WHITAKER
LAB & ENGINEERING

2500 Tremont Road • Savannah, Georgia 31405
912.234.0696 • www.whitakerlab.net

Hussey Gay Bell
329 Commercial Drive
Savannah, GA 31406

Attention: Mr. Evan Bennett, PE
ebennett@husseygaybell.com
M: (912) 346-3080

Referencing: Report of Near Surface Subgrade Soil Evaluation for
Two Chop Road Paving Project
Two Chop Road
Bulloch County, Georgia
Report No.: 05-04-22-5

Dear Mr. Bennett:

In accordance with your request, WHITAKER LABORATORY, INC. has conducted an evaluation of the near surface subgrade soils within the existing dirt road for the purpose of providing site preparation recommendations for asphalt pavement sections. We understand that the existing dirt road (approximately 3.1 miles) will be paved with asphalt. In addition, we understand that the existing road will have drainage installed and may require widening in areas.

As requested, Whitaker Laboratory, Inc. performed standard penetration test (SPT) borings approximately every 1/10 of a mile (approximately every 500 feet) along the entire length of the existing dirt road. SPT boring were performed within the existing dirt road. No borings were performed within any ditch areas of this road. A total of 32 SPT borings were performed and each boring extended to a depth of 5 ½ feet below existing grades. Standard penetration test borings are performed using rotary head drilling equipment and advancing hollow stem augers. Sampling and Standard Penetration Testing, (SPT), was performed in accordance with ASTM D-1586. SPT samples were taken at 2.5 foot intervals of depth for the first 10 feet, and at 5.0 foot intervals thereafter. Standard Penetration testing is done with a 140 pound hammer falling 30-inches and a two inch diameter sampling spoon. Results of Standard Penetration Testing (SPT N values) provide an indication of the relative consistency, density and in-situ strengths of the tested soils.

We have attached a boring location plan and the boring logs to this report for your reference and review.

Findings:

- Loose to very firm sands (SP-SM) were encountered at the ground surface and extended to depths reaching 6 to 66 inches below existing grades. Please note that these sands were encountered to range from 12 to 24 inches throughout the majority of the SPT boring on this site. Isolated areas contained less than 12 inches or more than 24 inches of sand below existing grades.

- Below these loose to very firm surface sands, firm to hard sand clays and clays were encountered and extended to the termination depth of the borings at 5 ½ feet below existing grades.

- Groundwater was not encountered within any of the borings at the time of our evaluation except B-18. Groundwater at B-18 was encountered at a depth of 5 feet below existing grades. Please note that the ground water elevation can be expected to fluctuate with the season of the year, surrounding ground surface conditions and with recent rainfall amounts.

Earthwork Recommendations:

Please note that Whitaker recommends that bottom of pavement section elevations for the new asphalt pavement reside at or above the existing grade elevation of the existing dirt road.

Based upon the findings of this field exploration, Whitaker Laboratory, Inc. offers the following recommendations for preparing the subgrade for the acceptance of pavement sections.

Existing Dirt Road

This pertains to the existing dirt road and does not include the ditches and/or shoulder that may be used to widen the roadway and/or installed drainage.

- Prior to fill placement (if required), all exposed subgrade soils within pavement areas plus 5 feet outside the pavement area shall be thoroughly compacted in-place to 95% of ASTM-D-1557 and pass thorough proof-rolling inspections prior to backfilling/filling operations begin. Areas that are not stable enough to support successful compaction efforts on backfill soil, subgrade stabilization shall be performed on the exposed subgrade soil prior to backfill/fill placement.

- Recommendations for subgrade soil stabilization may consist of one or a combination of the following depending upon the severity of the instability:

    - Drying and recompacting of the in-situ soil. Please note that due to the in-situ soil consisting of clayey type soils, drying and recompacting could take a substantial amount of time and effort.
    - Further undercut to a competent material and replace with approved, compacted backfill.
    - Placement of stabilization fabric (Mirafi RS 580i or Terra Tex HPG-HM 58).
    - Mixing of Cement with exposed subgrade (would need further evaluation & testing to determine appropriate cement content).

- Based upon the SPT borings, soil stabilization will not likely be required for the existing dirt road, unless the existing soils are disturbed during construction. In addition, the exposed soils shall be grade to promote positive surface drainage during and after construction. If groundwater is not property managed during construction, stable soils could become unstable.

- Backfill and fill material should be placed in maximum 12 inch loose lift thicknesses with each lift compacted by appropriate compaction equipment to 95% density in accordance with ASTM D-1557.

