BRIDGE AND RETAINING WALL
FOUNDATION INVESTIGATION REPORT
I-575 over Noonday Creek (South)
Northwest Corridor Project

GDOT Project No. CSNHS-0008-00(256), PI No. 0008256
Cobb County, Georgia

WILLMER ENGINEERING INC.
Project No. ATL-171-3099B

Document No.: ATL-171-3099**B**
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Issue Date: November 12, 2008
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Prepared For

GEORGIA TRANSPORTATION PARTNERS
Atlanta, Georgia

Prepared By

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WILLMER ENGINEERING INC. | WE

November 12, 2008

VIA COURIER

Pete M. McMahon, PE
Georgia Transportation Partners
c/o PBS&J
5665 New Northside Drive
Suite 400
Atlanta, Georgia 30328

SUBJECT: **Bridge and Retaining Wall Foundation Investigation Report**
I-575 over Noonday Creek (South)
Northwest Corridor Project
GDOT Project No. CSNHS-0008-00(256), PI No. 0008256
Cobb County, Georgia
Willmer Project No. ATL-171-3099B

Dear Mr. McMahon:

Willmer Engineering Inc. (Willmer) is pleased to provide this Bridge and Retaining Wall Foundation Investigation (BFI and WFI) report for the proposed widening of I-575 bridge over Noonday Creek (South) in Cobb County, Georgia. The BFI and WFI were performed in general accordance with our contract with Georgia Transportation Partners (GTP), dated May 12, 2007. The objective of this investigation was to gather sufficient geotechnical information to support the costing plans to be developed by GTP. Additional borings will be performed in the design/build phase of the project to provide additional information as required. This report was prepared in general accordance with Georgia Department of Transportation (GDOT) guidance documents for bridge and retaining wall foundation investigation. This report was revised to incorporate GTP comments dated November 26 and December 18, 2007, and GDOT comments dated February 22 and October 15, 2008.

The attached summary presents the site and subsurface conditions along the proposed bridge and retaining wall alignments, and our geotechnical recommendations related to foundation design and construction.

We appreciate the opportunity to be of service to you on this project and look forward to a continuing relationship. Please contact us if you have any questions concerning this report or require further assistance.

Sincerely,

WILLMER ENGINEERING INC.

Murthy S. Kotha
Project Engineer

for Sujit K. Bhowmik, PhD, PE
Chief Engineer

James L. Willmer, PE
Executive Vice President/Principal Consultant

MSK/SKB/JLW:ks
I:\Word Processing\Projects\171-GEO\171-3099 Northwest Corridor Project (Bechtel)\Reports\3099 B - Noonday Creek (South)\171-3099B REVISED BFI - RWI Report - I-575 over Noonday Creek (South) 11-11-08.doc

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Attachments: **Bridge and Retaining Wall Foundation Investigations**

Figures

Figure 1 Project Location Map
Figure 2 Boring Location Plan
Figure 3 Generalized Subsurface Profile (Bridge)
Figure 4 Generalized Subsurface Profile (MSE Wall)

Appendix

Boring Record Legend
Unified Soil Classification System Reference Sheet
Engineering Description of Rock Hardness
Boring Records: BB-1 through BB-4, and W-1
Laboratory Test Results

Revision History:

Revision	Issue Date	Document Status
A	November 19, 2007	Issued for Review
0	January 7, 2008	Issued for Use
1	August 22, 2008	Issued for Use
2	November 12, 2008	Issued for Use

BRIDGE FOUNDATION INVESTIGATION	
Willmer Project Number	ATL-171-3099B
GDOT Project Number	CSNHS-0008-00(256)
Project P.I. Number	0008256
Location	I-575 Bridge over Noonday Creek (South), Cobb County, Georgia (see Figure 1).

GENERAL INFORMATION	
Project Description	Three new parallel bridges (one in the center median area and one each on the left and right sides of existing bridges) are planned for the proposed I-575 widening over Noonday Creek (South). The bridges will be three-span, 170 feet long reinforced concrete structures. The design lengths for the three spans from south to north are 50, 70 and 50 feet, respectively. The existing bridges are supported on H-piles at the end bents and spread footings at the intermediate bents. No BFI report is available for the existing bridges.
Geologic Information	The project alignment is geologically sited within the Piedmont Physiographic Province of Georgia, and is underlain by Metamorphosed Maffic Rock Formations which include amphibolite, mica schist and biotite gneiss.
Subsurface Features	The subsurface profile is generally comprised of fill, alluvium and residuum underlain by partially weathered rock (PWR) and parent bedrock, except at BB-2 where no fill or alluvium was encountered. The fill material consists of loose to medium dense silty fine sand or stiff sandy silt/sandy clay. The alluvial soils consist of very loose to loose silty/clayey sand, and the residual soils consist of medium dense to dense silty sand. Ground water was encountered at all boring locations and the ground water elevation ranged from about 912 to 923 feet.

