
5040			20	4		N=68					
	Hard, with sand, dry, light olive gray (continued)										
	23.0'										
	SANDY CLAY										
	Hard, dry, dark grayish brown										
5035			25	SS 5		50 N=50		5.9			
	27.0'										
	LEAN CLAY										
	Hard, with sand, dry, light gray										
5030			30	SS 6		38-50 N=88		8.1			
5025			35								
5020			40								
	40.0'										
	AUGER REFUSAL AT 40.0 FEET										

WATER LEVEL OBSERVATIONS	
WD	Not Encountered
AB	Not Encountered
AD	Not Performed

OLSSON ASSOCIATES
1802 East 123rd Street
Olathe, KS 66061
Telephone: (913) 829-0078
Fax: (913) 829-0258

STARTED	2/15/13	FINISHED	2/15/13
DRILL CO.	HCSI	DRILL RIG	CME-55
DRILLER	MEM	LOGGED BY	JAM
METHOD	Solid Stem Auger 4"		

LOG OF BOREHOLE NO. B-105

CLIENT: **Summit Midstream Partners LLC**

PROJECT NO.: **013-0247**

LOCATION: **De Beque, Colorado**

PROJECT NAME: **Summit Midstream - De Beque CO Processing**

APPROX. SURFACE ELEV. (ft): 5067.3

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" N-VALUE	UNC. STR. (PP) (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
	CLAYEY SAND		0								
	Loose, trace roothairs, dry, brown										
5065											
			5	SS 1		4-4-4 N=8		6.5			
5060											
	8.5'										
	Very dense, gravelly, dry, brown with gray		10	SS 2	SC	16-25-50 N=75		6.5			P-200 = 33.3%
5055											
	13.0'										
	LEAN CLAY										
	Hard, with sand, dry, dark olive gray		15	SS 3		18-35-38 N=73		9.5			
	16.0'										
	Hard, shaley, dry, light gray										
5050											
			20	SS		50		6.7			

CONTINUED NEXT PAGE

WATER LEVEL OBSERVATIONS	
WD	Not Encountered
AB	Not Encountered
AD	Not Performed

OLSSON ASSOCIATES
1802 East 123rd Street
Olathe, KS 66061
Telephone: (913) 829-0078
Fax: (913) 829-0258

STARTED	2/15/13	FINISHED	2/15/13
DRILL CO.	HCSI	DRILL RIG	CME-55
DRILLER	MEM	LOGGED BY	JAM
METHOD	Solid Stem Auger 4"		

LOG OF BOREHOLE NO. B-105

CLIENT: **Summit Midstream Partners LLC**

PROJECT NO.: **013-0247**

LOCATION: **De Beque, Colorado**

PROJECT NAME: **Summit Midstream - De Beque CO Processing**

ELEVATION (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	DEPTH (ft)	SAMPLE TYPE NUMBER	CLASSIFICATION (USCS)	BLOWS/6" N-VALUE	UNC. STR. (PP) (tsf)	MOISTURE (%)	DRY DENSITY (pcf)	LL/PI (%)	ADDITIONAL DATA/ REMARKS
			20	4		N=50					
	Hard, shaley, dry, light gray (continued)										
	22.0'										
5045	*Hard, shaley, trace gravel, dry to moist, brown with gray and yellowish brown*		25	SS 5	CL	29-37-50 N=87		10.6			P-200 = 92.0%
5040	***28.0'***										
	WEATHERED SHALE *Hard, clayey, dry, light grayish brown*		30	SS 6		50 N=50		5.5			
	30.5'										

BASE OF BORING AT 30.5 FEET

WATER LEVEL OBSERVATIONS	
WD	Not Encountered
AB	Not Encountered
AD	Not Performed

OLSSON ASSOCIATES
1802 East 123rd Street
Olathe, KS 66061
Telephone: (913) 829-0078
Fax: (913) 829-0258

STARTED	2/15/13	FINISHED	2/15/13
DRILL CO.	HCSI	DRILL RIG	CME-55
DRILLER	MEM	LOGGED BY	JAM
METHOD	Solid Stem Auger 4"		

APPENDIX C
Summary of Laboratory Test Results

Olsson Associates
1802 E. 123rd St.
Olathe, KS 66061
ph: 913-829-0078
fax: 913-829-0258