- Compaction efforts on subgrade soil (exposed subgrade after stripping), backfill and fill shall be made with a large vibratory smooth drum roller (Cat CS 74 or equivalent - centrifugal force range of 37,300 – 74,600 lb).

- All of the fill and backfill (including utility line backfill) for this project should consist of clean, granular soils. The fill should be free of objectionable roots, clay lumps, organics and other debris. The fill should be readily compactable during placement. Soils classified as SC or SM with a minimum of 15% passing a #200 sieve and a maximum of 35% passing a #200 sieve may be acceptable. Soils with the minus #200 fraction classified as MH, CH or OH may be rejected. Soils classified as SC or CL, exhibiting moisture sensitivity, soils with excessive clay content, or excessive moisture should not be used without approval from the geotechnical engineer. Approved soils will need to be moisture conditioned as necessary to facilitate proper compaction throughout its entire depth.

Ditches and Shoulder Areas

This pertains to the ditches and/or shoulder that may be used to widen the roadway and/or installed drainage.

- The site shall be initially stripped of unsuitable surface soils/materials. Site stripping shall include the removal of surface vegetation, organic matter, debris, and organic soils (to include stumps and root systems). Stripping depths should extend to the depth required to effectively remove all unsuitable near surface organic soils/materials.

- After stripping and prior to backfill/fill placement, all exposed subgrade soils within pavement areas plus 5 feet outside the pavement area shall be thoroughly compacted in-place to 95% of ASTM-D-1557 and pass thorough proof-rolling inspections prior to backfilling/filling operations begin. Areas that are not stable enough to support successful compaction efforts on backfill soil, subgrade stabilization shall be performed on the exposed subgrade soil prior to backfill/fill placement.

- Recommendations for subgrade soil stabilization may consist of one or a combination of the following depending upon the severity of the instability:

    - Drying and recompacting of the in-situ soil. Please note that due to the in-situ soil consisting of clayey type soils, drying and recompacting could take a substantial amount of time and effort.
    - Further undercut to a competent material and replace with approved, compacted backfill.
    - Placement of stabilization fabric (Mirafi RS 580i).
    - Mixing of Cement with exposed subgrade (would need further evaluation & testing to determine appropriate cement content).

- Due to SPT borings not being performed in the ditch areas, provisions should be in place for soil stabilization to be required within some areas.

- Provisions should also be in place if groundwater is encountered within the ditches. Please note that temporary dewatering will likely be required if groundwater is encountered. Typically, the groundwater level needs to be 24 inches below subgrade elevations to properly compact the subgrade and subsequent backfill materials. Utilizing an initial thin layer of stone compacted into the subgrade soils will help, however, dewatering may still be critical to adequately compact the subgrade, backfill and fill soils. Although dewatering techniques consisting of well point systems, sump pits with pumps, and/or drainage ditches are typically effective methods to lower groundwater, the means and methods for dewatering should ultimately be the responsibility of the contractor.

- Backfill and fill material should be placed in maximum 12 inch loose lift thicknesses with each lift compacted by appropriate compaction equipment to 95% density in accordance with ASTM D-1557.

- Compaction efforts on subgrade soil (exposed subgrade after stripping), backfill and fill shall be made with a large vibratory smooth drum roller (Cat CS 74 or equivalent - centrifugal force range of 37,300 – 74,600 lb).

- All of the fill and backfill (including utility line backfill) for this project should consist of clean, granular soils. The fill should be free of objectionable roots, clay lumps, organics and other debris. The fill should be readily compactable during placement. Soils classified as SC or SM with a minimum of 15% passing a #200 sieve and a maximum of 35% passing a #200 sieve may be acceptable. Soils with the minus #200 fraction classified as MH, CH or OH may be rejected. Soils classified as SC or CL, exhibiting moisture sensitivity, soils with excessive clay content, or excessive moisture should not be used without approval from the geotechnical engineer. Approved soils will need to be moisture conditioned as necessary to facilitate proper compaction throughout its entire depth.

Pavement Recommendations:

Subgrade for driveways and parking areas should consist of a minimum of 24-inches of clean sand subgrade compacted to a density of 95% of its maximum dry density as determined by ASTM-D-1557. Pavement designs should also provide a minimum of 24-inches separation between the bottom of the base course material and the seasonal high ground water table. Undercutting, re-compacting, and/or replacing of existing surface soils will be required unless subgrade consists of organic free, virgin sandy soils that are proven to be a minimum of 24-inches thick, 24-inches above the seasonal high ground water table, compacted to 95% of ASTM D-1557 and passes a proof-roll. Final grades and elevations will determine the extent of any filling, undercutting and backfilling that may be required.

