EXHIBIT B-1



6445 Shiloh Road, Suite A Alpharetta, GA 30005 **T/** 770-781-8008 **F/** 770-781-8003

	MEMORANDUM							
TO:	Alok Pandya, P.E.	DATE:	September 7, 2018					
COMPANY:	Brown & Caldwell	SUBJECT:	Norman Road Dam, Milam Park, Clarkston, GA – Geotechnical Memo (DeKalb County Project #5)					
ADDRESS:	990 Hammond Drive, Suite 400 Atlanta, GA 30328	PROJECT NAME/NO.:	Dekalb Co. Gravity Sewer Rehabilitation, Replacement, and Construction 18C17041.00					
FROM:	J. Ryan Collins, P.E & Graham Elliott, P.E.	CC:	Jesse Brown (Brown & Caldwell)					

Schnabel, Engineering, LLC (**Schnabel**) is pleased to present this geotechnical memorandum to summarize the subsurface exploration, geotechnical testing and recommendations for the sewer line rehabilitation at Norman Road Dam in Milam Park, Clarkston, GA. This memorandum summarizes the following:

- 1. Scope of Geotechnical Service
- 2. Subsurface Exploration and Geotechnical Testing
- 3. Geotechnical Recommendations & Construction Considerations for Planned Sewer Modifications
- 4. Visual Inspection of the Dam
- 5. Limitations

This memorandum includes three (3) Appendices. Appendix A presents a photographic log with captions to summarize visual observations made during field reconnaissances of the project site. Appendix B includes a boring location plan and soil boring logs. Appendix C contains results of geotechnical laboratory testing data.

SCOPE OF GEOTECHNICAL SERVICE

Schnabel was contracted by Brown and Caldwell Constructors, Inc. (BCC) to provide geotechnical recommendations related to sewer line replacement projects located in DeKalb County, Georgia. The subject project site is located adjacent to Norman Road Dam at Milam Park in Clarkston, Georgia. Schnabel was provided the following information regarding the sewer line relocations which was used to identify the scope of services:

- Maximum estimated depth of excavation: 13 feet,
- Length of pipe on new alignment outside of existing trench: 167 feet,
- Proposed sewer realignments:
 - Join manhole '18-095-S203' 167 feet across the toe of the downstream slope to join new manhole 'PROP-S001' that will drain 203 feet to the existing manhole '18-096-S0038'.

SENT VIA:	First Class Mail	Overnight Service	Other	

- Sewer line from manholes '18-095-S203' to '18-096-S037' is proposed to be abandoned in place.
- Visual observations to be made along the line that traverses the backyards of eight residential properties on the east side of the lake.

Schnabel proposed a series of soil test borings, including Standard Penetration Testing (SPT) and hand-augering with Dynamic Cone Penetrometer (DCP) soundings to be performed in the approximate locations of the sewer line replacements. In addition, Schnabel proposed that recommendations would be provided regarding how to abandon the existing sewer infrastructure at the toe of the dam. Schnabel proposed that the soil test borings would extend approximately 20 feet or until refusal, whichever was encountered first. Hand auger borings and DCP soundings were limited to a depth of six (6) feet, or occurrence of refusal or cave-in, whichever occurs first.

Using the results of the geotechnical exploration and visual observations during the field reconnaissances, Schnabel proposed to provide recommendations regarding the sewer line replacements using the design information provided by BCC.

SUBSURFACE EXPLORATION AND GEOTECHNICAL TESTING

Three (3) standard penetration test (SPT) borings identified as SPT-01, SPT-02 and SPT-03 were drilled at the approximate locations presented in plan in Appendix B. The borings were drilled with a tracked rig using hollow stem auger means and methods. SPT were performed near continuously in the upper 10 feet, and at 5 foot depth intervals thereafter, in accordance with ASTM D1586. Disturbed samples were obtained from the SPT split spoon sampler and bulk soil samples were obtained from the auger cuttings. The boring logs were described and classified in accordance with ASTM D2488.

Two (2) hand auger borings, identified as HA-1 and HA-2, were performed upstream of the dam in the backyard of the 996 Nielsen Drive property. The approximate locations of the hand auger borings are presented in plan in Appendix B. The purpose of these exploration points was to identify the subsurface conditions on the approximate alignment of the new sewer line. Within the hand auger borings, hand-operated dynamic cone penetration (DCP) soundings were performed in accordance with recommendations described in ASTM Special Technical Publication No. 399, "Dynamic Cone for Shallow In-Situ Penetration Testing", authored by George Sowers (the person responsible for inventing the DCP apparatus and testing procedure for use in Piedmont soils). Boring logs, including the DCP blow counts, are presented in Appendix B.

The materials sampled from the Norman Road Dam site consisted of fill, alluvial, and residual soils comprised of sandy silts and silty sands, typically. The SPT blow counts were on the order of 5 to 7 in fill. The SPT blow counts were on the order of 2 in alluvial material. The SPT blow counts were on the order of 4 or greater in residual materials. The material encountered in the back yard of 996 Nielsen Drive consisted of plastic sandy silts and appeared to be Piedmont Residual soils. DCP blows per increment of the residual soils were 11 or greater. Representative soil samples were tested for geotechnical index properties to confirm the visual-manual soil descriptions and classifications (see Appendix C).

GEOTECHNICAL RECOMMENDATIONS & CONSTRUCTION CONSIDERATIONS FOR PLANNED SEWER MODIFICATIONS

Impact of trench excavations on stability of the dam

Based upon the proposed alignment of the sewer line replacement (60% design AutoCAD drawings provided to Schnabel) and our understanding of the work intended to be performed at the site, the installation of the sewer line between

manholes 18-095-S203 and proposed manhole PROP-S001 by excavating an open trench is not anticipated to adversely impact the Norman Road Dam. The sewer line replacement is oriented from the asphalt entrance of Milam Park to the baseball outfield located in the park. The limits of the trench excavation are therefore outside the limits of the dam footprint. However, we caution that the elevated fill downstream of the channel may be providing additional support/stability against a slip surface that extends through the embankment and its foundation. Removing soil (i.e. trench) may reduce the slope stability factor of safety of the dam at that location. Schnabel has not performed slope stability analyses as part of this scope, and so the critical slip surfaces have not been identified. While it is not anticipated that the trench excavation will cause impacts to the embankment or its foundation, it is imperative that the on-site personnel monitor the dam for visual evidence of movement, excessive seepage or boils (i.e. quick condition, 'running sands') in the trench excavation, and any other evidence of movement or change to the overall condition of the structure.

Based on the results of the geotechnical exploration and conditions observed during the field reconnaissances, it is not anticipated that the trench excavation(s) between manholes 18-095-S203 and Manhole 096-S032 (Line located in residential backyards on east side of lake) will impact the stability of the dam.

Trench excavations

There are two (2) segments of sewer line replacement proposed at the Norman Road site. Line replacement number 01 will consist of the segment between manholes 18-095-S203 and PROP-S001. Line replacement number 02 will consist of lines between manholes 18-095-S203 and 096-S032. Both are described below. We note that the recommendations are different for the two lines.

Line Replacement number 01

The sewer line replacement should be achievable by cut and cover methods. Side slopes in the trench should be cut back to 2 horizontal to 1 vertical, typically, with enough base width to provide access for crews installing the sewer lines. 29CFR1926 OSHA (Subpart P - Excavations) regulations and Georgia Law regarding worker safety should be adhered to at all times.

The presence of alluvial soils in the vicinity and under the dam has been noted during Schnabel's geotechnical field exploration and in the draft report titled "Report of Subsurface Exploration and Geotechnical Engineering Evaluation", prepared by Willmer Engineering, dated November 6, 2014 (Willmer Report). Alluvial soils are notorious for creating unstable conditions due to their low strength and permeable nature. If running sands are encountered, additional modifications to the trench excavation may be necessary to protect the integrity of the trench and the surrounding materials. The trench excavation should be dewatered to a depth no less than three (3) feet below the working subgrade. All standing water should be removed from the trench excavation prior to placing any backfill.

Line Replacement number 02

The sewer line replacement should be achievable by cut and cover methods. Side slopes in the trench should be cut back to 2 horizontal to 1 vertical, typically, with enough base width to provide access for crews installing the sewer lines. 29CFR1926 OSHA (Subpart P - Excavations) regulations and Georgia Law regarding worker safety should be adhered to at all times.

The hand auger exploration in the backyard of 996 Nielsen Drive indicated that the sewer line excavations will likely encounter residual soil. While it is not anticipated that alluvial soils will be encountered, the presence of alluvial soils may

impact the trench stability. The trench excavation should be dewatered to a depth no less than three (3) feet below the working subgrade. All standing water should be removed from the trench excavation prior to placing any backfill.

It is the responsibility of the Contractor to take all reasonable precautions with respect to identifying and protecting existing utilities. Measures include a Utility Clear through the Georgia 811 public service, clearly marking all underground and aboveground utilities with caution flagging, using care when excavating sewer trenches, and not performing work that could potentially damage adjacent utilities. If utility relocation is required to execute the work, then the Contractor should contact the utility provider(s) to coordinate such activities. We note that several underground utilities were identified at the Norman Road Dam site during the field activities, and these underground utilities were only identified by our privately hired utility locator that was hired for screening the specific boring locations only; not for a Subsurface Utility Engineering (SUE) investigation of the new sewer alignment. Extreme caution should be taken when excavating the trenches at the Norman Road Dam site.

Trench Backfill Materials

There are several backfill materials that will result in achieving the project intent. The following sections will briefly describe the backfill materials and associated recommendations.

Earth Fill:

Based upon the materials encountered in the in the proposed Sewer Line replacements, earth backfill with the cuttings removed from the trenches appears to be suitable for cut and cover activities for both line replacement segments. We caution that the in-place material may not be compacted to a normal recommended density, and so some shrinkage may occur. Additional fill material sources should be identified and secured prior to initializing work.