PWR AND AUGER REFUSAL ELEVATIONS (feet)

Bridge	Bent No.	Reference Boring No.	Top of PWR	Auger Refusal
Left	1	BB-1	909	905
	2	--	--	--
	3	BB-3	901	900
	4	--	--	--
Center	1	--	--	--
	2	BB-2	917	916
	3	--	--	--
	4	--	--	--
Right	1	--	--	--
	2	--	--	--
	3	--	--	--
	4	BB-4	891	890

MAXIMUM PILE DESIGN LOADS			
Pile Type	**Load Transfer (%)**		**Design Load**
	Friction	**End Bearing**	
H-Piles	20	80	10 BP 42 = 55 Tons
			12 BP 53 = 70 Tons
			14 BP 73 = 96 Tons
			14 BP 89 = 117 Tons

FOUNDATION RECOMMENDATIONS				
Bridge	**Bent No.**	**Drilled Shaft (Bearing)**	**Spread Footing (Bearing)**	**Pile Bent (Type)**
Left	1			H
	2	100 ksf on rock	20 ksf on rock *	
	3	100 ksf on rock		
	4			H
Center	1			H
	2	100 ksf on rock		
	3	100 ksf on rock	20 ksf on rock *	
	4			H
Right	1			H
	2	100 ksf on rock	20 ksf on rock *	
	3	100 ksf on rock	20 ksf on rock *	
	4			H

ELEVATIONS (feet)						
Bridge	**Bent No.**	**Reference Boring No.**	**Bottom of Drilled Shaft**	**Bottom of Spread Footing**	**H-Pile Tip Elevations**	
					Minimum Tip	**Estimated Tip**
Left	1	BB-1			908±	906±
	2	BB-2	909 or below	*		
	3	BB-3	893 or below			
	4	BB-4			890±	890±
Center	1	BB-1			908±	906±
	2	BB-2	909 or below			
	3	BB-3	893 or below	*		
	4	BB-4			890±	890±
Right	1	BB-1			908±	906±
	2	BB-2	909 or below	*		
	3	BB-3	885 or below	*		
	4	BB-4			890±	890±

* No borings were performed at these bent locations. The drilled shaft recommendations at these bents are based on borings BB-2 and BB-3 performed at Bents 2 and 3 of the center and left bridges, respectively. Since Bents 2 and 3 of the existing bridges are supported on spread footings, shallow rock may be encountered at these bent locations. Borings should be performed at these locations during the design/build phase to determine the depth to rock. Spread footings should be used in lieu of drilled shafts if rock is encountered within 10 feet below final grade. Bottom elevations of spread footings will depend on the depth to rock.

NOTES: GENERAL	
Elevations	All elevations referenced in this report are based on Control Point No. 507 (5/8" rebar, EL. 929.37 feet) established by the surveyors.
Theoretical Scour	Based on the boring data, the theoretical scour line is expected to vary along the bridge bents. The theoretical scour line may be raised to EL 915 at Bent 2 of the center bridge because of the presence of scour-resistant rock that was encountered during our field investigation.
Erosion	We recommend the use of 24 inches of Type I riprap and filter fabric.
As-built Information	As-built information should be forwarded to the Geotechnical Engineering Bureau upon completion of the foundation system.
NOTES: SPREAD FOOTINGS	
Embedment	Spread footings (if used) should be embedded a minimum of one foot into hard rock to protect the footing from scour.
Temporary Shoring	Temporary shoring may be required to construct spread footings (if used) at Bents 2 and 3. Care should be exercised not to undermine the spread footings for the existing bridges. Because ground water was encountered above the possible footing bottom elevations (i.e., above rock), dewatering of the excavations will also be required.
Cofferdams	Cofferdams will be needed to construct the spread footings (if used) in some portions of Bents 2 and 3 where the footing excavation will extend into the water area of the creek. Dewatering of the excavations will also be required. Seal concrete may also be required.
NOTES: PILE BENTS	
PDO	Driving resistance after Minimum Tip Elevations are achieved.
Waiting Period	None required (see MSE wall recommendations).
Down-drag Protection	To avoid inducing down-drag loads onto the piles from potential settlement of the loose and very loose silty sand layers during construction of the MSE wall, we recommend that the piles at Bent 4 that fall within the MSE wall area be protected from down-drag by using Jackets or other approved measures.
NOTES: DRILLED SHAFTS	
Drilled Shaft Special Provision	The drilled shafts should be constructed as per Special Provision 524: Drilled Caisson Foundations.
Rock Socket	A minimum 7-foot socket into sound rock will be required for all drilled shafts at this site.
Minimum Shaft Diameter	A minimum shaft diameter of 48 inches shall be used to allow for inspection of the bearing surface.

Temporary Casing	Temporary steel casing will be required at all drilled shaft locations to provide for inspection of the rock bearing surface and test hole. The casing should be extended below the top of the bedrock surface if the bedrock is fractured and/or broken. The casing should be of sufficient strength to withstand handling stresses, concrete pressure, and surrounding earth and/or fluid pressures.
Permanent Casing	Permanent casing will be required if any of the shaft locations fall in the creek.
Ground Water	At locations adjacent to the creek, ground water should be expected at or slightly above the creek water level. Thus, seepage into the shaft excavations should be expected. It is anticipated that this seepage can be handled by pumping from the shaft excavations. Also, if the soil-bedrock interface becomes a conduit for ground water infiltration or if fractures and/or voids in the rock produce ground water seepage into the drilled shaft excavation, the temporary steel casing should be extended into the rock to seal off the ground water flow.
Special Problems	If possible, all concrete for foundations should be poured the same day the excavation is made. If this is not practical, the foundation excavation should be adequately protected against any detrimental change in conditions such as from disturbance, sloughing, ground water and rainfall. Surface run off water must be drained away from all drilled shaft excavations and not allowed to pond.