Based upon the near surface soil conditions encountered on this site, the in-situ soils can be made suitable for use as subgrade soil residing below bottom of pavement sections elevations. **Please note however, soil subgrade stabilization may be required within ditch and shoulder areas to make the in-situ soils suitable for use as subgrade.**

Subgrade preparation for pavement areas shall be performed in accordance with the above Earthwork recommendations section of this report. As recommended above, bottom of pavement section elevations for the new roundabout should reside above the current top of existing pavement elevations residing at the middle of the existing intersection.

Due to the groundwater not being encountered on this site, underdrains will not be required.

If a rain event of 0.5 inches or more, occurs after initial proof rolling and prior to subsequent placement of base or surface wearing course, the proof roll testing must be repeated just prior to additional work.

The below recommended pavement sections should be considered standard and typical for the area. We have not been provided traffic data and/or been instructed to perform CBR testing on subgrade soils, therefore these pavement sections should not be considered a pavement design. The below recommended pavement sections are based upon the assumption that the sandy subgrade soils will yield a minimum CBR value of 8 if compacted to 95% ASTM D-1557 for a full 24-inch depth. In addition, the below recommended light duty pavement sections should be considered for car traffic areas only. Below recommended heavy duty sections should be utilized for all areas receiving truck traffic (delivery trucks and garbage trucks with 18-kip axle loads). In addition, the heavy-duty sections recommended below are for low volume truck traffic (15 to 20 trucks per day).

LIGHT DUTY PAVEMENT (CARS & LIGHT TRUCKS)

SUBGRADE:	Minimum – 24-inches of drained, compacted, coarse grained soil
BASE COURSE:	Minimum - 6-inches of Graded Aggregate Construction
SURFACE COURSE:	Minimum - 2-inches of 12.5 mm Superpave

HEAVY DUTY PAVEMENT (LOADED TRUCKS WITH 18+ kip AXLE LOADS)

SUBGRADE:	Minimum – 24 inches of drained, compacted, coarse grained soil
BASE COURSE:	Minimum - 8-inches of Graded Aggregate Construction
BINDER COURSE:	Minimum - 2-inches of 19 mm Superpave
SURFACE COURSE:	Minimum - 2.0-inches of 9.5 mm Type II Superpave, or Minimum - 2.0-inches of 12.5 mm Superpave

In all projects, a minimum mat temperature of 185° F must be maintained through final roller pass.

Please note that specifications for the above mentioned base course and surface course can be found under Sections 310, 400,402, 815 and 828 of the Georgia Department of Transportation State of Georgia Standard Specifications Construction of Transportation Systems, 2001 Edition. The mix design must include "lime".

We thank you for the opportunity to be of service on this project. We appreciate your trust and we look forward to a continuing relationship in the future. If you should have any questions, please don't hesitate to contact our office.

Respectfully submitted,
WHITAKER LABORATORY, INC.