Earth fill as trench backfill should be placed in horizontal, 6-inch loose lifts and compacted to 95% of maximum dry density as determined by the Standard Proctor Test, ASTM D698. The water content of the fill should be placed between optimum and 4% wet of optimum water content as defined by the water content/density relationship curve for that material. Hand-operated or remote control compaction equipment is likely required. A walk behind plate compactor or "wacker-packer" will be required where a remote-controlled sheep's foot roller cannot maneuver effectively. Water should be removed from the subgrade and fill should not be placed on standing water, or frozen subgrade, at any time. The geotechnical engineer should approve the subgrade and observe fill placement activities for compliance with recommendations and to observe the dam for visual evidence of distress or deformation.

Flowable Fill:

Controlled low-strength material (CLSM or Flowable Fill) is a cementitious material that will cure like concrete and will likely prove to be a faster means of backfilling the new sewer line. The option of flowable fill may be suitable for the segment of sewer line being replaced downstream of the Norman Road Dam. However, access restrictions to the segments of sewer line running along the backyards of residences on Nielsen Drive will likely make this material not suitable for use as trench backfill. If the contractor elects to use this material, the previously described recommendations regarding foundation preparation and trench dimensions should still be adhered to. Precautions to protect the pipe from floatation should also be taken if this trench backfill is used.

Lean Concrete:

Lean concrete is a low-strength, cementitious material that will prove to be a fast means of backfilling the new sewer line. The option of lean concrete may be suitable for the segment of sewer line being replaced downstream of the Norman Road Dam. However, access restrictions to the segments of sewer line running along the backyards of homes on Nielsen Drive will likely make this material not suitable for use as trench backfill. If the contractor elects to use this material, the previously described recommendations regarding foundation preparation and trench dimensions should still be adhered to. Precautions to protect the pipe from floatation should also be taken if this trench backfill is used.

Abandonment of DIP Sewer Line

We note that a section of ductile iron pipe (DIP) sewer line between manhole 18-095-S203 and manhole 18-096-S037 is anticipated to be abandoned in place (Photograph 27). This abandonment can be achieved by filling the abandoned segment of pipe with cementitious non-shrink grout. The two termini of this segment of line should be bulk-headed using appropriate means and methods as determined by a qualified grouting Contractor. Grout should be injected through the downstream (lower elevation) bulkhead. An air vent should be provided to allow displaced air to escape from the line. Non-shrink admixtures should be utilized to reduce shrinkage cracking and the potential for voids.

VISUAL INSPECTION OF THE DAM

A visual inspection of the dam was performed and observations recorded in Photographs that are presented in Appendix A and documented in the sections below.

Upstream slope

A locked gate and metal fence traverses the upstream crest of the dam, which prohibits direct access to the lake and the upstream embankment slope (Photographs 2, 32). Additionally, the upstream slope of the embankment could not be thoroughly observed due to the presence of the lake. A small floating dock is present in the lake immediately upstream of the embankment near the center of the dam (Photograph 35). Small voids and erosion features were identified just upstream of the fence (Photographs 37, 38). The overall condition and grade of the upstream embankment slope is unknown at this time.

Downstream slope

The downstream slope of the embankment is steep, estimated to be on the order of 1.75 Horizontal to 1 vertical (1.75H: 1V) with some locations estimated to be on the order of 1H:1V or steeper (Photograph 9). A slope that is identified to be this steep does not likely meet adequate factors of safety for dams using the standard of practice or various agency guidelines, including the Georgia Safe Dams Program (GSDP), United States Army Corps of Engineers (USACE) and the Natural Resources Conservation Service (NRCS). We caution that executing slope stability analyses was not intended to be performed during this scope of service. However, the Wilmer Report indicates that the dam in its current configuration does not meet adequate factors of safety in steady state conditions. In addition, evidence of potential slope failure exists in the form of longitudinal asphalt cracking observed on the downstream (eastbound) lane of Norman Road over the embankment (Photographs 21, 22).

The downstream embankment is littered with miscellaneous debris, damaged or broken structures, leaning retaining walls, and other obvious discontinuities (Photographs 15, 16, 17, 18). Portions of the embankment could not be adequately inspected due to the presence of tall/dense vegetation, debris, or other structures, including concrete channels

which traverse the downstream slope and serve as roadway drainage features for stormwater (Photograph 11). Principal spillway discharge exits near the left abutment of the dam and discharges into a small channel, which immediately turns right (west) and traverses the toe of the dam (Photograph 28). After travelling approximately 120 feet from the outlet location in the aforementioned alignment, the discharge enters a 60-inch diameter corrugated metal pipe (CMP) culvert. The 60-inch CMP culvert is oriented in a generally southern direction and traverses the outfield of a baseball field before discharging further downstream. In addition, a storm drain outlet contributes flows from the right abutment into the channel. The channel is divided by a 35 foot wide section of earth fill located near the center of the dam with a 60-inch diameter CMP culvert joining the left and right sections of the channel.

Crest of the dam

The Norman Road Dam is located near the eastern limits of the City of Clarkston and traverses the crest of the dam. Norman road is a two-lane asphalt-paved road which serves as a main thoroughfare in the town of Clarkston, Georgia. Longitudinal cracks were noted in the asphalt paving (Photograph 22) which is an indicator of slope failure/movement of the embankment. The upstream side of the crest is barricaded by a steel fence and guardrail. The downstream side of the crest is traversed by sidewalk and guardrail. Storm drainage features are also present on the downstream side of the crest.

Principal spillway and appurtenant structures

The principal spillway consists of a reinforced concrete drop inlet (riser) located near the left abutment of the dam (Photographs 28, 29, 30, 31, and 32). A concrete inlet channel is present which conveys water from the lake into the riser structure (Photograph 32). The riser structure has un-grouted masonry bricks supporting the cover of the drop inlet in place, and two sides of the riser are obstructed by dense vegetation and grass (Photograph 31). The riser structure appears to be constructed of brick masonry, which is in need of re-pointing of the mortar joints. The overgrown vegetation is adversely impacting the hydraulic capacity of that structure. No trash guards were noted on the principal spillway structure.

An abandoned CMP structure is visible in the lake (Photograph 36). The CMP appears to be on the order of 12-inches in diameter. The CMP was observed to be filled with cured grout. The downstream end of the former principal spillway conduit was not observed during the field reconnaissances.

Seepage

The Norman Road Dam did not exhibit evidence of uncontrolled seepage during the time of the visual inspection. However, we note that excessive vegetation and debris were present on the downstream face of the dam such that a full inspection of the embankment could not be performed. We recommend that the vegetation and debris be removed from the embankment and a thorough visual inspection be performed by the party responsible for the dam.

LIMITATIONS

We note the following limitations of this geotechnical study:

- 1. The hydrology and hydraulics of the dam have not been evaluated.
- 2. Slope stability has not been analyzed as it is outside of Schnabel's scope of service.
- 3. Hydraulic design of the sewer rehabilitation is outside Schnabel's scope of services.

- 4. No serviceable geotechnical monitoring instrumentation appears on the dam. The piezometers installed by others have sealed caps and could not be read.
- 5. No topographic surveying has been performed under this scope of service.
- 6. Conditions described in this memorandum are valid only for the times that the inspections were undertaken.
- 7. Groundwater conditions may vary daily, annually, and/or with seasonal effects.
- 8. This memorandum describes the conditions specifically encountered beneath the ground at the locations of the borings and at that time. Interpolations or extrapolations of ground conditions at locations or times other than those described herein should not be assumed.
- 9. During construction of the sewers, should ground and groundwater conditions differ from the observed conditions presented in this memorandum, Schnabel should be contacted immediately in order to evaluate whether the recommendations remain valid.
- 10. The design of temporary works is outside of Schnabel's scope of service (i.e. support of excavation, shoring, dewatering systems erosion and sediment control).
- 11. Engineering Services During Construction (ESDC) are excluded.

SIGNED:

J. Ryan Collins, P.E., Project Engineer

SIGNED:

Graham Elliott, P.E., Senior Associate

OR G

OR G

OR G

No. PEGASTER

PROFESSIONAL

038025 SSIONAL *

APPENDIX A: PHOTOGRAPH LOG



DATE TAKEN: 05/23/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

View along crest of dam, from west to the east. Milam Park is on the right of this photograph and the lake is on the left.



PHOTO NUMBER: 2

DATE TAKEN: 05/23/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

View along crest of dam, from east to west.



DEKALB SEWER GEOTECHNICAL SERVICES, BROWN & CALDWELL, DEKALB COUNTY, GA PROJECT NO. 18C17041.00



DATE TAKEN: 05/22/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

Geophysical surveying for underground utilities at the location of soil boring SPT-1 in the entrance to Milam Park.



PHOTO NUMBER: 4

DATE TAKEN: 05/22/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

Energizing a water line to enable geophysical survey of it's location prior to drilling at soil boring SPT-01.



DEKALB SEWER GEOTECHNICAL SERVICES, BROWN & CALDWELL, DEKALB COUNTY, GA PROJECT NO. 18C17041.00



DATE TAKEN: 05/22/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

Geophysical surveying for utilities, prior to drilling at soil boring SPT-02.



PHOTO NUMBER: 6

DATE TAKEN: 05/22/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

Drill rig location at soil boring SPT-02.



DEKALB SEWER GEOTECHNICAL SERVICES, BROWN & CALDWELL, DEKALB COUNTY, GA PROJECT NO. 18C17041.00



DATE TAKEN: 05/22/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

Drilling at soil boring SPT-2. Note the geophysical surveying in progress in the outfield around the location of soil boring SPT-03.



PHOTO NUMBER: 8

DATE TAKEN: 05/22/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

Headwall at large conduit under Norman Road at entrance to Milam Park.



DEKALB SEWER GEOTECHNICAL SERVICES, BROWN & CALDWELL, DEKALB COUNTY, GA PROJECT NO. 18C17041.00



DATE TAKEN: 05/22/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

Downstream slope of dam with partial placement of rip rap stone. Note water flow at toe of slope and bowed alignment of retaining wall near orange barrier fence.



PHOTO NUMBER: 10

DATE TAKEN: 05/22/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

Eastern end of retaining wall at the downstream toe of the dam. Note lean of the wall.