RETAINING WALL INVESTIGATION	
Location	The proposed MSE Wall (Wall No. 1) extends from Station 123+44 to Station 124+59 and is located about 115 feet to the right of the proposed project centerline (i.e., near the northeast end of the proposed northbound bridge widening) . The total length of the wall is 115 feet (see Figure 2) and the maximum height of the wall is about 29 feet. The top elevation of the wall is about 949 feet and the bottom elevation of the wall ranges from about 920 to 943 feet.
Subsurface Features	The subsurface profile (see Figure 4 and boring logs for BB-4 and W-1) along the proposed MSE wall is comprised of fill, alluvium and residuum underlain by partially weathered rock (PWR) and parent bedrock. The fill consists of loose silty sand and/or stiff sandy silt/clay. The alluvium consists of very loose to loose silty sand and/or medium dense clayey sand. The residual soils consist of very loose to medium dense silty sand underlain by partially weathered rock. Auger refusal was encountered at both the borings. Ground water was encountered at the borings between elevations 912 and 916 feet.
Soil Parameters	The following soil design parameters are recommended for use for the proposed MSE wall: Soil Unit Weight γ = 125 pcf Cohesion c = 0 psf Angle of Internal Friction ϕ = 32 degrees Coefficient of Sliding Friction μ = 0.40 The above design parameters assume the backfill material behind the MSE wall fill to consist of silty sand compacted to the specified density, and the subgrade prepared as recommended below.

Recommendations	We recommend that the MSE wall be constructed in stages to minimize differential settlement along the wall. The following steps are recommended for the MSE wall: (i) Any soft/loose soils from beneath the MSE wall should be over-excavated and replaced with compacted wall backfill material. The depth and extent of any over-excavation should be determined by the project Geotechnical Engineer. (ii) The maximum allowable bearing pressure for the soil encountered along the MSE wall is 2,500 psf. However, at the location of maximum wall height, the design bearing pressure will likely exceed the above maximum allowable bearing pressure. Therefore, we recommend that the MSE wall be constructed in two stages. In the first stage, the wall should be constructed to half of its final height. A minimum 45-day waiting period should be allowed after the first stage before beginning the second stage of construction. Settlement of the MSE wall should be monitored upon completion of the first stage of construction. The length of the waiting period may be increased or decreased based on the settlement monitoring data, at the discretion of the project Geotechnical Engineer. (iii) After the waiting period, the MSE wall should be constructed to the final height. (iv) The MSE wall backfill material and drainage measures should conform to GDOT standard specifications.
Prepared By	Murthy S. Kotha / Sujit K. Bhowmik, PhD, PE
Senior Review By	James L. Willmer, PE

Revised: November 9, 2006

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

SPECIAL PROVISION

PROJECT NO. CSNHS-0008-00(256), Cobb County
P.I. NO. 0008256

SECTION 524 – DRILLED CAISSON FOUNDATIONS

524.1 General Description

This Work consists of furnishing all labor, materials, equipment, tools and services necessary for construction of drilled caisson foundations and includes all incidentals and additional work in conjunction therewith. Adhere to the Department's Plans, Special Provisions and Standard and Supplemental Specifications for all Work.

524.2 Materials

Use materials that meet the requirements of the Standard Specifications with the following exceptions:

- Use non-air-entrained Class AA concrete with a coarse aggregate size of No. 67 stone and a slump at time of placement of between 7 and 9 inches (178 mm and 229 mm). Use 10 percent additional cement and a retarder or water reducing agent in all concrete.
- Use Grade 60 (Grade 420) reinforcing bars that conform to ASTM 615 (ASTM A 615M). If wire spirals are used, use spirals that conform to ASTM A 82.
- Use Grade 2 steel casing that conforms to ASTM A 252.

524.3 Construction Requirements

524.3.01 Personnel

Construct drilled caissons and supervise the work with personnel who are experienced in this type work. Visit and examine the work site and all conditions, and take into consideration all such

conditions that may affect the work. At least 30 days prior to beginning drilled caisson work, submit to the Engineer for review and approval the following proof of the ability of the personnel to construct drilled caisson foundations:

1. Evidence of the successful completion of at least five projects similar in concept and scope to the proposed foundation. Include names, addresses and telephone numbers of the owners' representatives for verification.
2. Résumés of foreman and drilling operators to be employed on this project. Provide evidence showing that the drill operator has experience and knowledge of the drill rig to be used on the project. The Department will be sole judge of the qualifications of the foreman and drill rig operator.
3. A detailed sequence of construction for drilled caisson work that describes all materials, methods and equipment to be used, including, but not limited to the following:
    - casing sizes with proposed top and tip elevations
    - drilling equipment including the manufacturer's specifications on the drill rig
    - methods and equipment for stabilizing and cleaning shaft excavations
    - methods of materials handling and disposal
    - methods and equipment for placing concrete
    - details of tremie and sealing methods, if required
    - details of reinforcement placement, including support and centralization methods

Do not begin drilled caisson construction until the qualifications, construction plan and methods have been approved in writing by the Engineer.