Jason H. Follo, P.E.
GA Registered Engineer
#31031

Blake L. Jones, P.E.
GA Registered Engineer
#44657

Attachments

Site Vicinity Map

Boring Location Plan

Boring Logs

Site Vicinity Map

Two Chop Raod,
Statesboro, Bulloch County, Georgia

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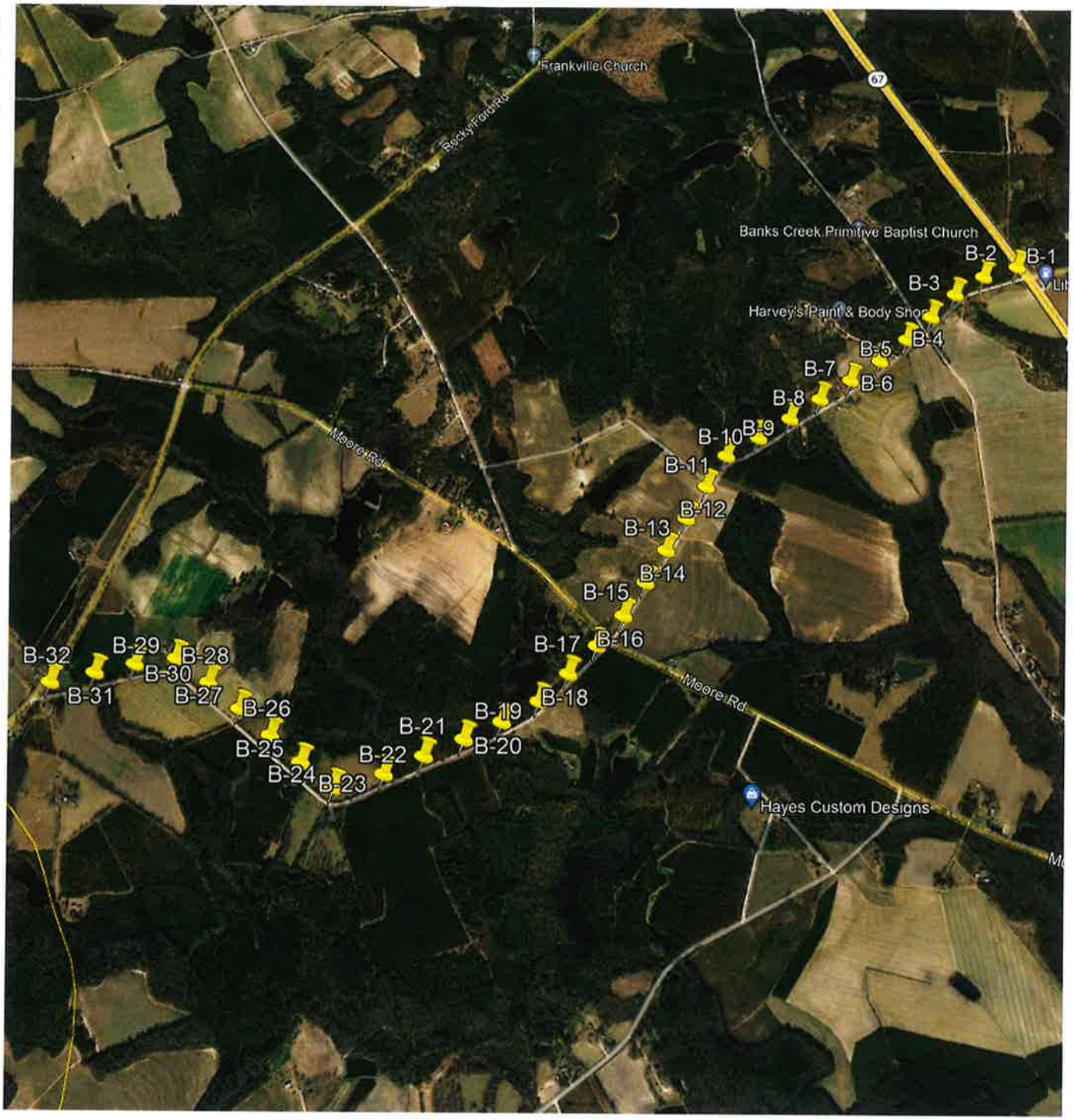
ALL BORING LOCATIONS ARE APPROXIMATE, & ARE BASED ONLY ON FIELD ESTIMATES.



Boring Location Plan

Two Chop Raod,
Statesboro, Bulloch County, Georgia

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WHITAKER LABORATORY, INC.
P.O. BOX 7078
SAVANNAH, GEORGIA 31418

Project Name Two Chop Road Paving Project **Date** 4/14,19/2022

Project Location Two Chop Road, Bulloch County, Georgia

Boring Number _____ **Field Engineer** Josh Kicklighter (B-48)

Ground Surface Elevation _____ **Ground Water Elevation** _____

Sample No.	Sample		Stratum		Visual Field Classification	N-Count
	From	To	From	To		
B-1			0	12"	Firm Brown Fine Sand (SP-SM)	-1' – 14
			12"	36"	Very Stiff Orange Sand Clay (SC)	-3' – 18
			36"	66"	Very Stiff Red/Orange Sand Clay (SC)	-5' – 23
					Groundwater not Encountered	
B-2			0	18"	Firm Brown Fine Sand (SP-SM)	-1' – 18
			18"	30"	Very Stiff Orange Sand Clay (SC)	-3' – 28
			30"	66"	Hard Red/Orange Sand Clay (SC)	-5' –33
					Groundwater not Encountered	
B-3			0	12"	Firm Brown/Tan Fine Sand (SP-SM)	-1' – 19
			12"	24"	Hard Tan/Orange Sand Clay (SC)	-3' – 32
			24"	66"	Very Stiff Red/Orange Sand Clay (SC)	-5' –28
					Groundwater not Encountered	
B-4			0	24"	Very Firm Brown/Tan Fine Sand (SP-SM)	-1' – 26
			24"	42"	Firm Tan Fine Sand (SP-SM)	-3' – 12
			42"	66"	Very Stiff Red/Orange Sand Clay (SC)	-5' –16
					Groundwater not Encountered	
B-5			0	12"	Firm Orange Fine Sand (SP-SM)	-1' – 14
			12"	66"	Very Stiff Tan/Red Clay (CL)	-3' – 19
					Groundwater not Encountered	-5' –25