SUMMARY OF LABORATORY RESULTS

CLIENT Summit Midstream Partners LLC

PROJECT NAME Summit Midstream - De Beque CO Processing

PROJECT NUMBER 013-0247

PROJECT LOCATION De Beque, Colorado

BORING NUMBER	SAMPLE I.D.	SAMPLE DEPTH (ft)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	VOID RATIO	SATURATION (%)	UNCONFINED STRENGTH (tsf)	ATTERBERG LIMITS			P-200	USCS CLASS.
								LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX		
B-1	SS-1	1.0 - 2.5	7.7								55.7	CL
B-1	SS-2	3.5 - 5.0	8.5					44	12	32		CL
B-1	SS-3	8.5 - 10.0	6.8								61.9	CL
B-1	SS-4	13.5 - 15.0	8.5									
B-2	SS-1	1.0 - 2.5	9.6					39	13	26		CL
B-2	SS-2	3.5 - 5.0	9.4								63.0	CL
B-2	SS-3	8.5 - 10.0	8.0									
B-2	SS-4	13.5 - 15.0	10.9								42.4	SC
B-3	SS-1	1.0 - 2.5	10.4								81.0	CL
B-3	SS-2	3.5 - 5.0	9.5									
B-3	SS-3	8.5 - 10.0	13.7								66.4	CL
B-3	SS-4	13.5 - 15.0	13.9									
B-4	SS-1	1.0 - 2.5	6.6								42.5	SC
B-4	SS-2	3.5 - 5.0	9.7									
B-4	SS-3	8.5 - 10.0	8.5								64.7	CL
B-4	SS-4	13.5 - 15.0	14.5									
B-5	SS-1	1.0 - 2.5	8.3									
B-5	SS-2	3.5 - 5.0	7.0								50.1	CL
B-5	SS-3	8.5 - 10.0	6.0									
B-5	SS-4	13.5 - 15.0	8.4								87.0	CL
B-101	SS-1	4.0 - 5.5	9.9					45	13	32	64.8	CL
B-101	SS-2	9.0 - 10.5	8.1									
B-101	SS-3	14.0 - 15.5	6.4									
B-101	SS-4	19.0 - 20.5	8.3								85.5	CL
B-101	SS-5	24.0 - 25.5	10.8									
B-101	SS-6	29.0 - 30.5	11.7									
B-102	SS-1	4.0 - 5.5	8.9									
B-102	SS-2	9.0 - 10.5	7.1								46.4	SC
B-102	SS-3	14.0 - 15.5	7.8									
B-102	SS-4	19.0 - 20.5	9.8									

Olsson Associates
1802 E. 123rd St.
Olathe, KS 66061
ph: 913-829-0078
fax: 913-829-0258

SUMMARY OF LABORATORY RESULTS

CLIENT Summit Midstream Partners LLC

PROJECT NAME Summit Midstream - De Beque CO Processing

PROJECT NUMBER 013-0247

PROJECT LOCATION De Beque, Colorado

BORING NUMBER	SAMPLE I.D.	SAMPLE DEPTH (ft)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	VOID RATIO	SATURATION (%)	UNCONFINED STRENGTH (tsf)	ATTERBERG LIMITS			P-200	USCS CLASS.
								LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX		
B-102	SS-5	24.0 - 25.5	7.9								69.6	CL
B-102	SS-6	29.0 - 30.5	7.4									
B-103	SS-1	4.0 - 5.5	9.2									
B-103	SS-2	9.0 - 10.5	11.3								66.4	CL
B-103	SS-3	14.0 - 15.5	12.4								41.3	SC
B-103	SS-4	19.0 - 20.5	18.5									
B-103	SS-5	24.0 - 25.5	10.6									
B-103	SS-6	29.0 - 30.5	5.8									
B-104	SS-1	4.0 - 5.5	3.5								20.9	SC
B-104	SS-2	9.0 - 10.5	7.9									
B-104	SS-3	14.0 - 15.5	4.3									
B-104	SS-4	19.0 - 20.5	6.9								76.1	CL
B-104	SS-5	24.0 - 25.5	5.9									
B-104	SS-6	29.0 - 30.5	8.1									
B-105	SS-1	4.0 - 5.5	6.5									
B-105	SS-2	9.0 - 10.5	6.5								33.3	SC
B-105	SS-3	14.0 - 15.5	9.5									
B-105	SS-4	19.0 - 20.5	6.7									
B-105	SS-5	24.0 - 25.5	10.6								92.0	CL
B-105	SS-6	29.0 - 30.5	5.5									