524.3.02 Equipment

Use excavation and drilling equipment with a rated capacity (including power, torque and downward thrust) to excavate a caisson of the maximum specified diameter to a depth of 30 feet (9.1 meters) or 20 percent deeper than the deepest caisson indicated on the Plans, as measured from the ground or water surface elevation, whichever is higher.

524.3.03 Casing

Use casing that is a metal shell of a thickness to withstand handling, internal and external pressures, and that is watertight, smooth and clean. If the elevation of the top of the caisson is below ground level or water level at the time of concrete placement, use an oversize casing from ground elevation to a point below the top of the caisson to prevent caving into the fresh concrete. Do not allow the top of the permanent casing, if required, to extend above the top of the drilled caisson. Use casing in all

materials that do not have sufficient strength to safely remain open and stable during and after excavation.

When casing is used, do not use casing with an outside diameter less than the specified diameter of the caisson. That portion of the caisson below the casing may be slightly smaller than the normal outside diameter of the caisson. However, use drilling tools to excavate the caisson below the casing that are no smaller than the outside diameter of the casing minus 2 inches (51 mm). Do not leave casing in place unless permitted by the Engineer, and cut off any permanent casing as shown on the Plans.

Provide adequate equipment during concrete placement to prevent pulling up the reinforcing cage during casing extraction. The casing may be pulled in partial stages. Maintain a sufficient head of concrete above the bottom of the casing to overcome hydrostatic pressure. Extract the casing at a slow uniform rate with pull in line with the center of the caisson.

524.3.04 Protection of Existing Structures

Monitor structures for settlement that are within a distance of ten shaft diameters or the estimated shaft depth, whichever is greater, in a manner approved by the Engineer. Record elevations to an accuracy of 0.01 foot (3 mm). Record elevations before construction begins, during the driving of any required casings, during excavation or blasting, or as directed by the Engineer.

Document thoroughly the condition of the structures with descriptions and photographs made both before and after drilled caissons are constructed. Document all existing cracks, and provide copies of all documentation to the Engineer.

At any time settlement of 0.05 foot (15 mm) or damage to the structure is detected, immediately stop the source of vibrations, backfill any open drilled shaft excavations and contact the Engineer for instructions.

524.3.05 Excavation

Drill and excavate all caissons through whatever substances and to the elevations required. Excavate near the tip elevation in the presence of the Engineer. The Engineer may adjust the tip elevations depending on the quality of the bearing material found. Embed the caisson tips 7 feet (2.1 meters) into and on top of sound rock in accordance with Plan requirements and as determined by the Engineer. Sound rock is indicated by material that cannot be drilled with a conventional earth auger, and requires the use of special rock augers, core barrels, air tools, blasting and/or other methods of hand excavation. Sound rock is defined as material on which the rock auger penetration is equal to or less than 2 inches (51 mm) per five minutes of drilling with the auger subjected to a torque of 600,000 inch-pounds (67,791 kN-m) with a down thrust of 37,000 pounds (165 kN). There will be no additional compensation for removal of rock.

The Engineer will inspect the bottom of each caisson prior to setting the reinforcing cage and placing concrete. Obtain the Engineer's approval prior to placing the reinforcing cage. Remove water, sediment and debris from the bottom of the caissons to allow for a down-hole inspection. Bore the bottom of the caisson excavation a minimum of 6 feet (1.8 meters) into rock as outlined in

Specification 211.3.05.C, "Boring of Foundations and Seals". The Engineer will make a determination of the soundness and consistency of the rock and may adjust the tips of the caissons based on this information.

Where drilled caissons are located in other than open water areas, use casings or other methods approved by the Engineer to stabilize the excavation and control the hole size. When casing is not specifically required on the plans, fill in any over-excavations with Class AA concrete at no additional cost to the Department. Dispose of excess concrete, grout, displaced water and materials removed from the caisson excavation in areas approved by the Engineer, and in accordance with any Federal, State, or local code or ordinance. Verify the accuracy and existence of all applicable codes, ordinances or other regulations prior to disposing materials.

524.3.06 Reinforcing Steel

Assemble a cage of reinforcing steel and place it as a unit immediately prior to concrete placement. Assemble the cage so that the clearance between the cage and side of the caisson will be at least 5 inches (127 mm), and the clearance between the cage and bottom of the caisson will be 3 inches (76 mm).

If the caisson is lengthened, extend all reinforcement to within 3 inches (76 mm) of the bottom. If a splice is required, place it in the lower one-third of the caisson, or as shown on the Plans. Tie hoops or spirals to the caisson and column steel (vertical bars) at 100% of the junctions with double wire figure-eight ties. Do not weld the reinforcing steel. Support the cage from the top in a concentric manner to minimize its slumping downward during concrete placement and/or extracting the casing.