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Sample No.	Sample		Stratum		Visual Field Classification	N-Count
	From	To	From	To		
B-6			0	12"	Firm Orange Fine Sand (SP-SM)	-1' – 16
			12"	24"	Very Stiff Orange Sand Clay (SC)	-3' – 21
			24"	42"	Very Stiff Red/ Orange Sand Clay (SC)	-5' – 26
			42"	66"	Very Stiff Red/ Orange Clay (CL)	
					Groundwater not Encountered	
B-7			0	12"	Firm Brown Fine Sand (SP-SM)	-1' – 14
			12"	66"	Loose Tan Fine Sand (SP-SM)	-3' – 7
					Groundwater not Encountered	-5' – 7
B-8			0	54"	Firm Tan/Orange Fine Sand (SP-SM)	-1' – 23
			54"	66"	Stiff Orange Sand Clay (SC)	-3' – 16
					Groundwater not Encountered	-5' – 11
B-9			0	24"	Firm Brown/Tan Fine Sand (SP-SM)	-1' – 19
			24"	42"	Stiff Tan Sand Clay (SC)	-3' – 11
			42"	66"	Stiff Tan/Red Sand Clay (SC)	-5' – 14
					Groundwater not Encountered	
B-10			0	18"	Firm Orange/Tan Fine Sand (SP-SM)	-1' – 19
			18"	66'	Stiff to Firm Tan/Red Sand Clay (SC)	-3' – 11
					Groundwater not Encountered	-5' – 7

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Sample No.	Sample		Stratum		Visual Field Classification	N-Count
	From	To	From	To		
B-11			0	24"	Firm Tan/Brown Fine Sand (SP-SM)	-1' – 18
			24"	48"	Stiff Tan Sand Clay (SC)	-3' – 9
			48"	66"	Very Stiff Red/Tan Orange Sand Clay (SC)	-5' – 23
					Groundwater not Encountered	
B-12			0	18"	Firm Brown Fine Sand (SP-SM)	-1' – 18
			18"	66"	Very Stiff Orange Sand Clay (SC)	-3' – 16
					Groundwater not Encountered	-5' – 25
B-13			0	12"	Firm Tan/Brown Fine Sand (SP-SM)	-1' – 12
			12"	66'	Very Stiff Orange Sand Clay (SC)	-3' – 21
					Groundwater not Encountered	-5' – 28
B-14			0	12"	Firm Brown/Tan Fine Sand (SP-SM)	-1' – 12
			12"	54"	Stiff Orange Sand Clay (SC)	-3' – 12
			54"	66"	Very Stiff Red/Orange Clay (CL)	-5' – 21
					Groundwater not Encountered	
B-15			0	18"	Firm Tan/Brown Fine Sand (SP-SM)	-1' – 12
			18"	48"	Stiff Orange Sand Clay (SC)	-3' – 14
			48'	66"	Very Stiff Red/Orange Clay (CL)	-5' – 25
					Groundwater not Encountered	

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Sample No.	Sample		Stratum		Visual Field Classification	N-Count
	From	To	From	To		
B-16			0	12"	Firm Tan/Brown Fine Sand (SP-SM)	-1' – 18
			12"	24"	Very Stiff Tan Sand Clay (SC)	-3' – 28
			24"	66"	Very Stiff Tan/Red Sand Clay (SC)	-5' – 30
					Groundwater not Encountered	
B-17			0	6"	Firm Tan Fine Sand (SP-SM)	-1' – 25
			6"	30'	Very Stiff Orange/Red Sand Clay (SC)	-3' – 26
			30"	66"	Dense Tan/Orange Sand (SP-SM)	-5' – 42
					Groundwater not Encountered	
B-18			0	24"	Firm Brown/Tan Fine Sand (SP-SM)	-1' – 18
			24"	66"	Firm Tan Fine Sand (SP-SM)	-3' – 16
					Groundwater Encountered at 5 Feet	-5' – 11
B-19			0	7"	Very Firm Tan/Brown Fine Sand (SP-SM)	-1' – 21
			7"	24"	Hard Tan/Brown/Orange Sand Clay (SC)	-3' – 35
			24"	66"	Firm Brown/Tan Fine Sand (SP-SM)	-5' – 19
					Groundwater not Encountered	
B-20			0	24"	Very Firm Orange/Tan Fine Sand (SP-SM)	-1' – 28
			24"	66"	Very Stiff Orange/Red Sand Clay (SC)	-3' – 30
					Groundwater not Encountered	-5' – 23