DEKALB SEWER GEOTECHNICAL SERVICES, BROWN & CALDWELL, DEKALB COUNTY, GA PROJECT NO. 18C17041.00



DATE TAKEN: 05/22/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

Concrete lined chute in the downstream slope of dam to convey storm water from inlet on Norman Road. Note bottom of chute is blocked with loose rip rap, and vegetation. Note headwall and corrugated metal pipe (CMP) conduit at toe of downstream slope of dam.



PHOTO NUMBER: 12

DATE TAKEN: 05/23/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

Existing pvc standpipe piezometer in a mid-slope location on the downstream slope of the dam (installed by others, not by Schnabel Engineering, LLC).



DEKALB SEWER GEOTECHNICAL SERVICES, BROWN & CALDWELL, DEKALB COUNTY, GA PROJECT NO. 18C17041.00 Photographs taken by: J.R. Collins, P.E. & G. Elliott, P.E.



DATE TAKEN: 05/22/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

Corrugated metal pipe (CMP) conduit aligned parallel with toe of the downstream slope of the dam.



PHOTO NUMBER: 14

DATE TAKEN: 05/22/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

Corrugated plastic conduit in downstream slope of dam. Also note irregular coverage of loose rip rap and partial concrete veneer.



DEKALB SEWER GEOTECHNICAL SERVICES, BROWN & CALDWELL, DEKALB COUNTY, GA PROJECT NO. 18C17041.00



DATE TAKEN: 05/22/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

Downstream slope of dam, with vegetation growing through rip rap. Note water in toe ditch.



PHOTO NUMBER: 16

DATE TAKEN: 05/22/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

Water in ditch at toe of downstream slope of dam. Note vegetation growing through the rip rap facing.



DEKALB SEWER GEOTECHNICAL SERVICES, BROWN & CALDWELL, DEKALB COUNTY, GA PROJECT NO. 18C17041.00



DATE TAKEN: 05/22/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

Overgrown ditch at toe of downstream slope, viewed

toward the west.



PHOTO NUMBER: 18

DATE TAKEN: 05/22/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

Dry stone wall at head wall on the downstream slope of the dam.



DEKALB SEWER GEOTECHNICAL SERVICES, BROWN & CALDWELL, DEKALB COUNTY, GA PROJECT NO. 18C17041.00



DATE TAKEN: 05/22/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

View of embankment and channel as viewed from right abutment, facing east.



PHOTO NUMBER: 20

DATE TAKEN: 05/22/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

Water in ditch at toe of downstream slope of the dam.



DEKALB SEWER GEOTECHNICAL SERVICES, BROWN & CALDWELL, DEKALB COUNTY, GA PROJECT NO. 18C17041.00



DATE TAKEN: 05/22/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

Longitudinal cracking in the asphalt pavement of Norman Road along the crest of the dam. View toward the west.



PHOTO NUMBER: 22

DATE TAKEN: 05/22/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

Longitudinal cracking in the asphalt pavement of Norman Road along the crest of the dam. View toward the west.



DEKALB SEWER GEOTECHNICAL SERVICES, BROWN & CALDWELL, DEKALB COUNTY, GA PROJECT NO. 18C17041.00



DATE TAKEN: 05/22/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

Stormwater inlet to concrete lined chute on the downstream slope fo the dam. Note temporary the straw wattle at rear of the concrete.



PHOTO NUMBER: 24

DATE TAKEN: 05/22/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

View toward the south from the Norman Road across the outfield of Milam Park. Retaining walls.



DEKALB SEWER GEOTECHNICAL SERVICES, BROWN & CALDWELL, DEKALB COUNTY, GA PROJECT NO. 18C17041.00



DATE TAKEN: 05/22/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

View toward the southwest across the ball field of Milam Park. Note CMP conduit in foreground at toe of downstream slope of dam.



PHOTO NUMBER: 26

DATE TAKEN: 05/22/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

View toward entrance of Milam Park. Note leaning retaining wall adjacent the ditch at the toe of the downstream slope of the dam. Note leaning power pole on the crest of the dam. Concrete lined chute in foreground.



DEKALB SEWER GEOTECHNICAL SERVICES, BROWN & CALDWELL, DEKALB COUNTY, GA PROJECT NO. 18C17041.00

Photographs taken by:



DATE TAKEN: 05/22/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

Exposed sewer line located immediately downstream of Norman Road Dam.



PHOTO NUMBER: 28

DATE TAKEN: 05/22/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

Headwall and conduit under Norman Road, view from downstream side of dam.



DEKALB SEWER GEOTECHNICAL SERVICES, BROWN & CALDWELL, DEKALB COUNTY, GA PROJECT NO. 18C17041.00



DATE TAKEN: 05/22/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

Drop inlet to spillway structure on upstream side of dam in the left abutment. Note CMP conduits.

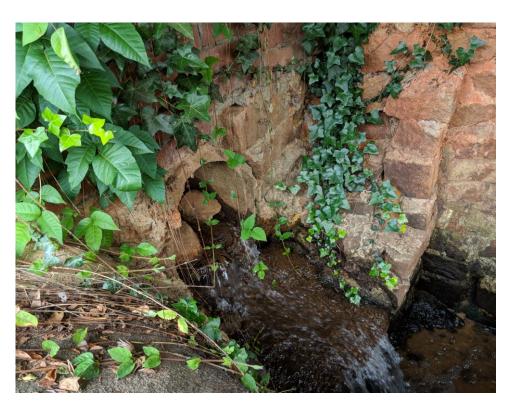


PHOTO NUMBER: 30

DATE TAKEN: 05/22/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

Spillway structure on upstream side of dam in the left abutment.
Apparent storm drainage pipe shown here, origins unknown.



DEKALB SEWER GEOTECHNICAL SERVICES, BROWN & CALDWELL, DEKALB COUNTY, GA PROJECT NO. 18C17041.00



DATE TAKEN: 05/22/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

Soffit of the concrete slab atop the spillway structure. Note the lack of mortar in the brick pedestal.



PHOTO NUMBER: 32

DATE TAKEN: 05/22/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

Spillway structure on upstream side of dam in the left abutment. Note overgrown vegetation in the concrete lined spillway channel.



DEKALB SEWER GEOTECHNICAL SERVICES, BROWN & CALDWELL, DEKALB COUNTY, GA PROJECT NO. 18C17041.00



DATE TAKEN: 05/22/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

View along the upstream slope of the dam toward the west. Note location of floating pontoon dock.



PHOTO NUMBER: 34

DATE TAKEN: 05/22/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

Principal spillway drop inlet, facing north towards the south opening of the structure.



DEKALB SEWER GEOTECHNICAL SERVICES, BROWN & CALDWELL, DEKALB COUNTY, GA PROJECT NO. 18C17041.00



DATE TAKEN: 05/22/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

Transverse cracking in the asphalt pavement across the width of Norman Road.



PHOTO NUMBER: 36

DATE TAKEN: 05/22/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

Grouted CMP Riser facing west. Floating dock in background.



DEKALB SEWER GEOTECHNICAL SERVICES, BROWN & CALDWELL, DEKALB COUNTY, GA PROJECT NO. 18C17041.00



DATE TAKEN: 05/23/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS: Erosion feature in upstream slope of dam.



PHOTO NUMBER: 38

DATE TAKEN: 05/23/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

Void in crest of dam along upstream crest.



DEKALB SEWER GEOTECHNICAL SERVICES, BROWN & CALDWELL, DEKALB COUNTY, GA PROJECT NO. 18C17041.00



DATE TAKEN: 05/22/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

Geophysical surveying for utilities, at the locations of hand auger holes HA-1 and HA-2 in the back yard of the Nielsen property, adjacent the lake.



PHOTO NUMBER: 40

DATE TAKEN: 05/22/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

Geophysical surveying for utilities, at the locations of Hand Auger holes HA-1 and HA-2 in the back yard of the Nielsen property, adjacent the lake.



DEKALB SEWER GEOTECHNICAL SERVICES, BROWN & CALDWELL, DEKALB COUNTY, GA PROJECT NO. 18C17041.00



DATE TAKEN: 05/24/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

COMMENTS:

Dynamic cone penetration (DCP) test sounding in the back yard of the Nielsen property on the upstream side of Norman Road dam. Note hand auger apparatus in left corner of photograph.



PHOTO NUMBER: 42

DATE TAKEN: 05/24/18

LOCATION:

Dam at Norman Road, Milam Park, Clarkston, GA

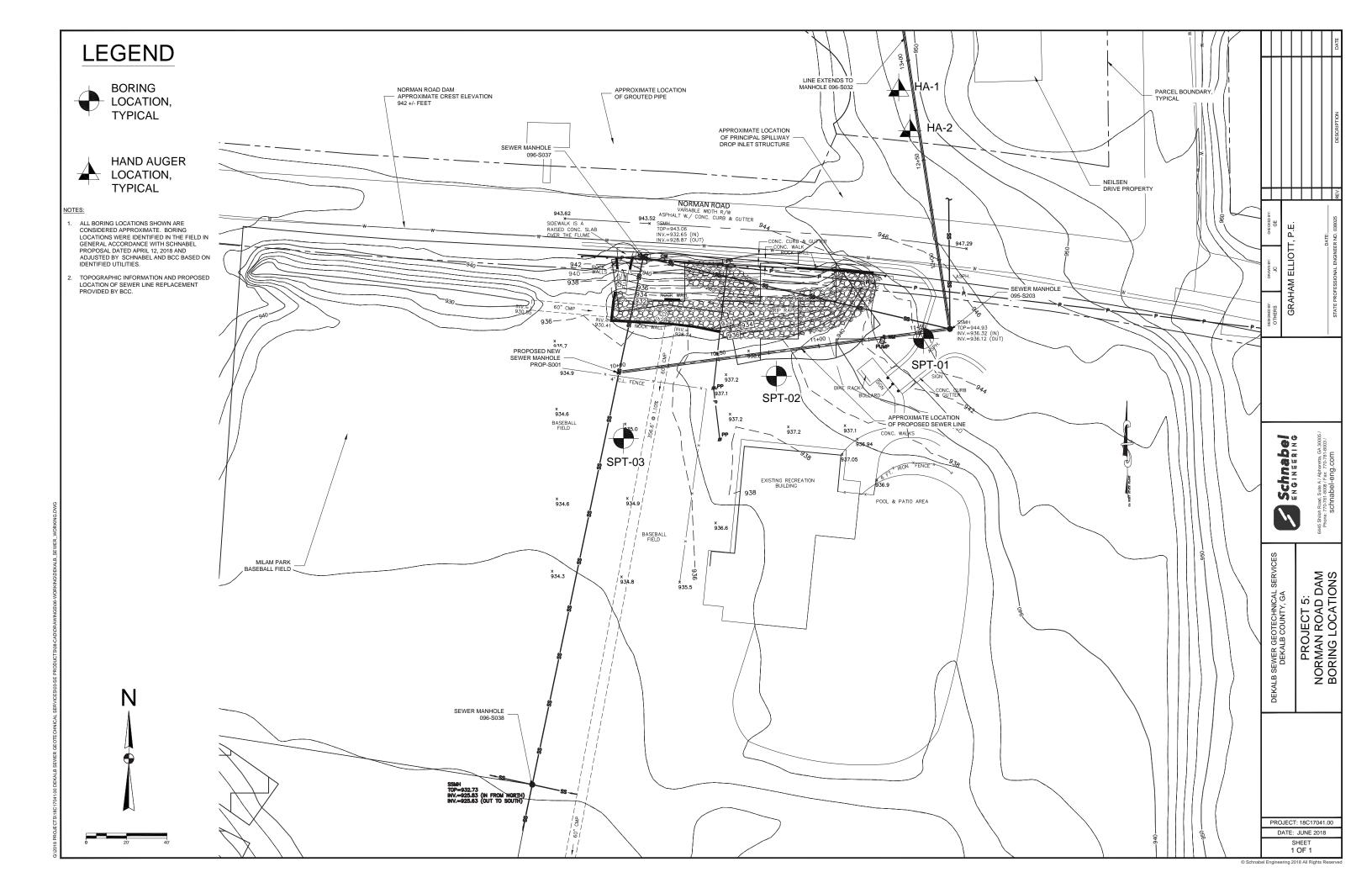
COMMENTS:

Hand auger boring to a depth of 6 feet in the backyard of the Nielsen Property on the upstream side of Norman Road dam.



DEKALB SEWER GEOTECHNICAL SERVICES, BROWN & CALDWELL, DEKALB COUNTY, GA PROJECT NO. 18C17041.00

APPENDIX B: BORING LOCATION PLAN AND BORING LOGS





TEST BORING LOG

Project: Norman Road Dam (Milam Park)

DeKalb County Clarkston, Georgia Boring Number: SPT-01
Contract Number: 18C17041.00

Contractor: Big Dog Geotechnical Testing, LLC Cumming, Georgia

Contractor Foreman: Dustin Dodd

Schnabel Representative: Jennifer Gaines

Equipment: Diedrich D-50 (ATC) **Method:** 2-1/4" I.D. Hollow Stem Auger

Hammer Type: Auto Hammer (140 lb)

Dates Started: 5/22/18 Finished: 5/22/18

Location: See Location Plan

Plunge: Bearing:

Ground Surface Elevation: 944± (ft) Total Depth: 20.0 ft

		Water L	evel Obser	rvations		
		Date	Time	Depth	Casing	Caved
Completion		5/22/18	11:10 AM	Dry		
After Drilling	¥	5/22/18	11:15 AM	11.5'		

Sheet: 1 of 1

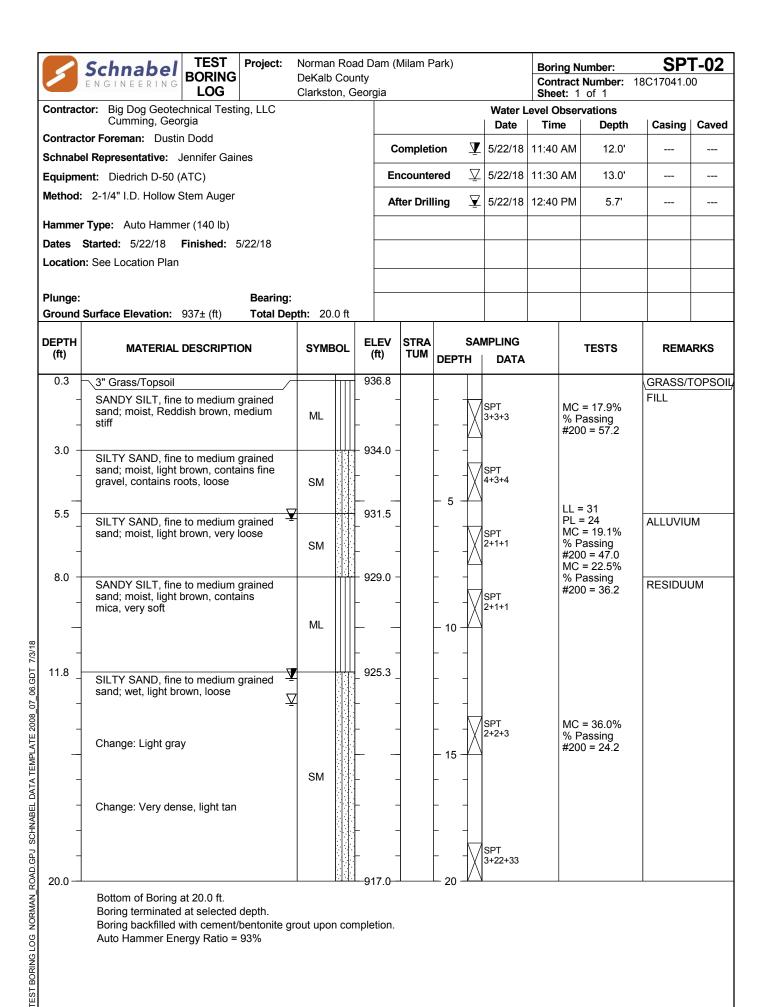
DEPTH (ft)	MATERIAL DESCRIPTION	SYME	BOL	ELEV (ft)	STRA TUM	SA DEPTH	AMPLING DATA	TESTS	REMARKS
	Asphalt/GAB								ASPHALT/GAE
1.0	SANDY SILT, fine to medium grained sand; moist, Reddish brown, contains mica, stiff	ML		- 943.0 - 	-		SPT 4+4+6	MC = 17.3% % Passing #200 = 52.4	FILL
3.0	CLAYEY SAND, fine to medium grained sand; moist, yellowish brown, loose	SC		- 941.0 - 	-	- 5	/ SPT 9+4+4		
5.5	SILTY SAND, fine to medium grained sand; moist, tanish gold, contains abundant mica, medium stiff			938.5	-		SPT 2+3+4	MC = 33.8% % Passing #200 = 27.9	RESIDUUM
-	Change: dark brownish gold			 	-	10	SPT 2+3+2		
_	Ā	SM		 	- -				
-	Change: loose				_	- 15	SPT 1+2+2		
_	Change: wet, tan, contains mica			 	-				
20.0				- 924.0	-	20	SPT 2+3+3	MC = 40.3% % Passing #200 = 35.0	

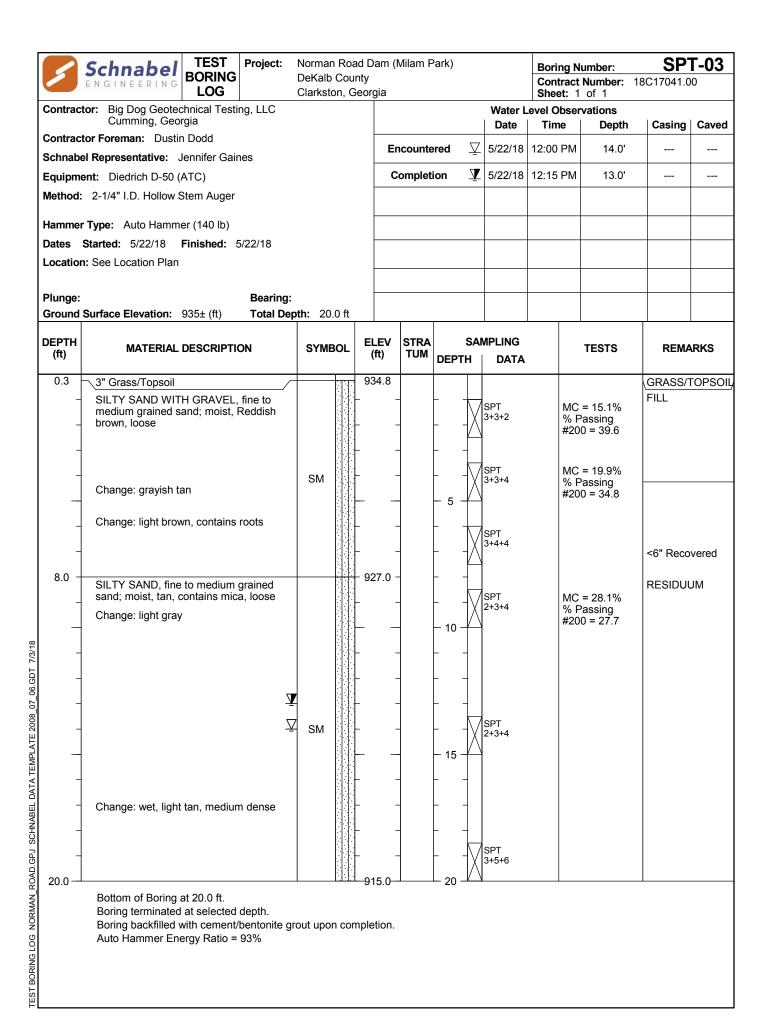
Bottom of Boring at 20.0 ft.

Boring terminated at selected depth.

Boring backfilled with cement/bentonite grout upon completion.