Check the elevation of the top of the steel cage before and after casing extraction. Any upward movement of the steel not exceeding 2 inches (51 mm) or any downward movement thereof not exceeding 6 inches (152 mm) will be acceptable. Any upward movement of the concrete or displacement of the steel beyond the above limits will be cause for rejection. Tie and support the reinforcing steel in the caisson so that the reinforcing steel will remain within allowable tolerances. In uncased caissons, use only heavy-duty plastic rollers (wheels). In cased caissons, use heavy-duty non-corrosive plastic rollers (wheels) or steel chairs. Place rollers at maximum intervals of 8 feet (2.4 meters) along the cage to ensure concentric spacing for the entire cage length. Use one roller for each one foot (305 mm) of diameter of the cage, with a minimum of four rollers at each interval. Do not use concrete spacer blocks. Use rollers that are constructed of a material approved by the Engineer and that have sufficient bearing surface to provide lateral support to the reinforcing cage.

Use rollers of adequate dimension to provide the annular spacing between the outside of the reinforcing cage and the side of the excavated hole or casing as shown on the Plans. If an oversize casing is used, use rollers that will provide concentric spacing. Use pre-cast concrete or heavy-duty plastic bottom supports (feet/boots) to provide a spacing of 3 inches (76 mm) between the cage and caisson bottom.

524.3.07 Concrete

Mix and place all concrete in accordance with Section 500 of the Specifications where applicable and the requirements herein stated.

Place concrete as soon as possible after all excavation is completed and reinforcing placed and supported. Place concrete continuously in the caisson to the top elevation of the caisson. The Engineer may allow free falling of concrete to a maximum of 60 feet (18.3 meters), if satisfactory methods are demonstrated.

If ground water is encountered and the hole can not be pumped dry, or if the Engineer does not approve free fall of concrete, place concrete using a gravity feed watertight tremie. Use a tremie pipe of at least 8 inches (203 mm) in diameter with a concrete hopper at the top. The Engineer may allow concrete to be placed by pumping through a supply line if satisfactory methods are demonstrated. If this method is allowed, use pump supply lines with watertight couplings. Seal the end of the pump line with a foam plug or other device approved by the Engineer to prevent concrete within the tremie or pump supply line from mixing with fluid in the excavation.

If a tremie is used, place it on the bottom of the excavation at the beginning of concrete placement, and keep it there until the tremie pipe and hopper are filled with concrete. Then raise the tremie only enough to induce concrete flow and do not lift the tremie further until the discharge end is immersed at least 10 feet (3.1 meters) into the deposited concrete. If concrete placement by pumping is used, secure the supply line in place so that the discharge end will not lift off the bottom of the excavation more than 6 inches (152 mm) until at least 10 feet (3.1 meters) of concrete has been placed. Embed the discharge end of the tremie or pump supply line a minimum of 10 feet (3.1 meters) in the concrete throughout the remainder of the concrete pour.

Complete the placement of all concrete in the caisson in two hours. Adjusted the retarder or water reducing agent as approved by the Engineer for the conditions encountered on the job so the concrete remains in a workable plastic state throughout the pour.

Prepare and cure the top surface of the construction joint in accordance with the requirements of Section 500. Locate construction joints as indicated on the Plans.

Do not place concrete under water in the caisson excavation without the permission of the Engineer. When permission is granted, place the concrete in accordance with the requirements of Section 500. Provide a sump to channel displaced water away from the caisson. Contain all displaced water to prevent water from entering into any body of water.

During the twenty-four hour period immediately following the completion of the placement of concrete in the caisson, do not install or extract casing within 50 feet (15.2 meters) of the completed caisson, and do not excavate any caissons within 15 feet (4.6 meters) of the completed caisson. If the Engineer determines that any construction adversely affects the recently constructed caisson, cease such activities immediately.

Protect any portion of drilled caissons exposed to a body of water from the action of water by leaving the forms in place for a minimum of seven days after pouring the concrete. Remove the forms prior to 7 days only if the concrete strength has reached 3000 psi (20.7 Mpa) or greater as tested by cylinder breaks.

524.3.08 Inspection and Safety

1. Check the dimensions and alignment of the caisson excavation under the observation of the Engineer.

2. Provide, use and maintain in good working order the following safety devices for the purpose of entering the caisson excavation for cleaning or inspection work:

   a. A safety harness attached to a separate safety line.

   b. OSHA-approved personnel lifting devices. Do not suspend any crane weights, blocks or other heavy weights above the head of any person entering the caisson excavation.

   c. Approved gas-testing equipment that tests for both oxygen level and percent explosion level. Provide and use an approved blower for fresh air if the testing equipment indicates the need.

   d. Casing of adequate thickness, size and depth to safely support the excavation.

   e. Non-electric pump(s) to adequately remove water from the excavation.

In addition, prior to entering the excavation, remove all loose and unnecessary objects from around the top of the caisson. Secure any caissons that will not be immediately poured after inspection and approval to prevent persons or objects from falling into the excavation.

524.3.08 Tolerances

Adhere to the following construction tolerances for drilled caissons:

1. Construct the drilled caisson to within 3 inches (76 mm) of the plan position plane, at the top-of-caisson elevation. Adhere to a vertical alignment tolerance of ¼-inch per 12 inches (6 mm per 305 mm) of depth.