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Sample No.	Sample		Stratum		Visual Field Classification	N-Count
	From	To	From	To		
B-21			0	18"	Firm Tan/Brown Fine Sand (SP-SM)	-1' – 12
			18"	66"	Very Stiff Orange/Red Sand Clay (SC)	-3' – 21
					Groundwater not Encountered	-5' – 28
B-22			0	24"	Firm Tan Fine Sand (SP-SM)	-1' – 18
			24"	54"	Very Firm Tan/Red/Orange Fine Sand (SP-SM)	-3' – 28
			54"	66"	Very Stiff Tan Sand Clay (SC)	-5' – 21
					Groundwater not Encountered	
B-23			0	12"	Firm Tan/Brown Fine Sand (SP-SM)	-1' – 7
			12"	48"	Stiff Tan/Orange Sand Clay (SC)	-3' – 9
			48"	66"	Very Stiff Tan/Red Sand Clay (SC)	-5' – 28
					Groundwater not Encountered	
B-24			0	42"	Firm to Loose Tan Fine Sand (SP-SM)	-1' – 18
			42"	66"	Very Stiff Tan/Red Sand Clay (SC)	-3' – 9
					Groundwater not Encountered	-5' – 19
B-25			0	36"	Firm to Loose Tan/Brown Fine Sand (SP-SM)	-1' – 23
			36"	66"	Stiff Tan/Orange Sand Clay (SC)	-3' – 9
					Groundwater not Encountered	-5' – 12

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Ground Surface Elevation _____ **Ground Water Elevation** _____

Sample No.	Sample		Stratum		Visual Field Classification	N-Count
	From	To	From	To		
B-26			0	8"	Firm Tan/Brown Fine Sand (SP-SM)	-1' – 21
			8"	66"	Hard Tan/Red/Orange Sand Clay (SC)	-3' – 30
					Groundwater not Encountered	-5' – 35
B-27			0	10"	Firm Tan/Brown Fine Sand (SP-SM)	-1' – 21
			10"	24"	Very Stiff Orange Sand Clay (SC)	-3' – 28
			24"	66"	Hard Tan/Red/Orange Sand Clay (SC)	-5' – 32
					Groundwater not Encountered	
B-28			0	18"	Firm Brown Fine Sand (SP-SM)	-1' – 18
			18"	54"	Stiff Orange Sand Clay (SC)	-3' – 7
			54"	66"	Very Stiff Red/Orange Sand Clay (SC)	-5' – 16
					Groundwater not Encountered	
B-29			0	6"	Firm Tan/Brown Fine Sand (SP-SM)	-1' – 11
			6"	54"	Very Stiff Red/Orange Sand Clay (SC)	-3' – 25
			54"	66"	Very Stiff Red/Tan Clay (CL)	-5' – 21
					Groundwater not Encountered	
B-30			0	12"	Firm Brown Fine Sand (SP-SM)	-1' – 14
			12"	54"	Stiff Orange Sand Clay (SC)	-3' – 11
			54"	66"	Stiff Orange/Red/Tan Clay (CL)	-5' – 11
					Groundwater not Encountered	

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Sample No.	Sample		Stratum		Visual Field Classification	N-Count
	From	To	From	To		
B-31			0	30"	Very Firm Brown Fine Sand (SP-SM)	-1' – 32
			30"	48"	Stiff Orange Sand Clay (SC)	-3' – 11
			48"	66"	Very Stiff Red/Orange Sand Clay (SC)	-5' – 21
					Groundwater not Encountered	
B-32			0	18"	Very Firm Brown Fine Sand (SP-SM)	-1' – 21
			18"	66"	Hard Red/Tan/Orange Sand Clay (SC)	-3' – 42
					Groundwater not Encountered	-5' – 44