Auto Hammer Energy Ratio = 93%





Schnabel
ENGINEERING

Contractor: Not Applicable

HAND AUGER LOG

Project: Norman Rd Dam (Backyard of 996 Nielson Dr)

DeKalb County Clarkston, Georgia **Hand Auger Number:**

Contract Number: 18C17041.00 Sheet: 1 of 1

Water Level Observations

Contractor Foreman: Not Applicable

Schnabel Representative: J R. Collins/Sam Cowan

Equipment: Dynamic Cone Penetrometer

Method: Hand Auger with DCP

Dates Started: 5/24/18 Finished: 5/24/18

Location: See Location Plan

Coordinate System: GA State Plane (W)

Plunge: Bearing:

Ground Surface Elevation: 947± (ft) Total Depth: 6.0 ft

	Date	Time	Depth	Casing	Caved
Not Encountered	5/24/18				

DEPTH (ft)	MATERIAL DESCRIPTION	SYMBO	DL	ELEV (ft)	STRA TUM	SA DEPTH	MPLING DATA	TESTS	REMARKS
0.3	3" Grass/Topsoil SANDY SILT, fine to medium grained sand; moist, Reddish brown, medium stiff to stiff			946.7					GRASS/TOPSOI DCP @ 0" = 4 (Seating) +5+8+9+12+14 RESIDUUM
-									DCP @ 18" = 6 (Seating) +12+14+15+13
_		ML	_						DCP @33" = 12 (Seating) +18+18+18+20
-			_						DCP @49.5" = 15 (Seating) +23
_						- 5 -			DCP @61" = 16 (Seating) +22
6.0	Bottom of Hand Auger at 6.0 ft.			- 941.0 -					DCP @69" = 21 (Seating) +24

Hand auger terminated at selected depth.

Hand auger backfilled with playground sand upon completion.

TEST BORING LOG NORMAN_ROAD_NIELSEN_HA_LOGS.GPJ SCHNABEL DATA TEMPLATE 2008_07_06.GDT 7/3/18

Schnabel
ENGINEERING

Contractor: Not Applicable

HAND AUGER LOG

Project: Norman Rd Dam (Backyard of 996 Nielson Dr)

> **DeKalb County** Clarkston, Georgia

Hand Auger Number:

Contract Number: 18C17041.00 Sheet: 1 of 1

Water Level Observations

Contractor Foreman: Not Applicable

Schnabel Representative: J R. Collins/Sam Cowan

Equipment: Dynamic Cone Penetrometer

Method: Hand Auger with DCP

Dates Started: 5/24/18 Finished: 5/24/18

Location: See Location Plan

TEST BORING LOG NORMAN_ROAD_NIELSEN_HA_LOGS.GPJ SCHNABEL DATA TEMPLATE 2008_07_06.GDT 7/3/18

Coordinate System: GA State Plane (W)

Plunge: Bearing:

Ground Surface Elevation: 946± (ft) Total Depth: 6.0 ft

	Date	Time	Depth	Casing	Caved
Not Encountered	5/24/18				

EPTH (ft)	MATERIAL DESCRIPTION	SYMBO	DL	ELEV (ft)	STRA TUM	SA DEPTH	MPLING DATA	TESTS	REMARKS
0.3	3" Grass/Topsoil SANDY SILT, fine to medium grained			945.7				LL = 47 PL = 28 MC = 19.7% % Passing	GRASS/TOPSC DCP @ 0" = 4 (Seating) +6+8+9
-	sand; moist, reddish brown, medium stiff to stiff		_	_				#200 = 62.1	RESIDUUM
_			_	-					DCP @ 18" = 15 (Seating) +27
		ML	_	-					DCP @32" = 13 (Seating) +12+11+12
_			_			 - 5 -			DCP @51" = 9 (Seating) +11+11+14
6.0	Bottom of Hand Auger at 6.0 ft.			940.0 -					— DCP @72" = 16 (Seating)

APPENDIX C: LABORATORY TEST RESULTS

Summary Of Laboratory Tests

Appendix Sheet 1 of 2 Project Number: 18C17041.00

Boring No.	Sample Depth ft	Sample	Description of Soil	(%	avity	. 	it	хәри	7.0	9,6	pu	ţ	ay	Dry 3f)	Aoisture)	
No.	Elevation ft	Type	Specimen	Natural Moisture (%)	Specific Gravity	Liquid Limit	Plastic Limit	Plasticity Index	% Retained No. 4 Sieve	% Passing No. 200 Sieve	Percent Sand	Percent Silt	Percent Clay	Maximum Dry Density (pcf)	Optimum Moisture Content (%)	
SPT-01	1.0 - 2.5	- Jar	SANDY SILT (ML), reddish brown	17.3					0.6	52.4	47.0					
31 1-01	945.0 - 943.5	Jai		17.5	_	_			0.0	32.4	47.0					
SPT-01	6.0 - 7.5	Jar	SILTY SAND (SM), tanish gold	33.8					0.2	27.9	71.9		<u></u>			
GI 1-01	940.0 - 938.5	Jai		00.0					0.2	27.5	71.0					
SPT-01	18.5 - 20.0	- Jar	SILTY SAND (SM), gray	40.3					0.0	35.0	65.0		<u></u>			
31 1-01	927.5 - 926.0	Jai		40.5	_	_			0.0	33.0	05.0					
SPT-02	1.0 - 2.5	- Jar	SANDY SILT (ML), trace gravel, reddish brown	17.9					2.1	57.2	40.7		<u></u>			
	938.0 - 936.5	Jai		17.9	_				2.1	57.2	40.7					
SPT-02	5.0 - 6.0	Bulk	SILTY SAND (SM), trace gravel, lt. brown	19.1	2.70	10.1	31	24	7	2.2	47.0	50.8	31.2	15.8	114.1	14.1
SF 1-02	934.0 - 933.0	Buik		19.1	2.70	31	1 24	,	2.2	47.0	50.6	31.2	15.6	114.1	14.1	
SPT-02 SPT-02 SPT-02 SPT-02 Notes:	6.0 - 7.5	- Jar	SILTY SAND (SM), trace gravel, brown	22.5			-		2.4	36.2	61.4	1		-		
31 1-02	933.0 - 931.5	Jai		22.5					۷.4	30.2	01.4	- -	- -	- -		
SPT-02	13.5 - 15.0	Jar	SILTY SAND (SM), It. brown	36.0					0.7	24.2	75.1	-				
2 31 1-02 E	925.5 - 924.0	Jai		30.0					0.7	27.2	75.1					
Notes:																

Notes:

1. Soil tests in general accordance with ASTM standards.



Project: Norman Road Dam (Milam Park)
DeKalb County
Clarkston, GA

AMIC I AB SUMMARY NORMAN ROAD GP.I TEST TEMPI ATE

^{2.} Soil classifications are in general accordance with ASTM D2487(as applicable), based on testing indicated and visual classification.

^{3.} Key to abbreviations: NP=Non-Plastic; -- indicates no test performed.

Summary Of Laboratory Tests

Appendix Sheet 2 of 2 Project Number: 18C17041.00

Boring	Sample Depth ft	Sample	Description of Soil	(%)	Gravity	¥	¥	Index	7.0	эле	Sand	ţ	ay	ارير عل	Noisture)		
No.	Elevation ft	Type	Specimen	Natural Moisture (%)	Specific G	Liquid Limit	Plastic Limit	Plasticity I	% Retained No. 4 Sieve	% Passing No. 200 Sieve	Percent Sa	Percent Silt	Percent Clay	Maximum Dry Density (pcf)	Optimum Moisture Content (%)		
SPT-03	1.0 - 2.5	- Jar	SILTY SAND WITH GRAVEL (SM), reddish brown	15.1	-	-			16.3	39.6	44.1						
3F 1-03	936.0 - 934.5	Jai		15.1	-	-			10.3	39.0	44.1						
SPT-03	3.5 - 5.0	- Jar	SILTY SAND (SM), trace gravel, grayish tan	19.9					3.2	34.8	62.0						
3F1-03	933.5 - 932.0	Jai		19.9	•	-			3.2	34.0	02.0	-					
SPT-03	8.5 - 10.0	- Jar	SILTY SAND (SM), tan	28.1							0.0	27.7	72.3				
3F1-03	928.5 - 927.0	Jai			1	1			0.0	21.1	12.3	ı		-			

Notes:

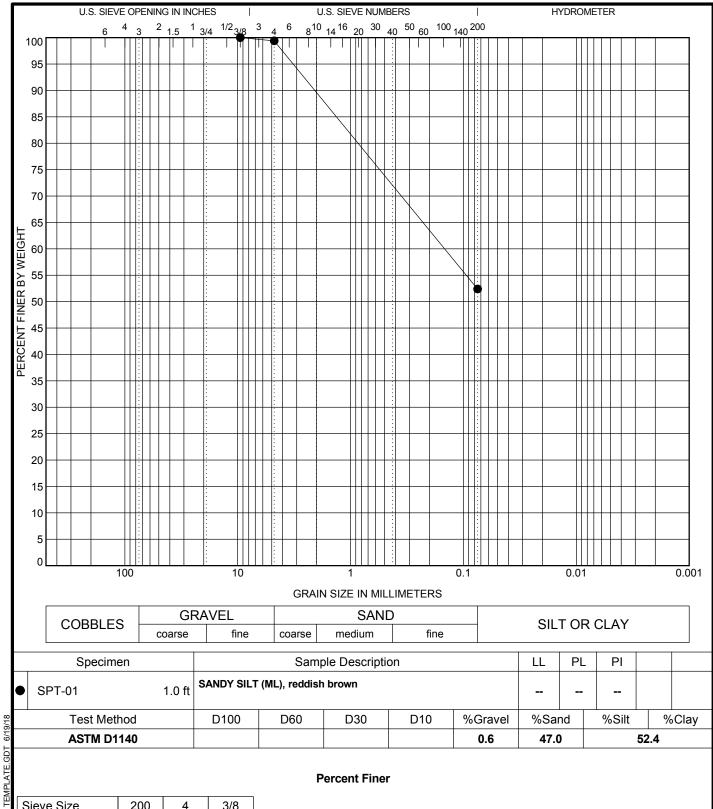
1. Soil tests in general accordance with ASTM standards.