2. Place reinforcement in accordance with the requirements of Section 511 of the Standard Specifications and Sub-section 524.3.06. Tie column steel (vertical bars) to hoops and spirals at 100% of the junctions with double wire figure-eight ties.

3. Placed vertical caisson reinforcing bars, including bars extending into columns or footings to within ½-inch (13 mm) of plan location. Place hoops or spirals to within 1 inch (25 mm) of their specified location. Adhere to a side form clearance of within ¼-inch (6 mm) of plan requirements.

4. Place the construction joint of the top of caissons used as caisson/column intermediate bents to within a tolerance of plus or minus 3 inches (76 mm) of the plan elevation.

524.4 Acceptability

In the event that significant voids are suspected in the concrete that were created during placement, verify the integrity of the caisson using a method that has been approved by the Engineer. If the caisson in question is found to be structurally deficient or out of tolerance in any way, the caisson will not be accepted unless corrective measures as approved by the Engineer are accomplished. Furnish additional materials and work necessary to effect corrections at no cost to the Department and with no increase in contract time.

524.5 Measurement

The length of accepted caisson foundation is measured in linear feet (meters) of caisson in place in the completed work. The length is measured from the final approved bottom elevation to 1 foot (305 mm) above the bottom of the footing cap where caissons are used in a footing or to the top of the caisson elevation detailed in the plans.

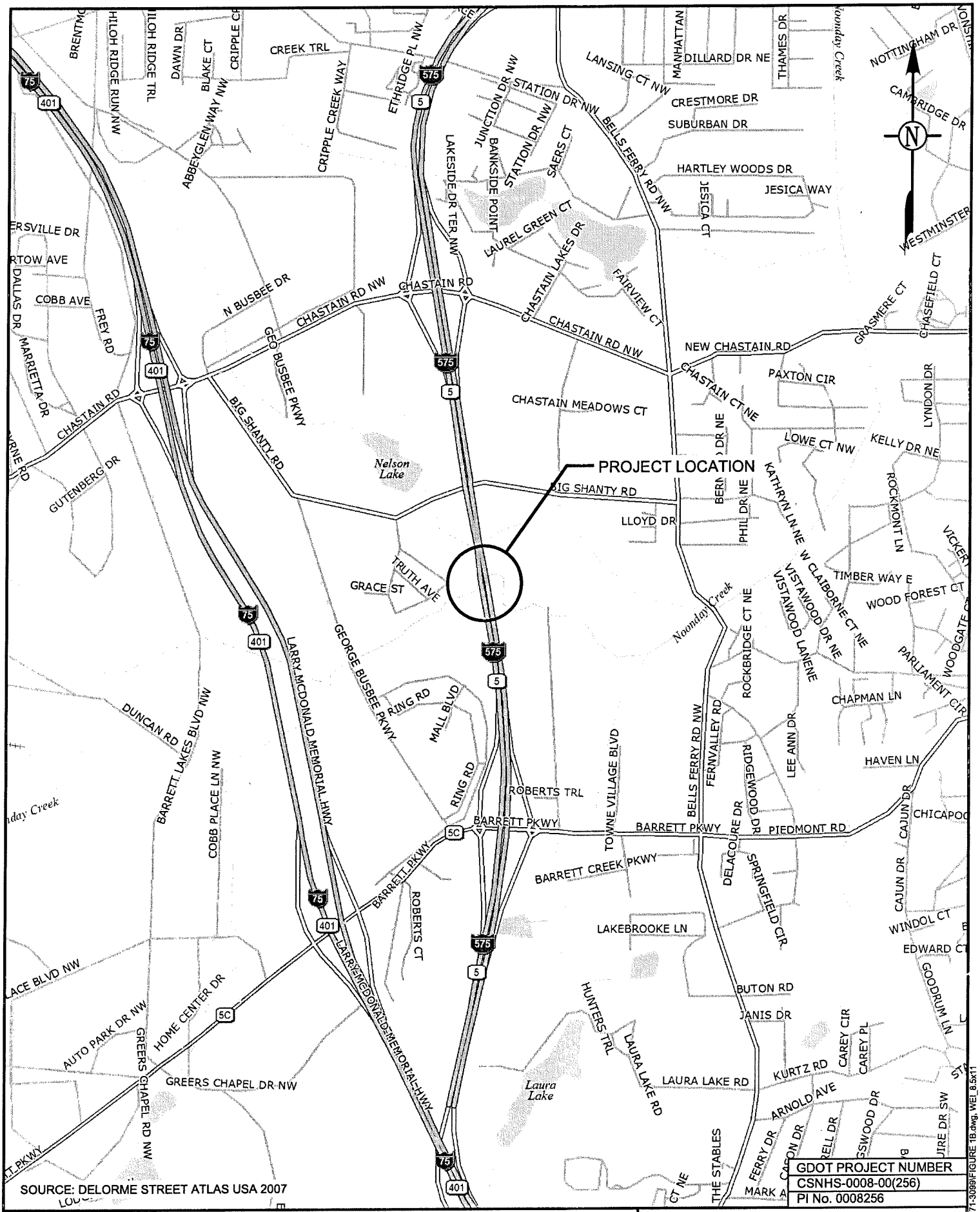
524.6 Payment

Drilled in place caisson foundations is paid for at the unit price bid per linear feet (meters) complete and in place as specified. The payment is full compensation for all excavation, furnishing and placement of reinforcing steel and concrete in the caisson, all temporary and permanent casing, disposal of excavated materials, and the cost of furnishing all tools, safety devices, labor, equipment and all other necessary items to complete the work.

Payment will be made under:

Item No. 524 DRILLED CAISSON_____INCHES (mm) DIA.....PER LINEAR FOOT (METER)

FIGURES



SOURCE: DELORME STREET ATLAS USA 2007

GDOT PROJECT NUMBER	
CSNHS-0008-00(256)	
PI No. 0008256	

SCALE: 1" = 2000'	
DATE: 10/26/2007	
DRAWN BY: MDB	
REVIEWED BY: MK	

WILLMER ENGINEERING INC. WE

GEOTECHNICAL ENGINEERING
CONSTRUCTION SERVICES
ENVIRONMENTAL SERVICES AND ENGINEERING
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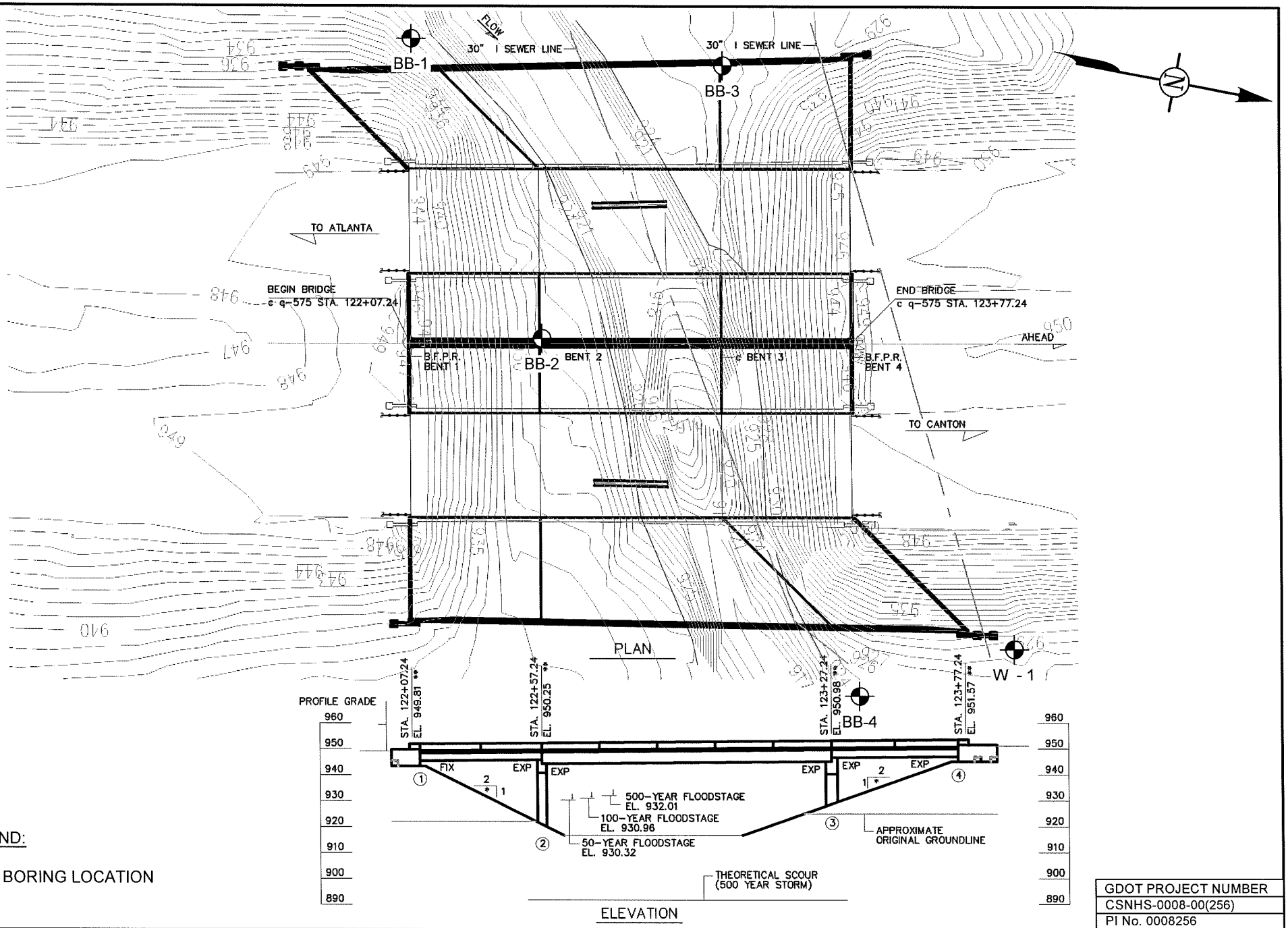
ATLANTA, GA 30340-4270