2. Soil classifications are in general accordance with ASTM D2487(as applicable), based on testing indicated and visual classification.

3. Key to abbreviations: NP=Non-Plastic; -- indicates no test performed.



Project: Norman Road Dam (Milam Park)
DeKalb County
Clarkston, GA



	Sieve Size	200	4	3/8
ادُ	% Finer	52.4	99.4	100.0

1/SHEET NORMAN ROAD.GPJ

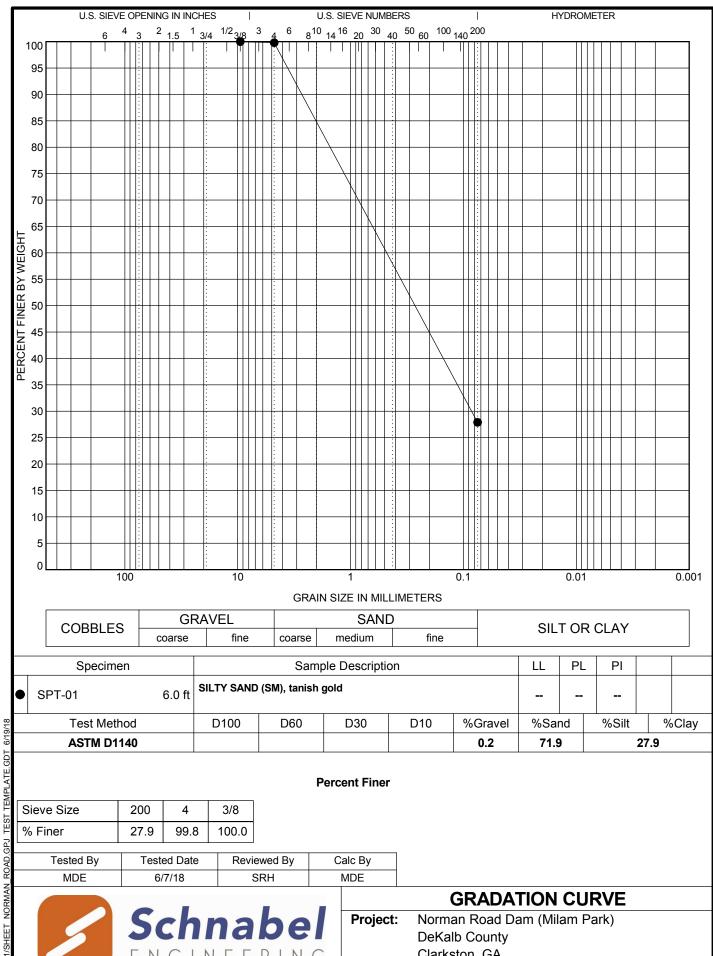
Tested By	Tested Date	Reviewed By	Calc By
MDE	6/7/18	SRH	MDE



GRADATION CURVE

Project: Norman Road Dam (Milam Park)

DeKalb County Clarkston, GA



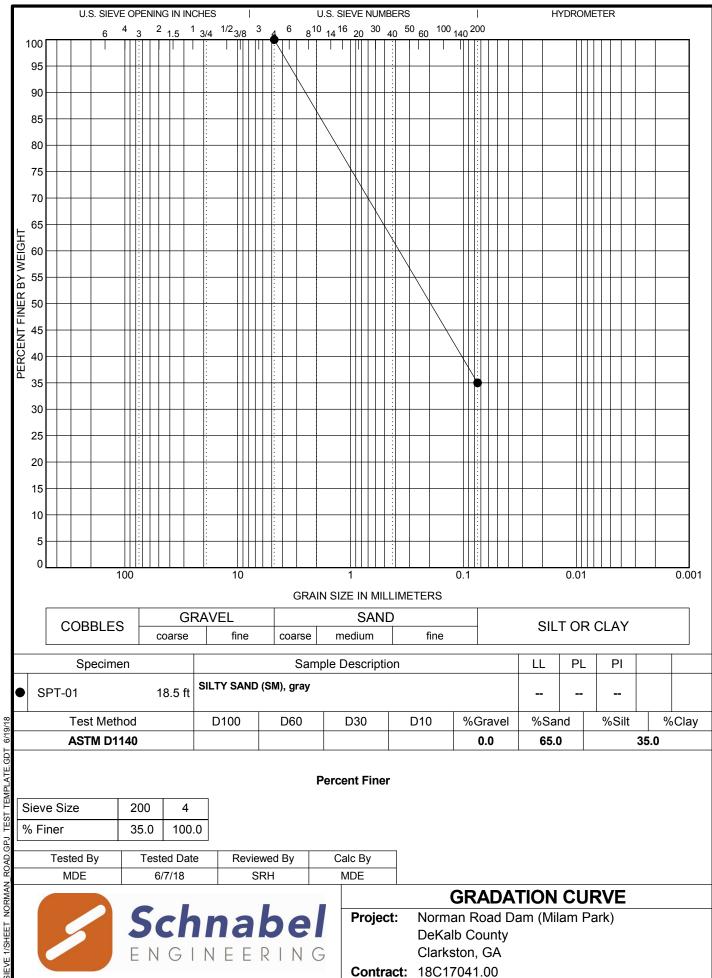
Sieve Size	200	4	3/8
% Finer	27.9	99.8	100.0

Tested By	Tested Date	Reviewed By	Calc By
MDE	6/7/18	SRH	MDE



Project: Norman Road Dam (Milam Park)

> **DeKalb County** Clarkston, GA



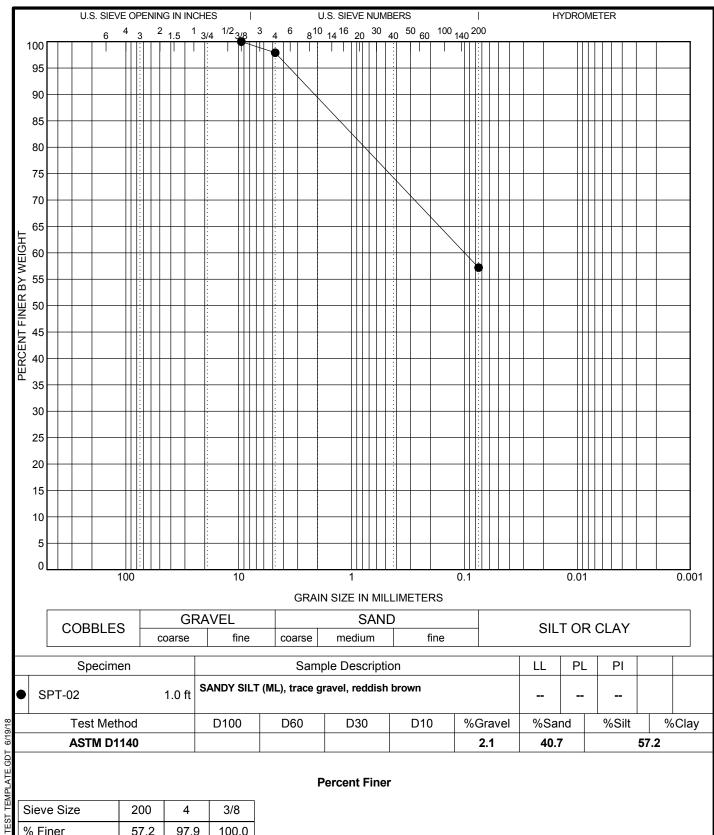
Sieve Size	200	4
% Finer	35.0	100.0

Tested By	Tested Date	Reviewed By	Calc By
MDE	6/7/18	SRH	MDE



Project: Norman Road Dam (Milam Park)

> **DeKalb County** Clarkston, GA



Sieve Size	200	4	3/8
% Finer	57.2	97.9	100.0

SIEVE 1/SHEET NORMAN ROAD.GPJ

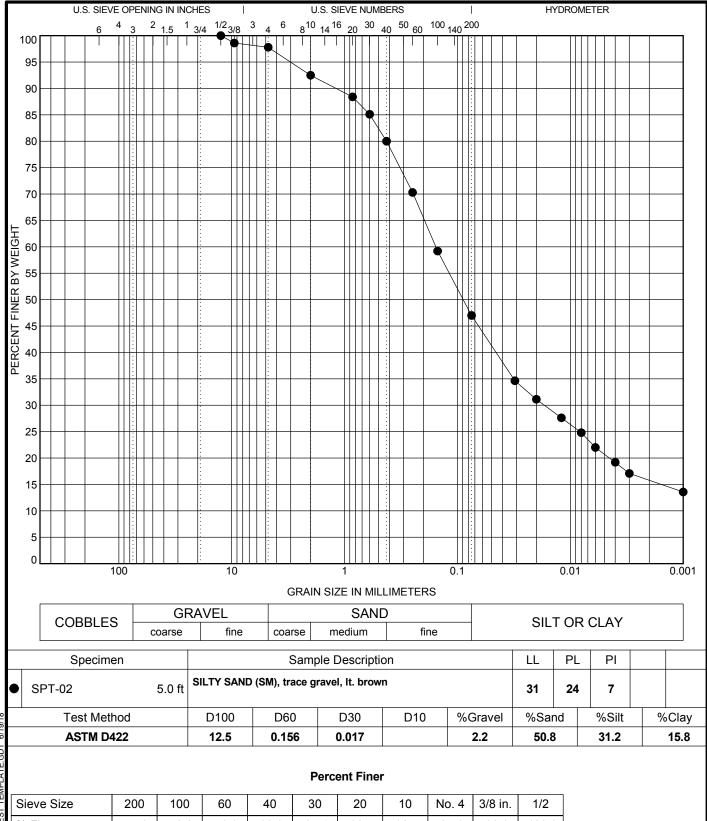
Tested By	Tested Date	Reviewed By	Calc By
MDE	6/7/18	SRH	MDE



GRADATION CURVE

Project: Norman Road Dam (Milam Park)

> **DeKalb County** Clarkston, GA



Siev	e Size	200	100	60	40	30	20	10	No. 4	3/8 in.	1/2
% F	iner	47.0	59.2	70.3	80.0	85.1	88.4	92.5	97.8	98.6	100.0

Tested By	Tested By Tested Date		Calc By
CAB	6/12/18	SRH	CAB

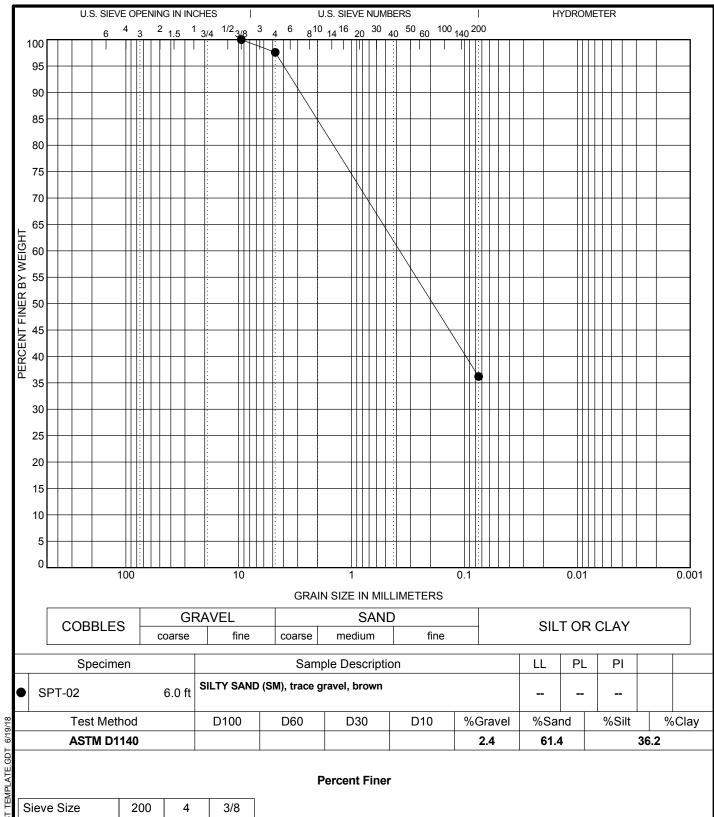


NORMAN ROAD.GPJ

GRADATION CURVE

Project: Norman Road Dam (Milam Park)

> **DeKalb County** Clarkston, GA



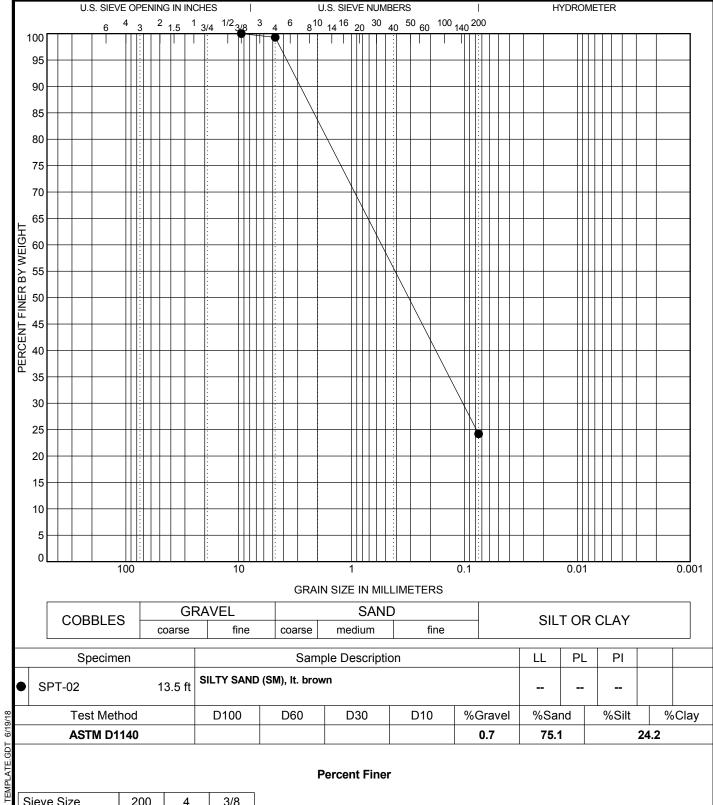
NORMAN		C	-				
	MDE	6/					
ROAD.GPJ	Tested By	Test	Tested Date				
J TEST	% Finer	36.2	97.6	100.0			
ST TE	Sieve Size	200	4	3/8			

Tested By	Tested By Tested Date		Calc By		
MDE	6/7/18	SRH	MDE		



Project: Norman Road Dam (Milam Park)

> **DeKalb County** Clarkston, GA



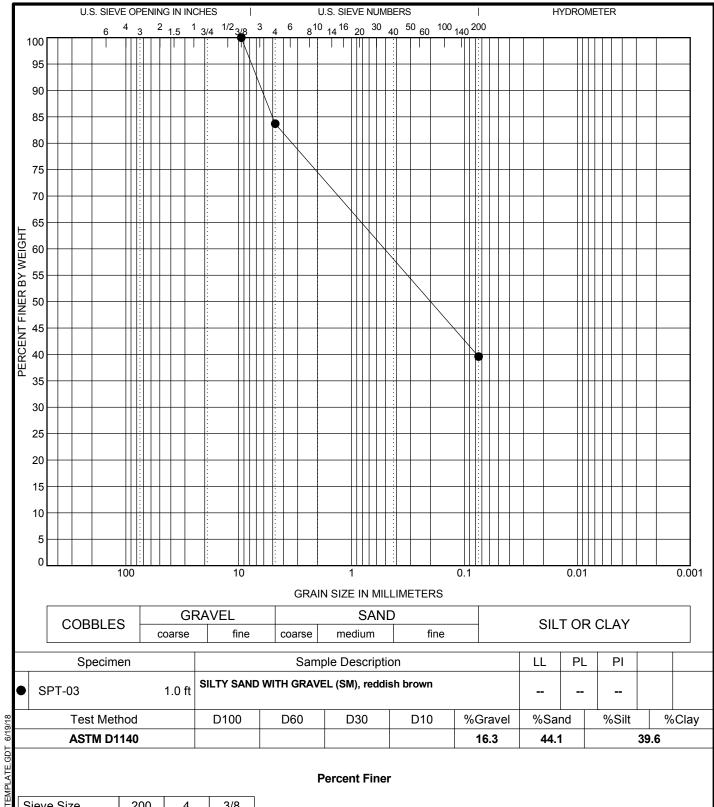
\sim				
EST TE	Sieve Size	200	4	3/8
\vdash	% Finer	24.2	99.3	100.0
ď			•	
AD.C	Tested By	Test	ed Date	Rev
Z RC	MDE	6/	7/18	
1/SHEET NORMAN ROAD.GPJ	5	S	ch	na

Tested By Tested Date		Reviewed By	Calc By		
MDE	6/7/18	SRH	MDE		



Project: Norman Road Dam (Milam Park)

> **DeKalb County** Clarkston, GA



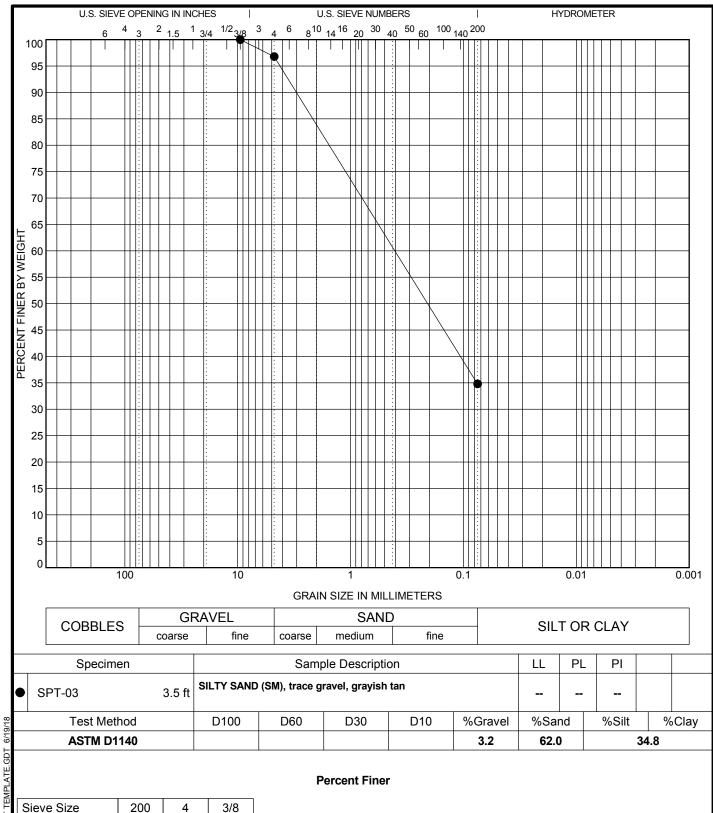
NORMAN		C	-	
	MDE	6/		
ROAD.GPJ	Tested By	Test	ed Date	Revi
F	% Finer	39.6	83.7	100.0
EST TEN	Sieve Size	200	4	3/8

Tested By	Tested By Tested Date		Calc By		
MDE	6/7/18	SRH	MDE		



Project: Norman Road Dam (Milam Park)

> **DeKalb County** Clarkston, GA



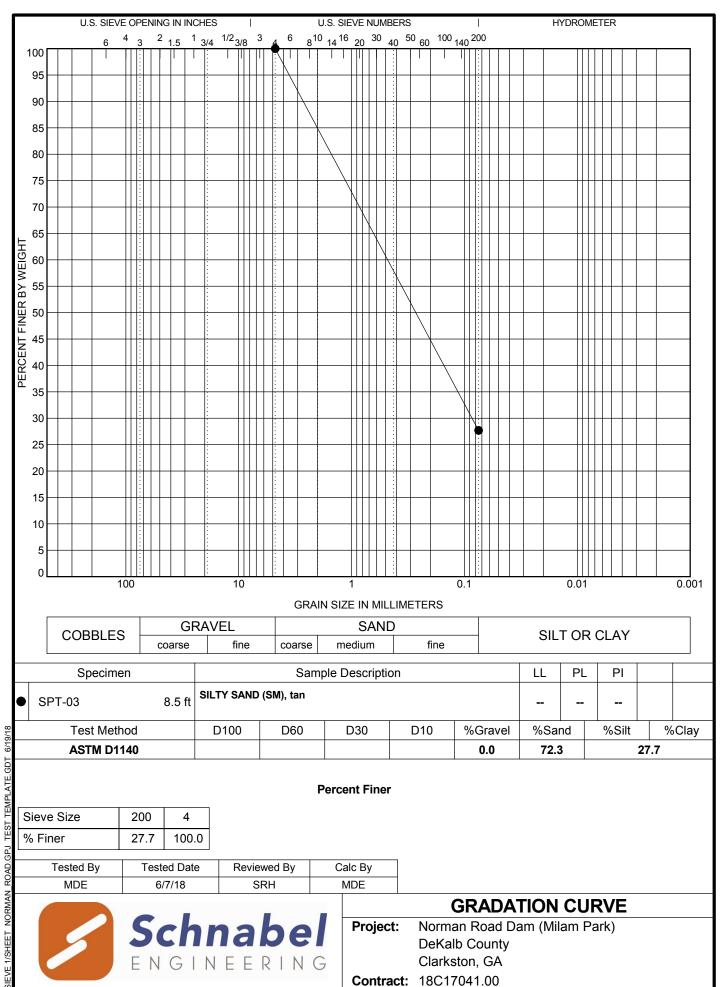
NORMAN RO	MDE	6/	6/7/18				
ROAD.GPJ	Tested By	Test	Revi				
.GP.		1					
J TEST	% Finer	34.8	96.8	100.0			
ST TE	Sieve Size	200	4	3/8			

Tested By Tested Date		Reviewed By	Calc By		
MDE	6/7/18	SRH	MDE		



Project: Norman Road Dam (Milam Park)

> **DeKalb County** Clarkston, GA



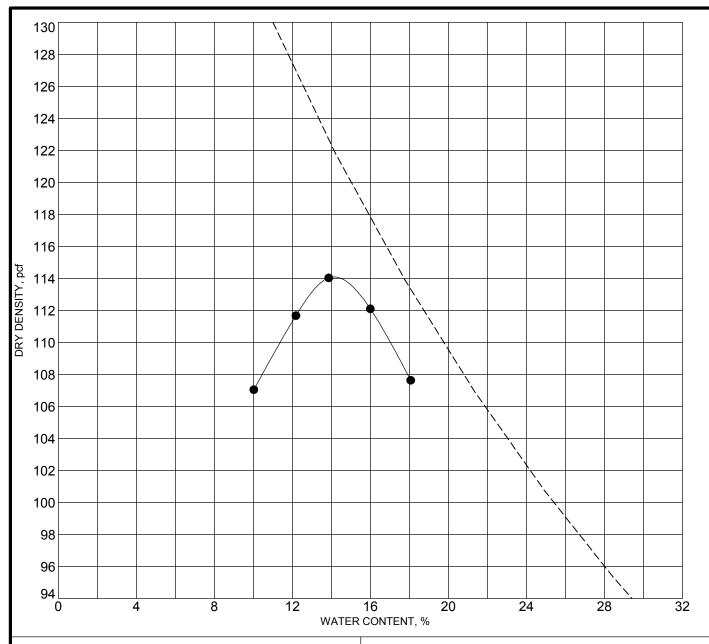
Sieve Size	200	4
% Finer	27.7	100.0

Tested By Tested Date		Reviewed By	Calc By		
MDE	6/7/18	SRH	MDE		



Project: Norman Road Dam (Milam Park)

> **DeKalb County** Clarkston, GA



Sample Description: SILTY SAND (SM), trace gravel, It. brown

2.70 Measured Specific Gravity:

Max. Dry Density (pcf): 114.1 14.1

Sample Source: SPT-02, 5.0 ft

Test Methods: ASTM D698 Method A

Comments:

Opt. Moisture (%):

Liquid Limit (LL): 31 Plasticity Index (PI): 7 % Retained #4 Sieve: 2.2 % Passing # 200 Sieve: 47.0



MOISTURE DENSITY RELATIONSHIP

Project: Norman Road Dam (Milam Park)

DeKalb County Clarkston, GA

Summary Of Laboratory Tests

Appendix Sheet 1 of 1 Project Number: 18C17041.00

Boring	Sample Depth ft	Sample		(%) Sravity		Ħ	Ħ	ndex	9 9	9 V e	pu	±	lay	cf)	Moisture 5)
No.	Elevation ft	Туре	Specimen	Natural Moisture (⁹	Specific G	Liquid Lim	Plastic Limi	Plasticity I	% Retaine No. 4 Sieve	% Passing No. 200 Siev	Percent San	Percent Sil	Percent Cl	Maximum Density (p	Optimum Moistu Content (%)
HA-2	0.0 - 6.0	- Bulk	SANDY SILT (ML), reddish brown	19.7	2.66	47	28	19	0.2	62.1	37.7	32.5	29.6	100.9	21.9
1174-2	946.0 - 940.0	Buik		13.7	2.00	7/	20	19	0.2	02.1	51.1	32.3	29.0	100.9	21.9

Notes:

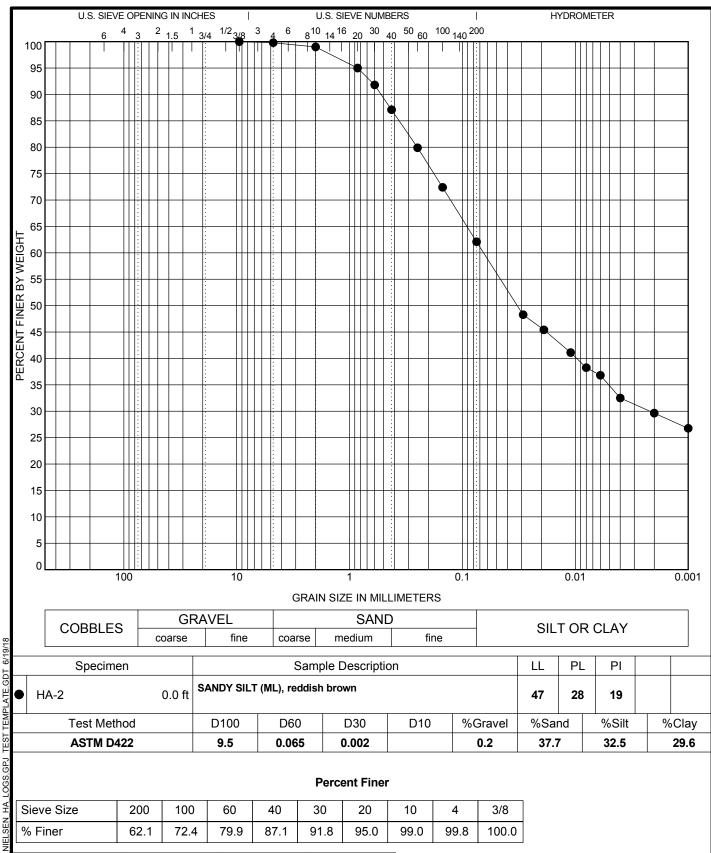
1. Soil tests in general accordance with ASTM standards.

2. Soil classifications are in general accordance with ASTM D2487(as applicable), based on testing indicated and visual classification.

3. Key to abbreviations: NP=Non-Plastic; -- indicates no test performed.



Project: Dekalb County Sewer Investigation Backyard of 996 Nielson Drive Dekalb County, GA



Sieve Size	200	100	60	40	30	20	10	4	3/8
% Finer	62.1	72.4	79.9	87.1	91.8	95.0	99.0	99.8	100.0

Tested By	Tested Date	Reviewed By	Calc By
CAB	6/12/18	SRH	CAB



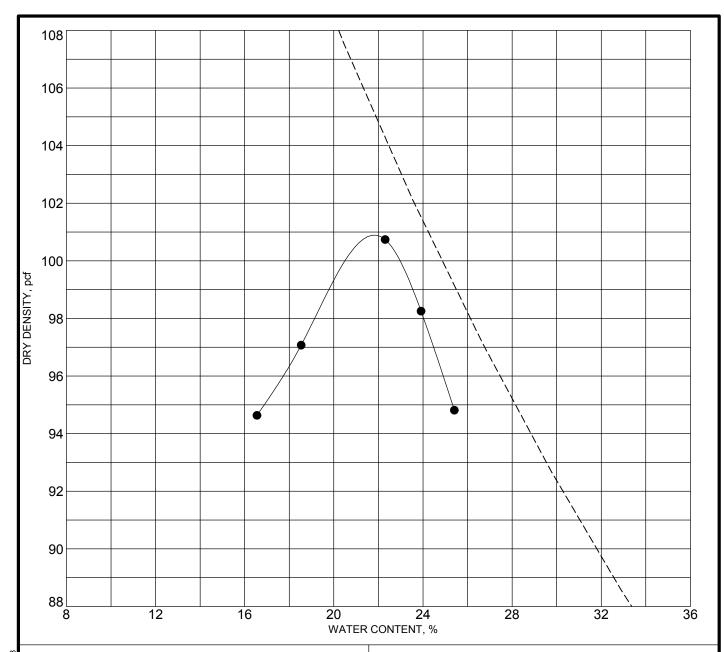
NORMAN ROAD

GRADATION CURVE

Project: **Dekalb County Sewer Investigation**

Backyard of 996 Nielson Drive

Dekalb County, GA



Sample Description: SANDY SILT (ML), reddish brown

Measured Specific Gravity: 2.66

Max. Dry Density (pcf): 100.9

21.9

Sample Source: HA-2, 0.0 ft

Test Methods: ASTM D698 Method A

Comments:

Opt. Moisture (%):

Liquid Limit (LL): 47
Plasticity Index (PI): 19
% Retained #4 Sieve: 0.2
% Passing # 200 Sieve: 62.1

COMPACTION NORMAN ROAD



MOISTURE DENSITY RELATIONSHIP

Project: Dekalb County Sewer Investigation

Backyard of 996 Nielson Drive

Dekalb County, GA