FIGURE 1
PROJECT LOCATION MAP
I-575 OVER NOONDAY CREEK (SOUTH)
NORTHWEST CORRIDOR PROJECT
COBB COUNTY, GEORGIA
WILLMER PROJECT No. ATL-171-3099B

I:\AutoCAD\171-GEO\171-3099\FIGURE 1B.dwg, WEI_8.5x11



GDOT PROJECT NUMBER
CSNHS-0008-00(256)
PI No. 0008256

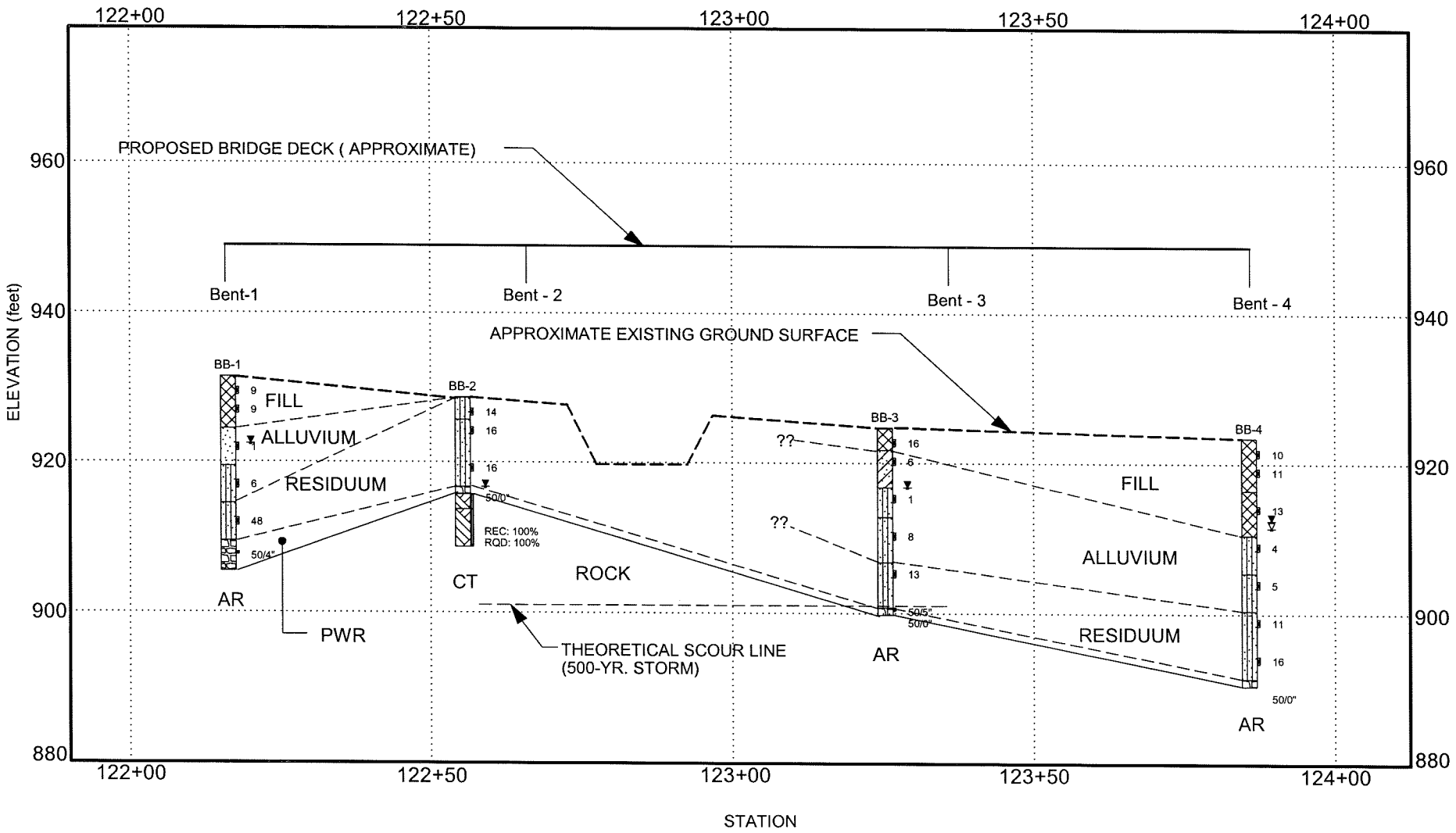
SCALE: 1" = 50'
DATE: 8/20/2008
DRAWN BY: CBS
REVIEWED BY: MK

WILLMER ENGINEERING INC.

GEOTECHNICAL ENGINEERING ¤ CONSTRUCTION SERVICES
ENVIRONMENTAL SERVICES AND ENGINEERING
3772 PLEASANTDALE ROAD - SUITE 165
ATLANTA, GA 30340-4270

FIGURE 2
BORING LOCATION PLAN
I-575 OVER NOONDAY CREEK (SOUTH)
NORTHWEST CORRIDOR PROJECT
COBB COUNTY, GEORGIA
WILLMER PROJECT No. ATL-171-3099B

I:\AutoCAD\171-GEO\171-3099\Revised Bridge plans\2004 Versions\Geo_NoondaySouth_PE.dwg, WEI_11x8.5



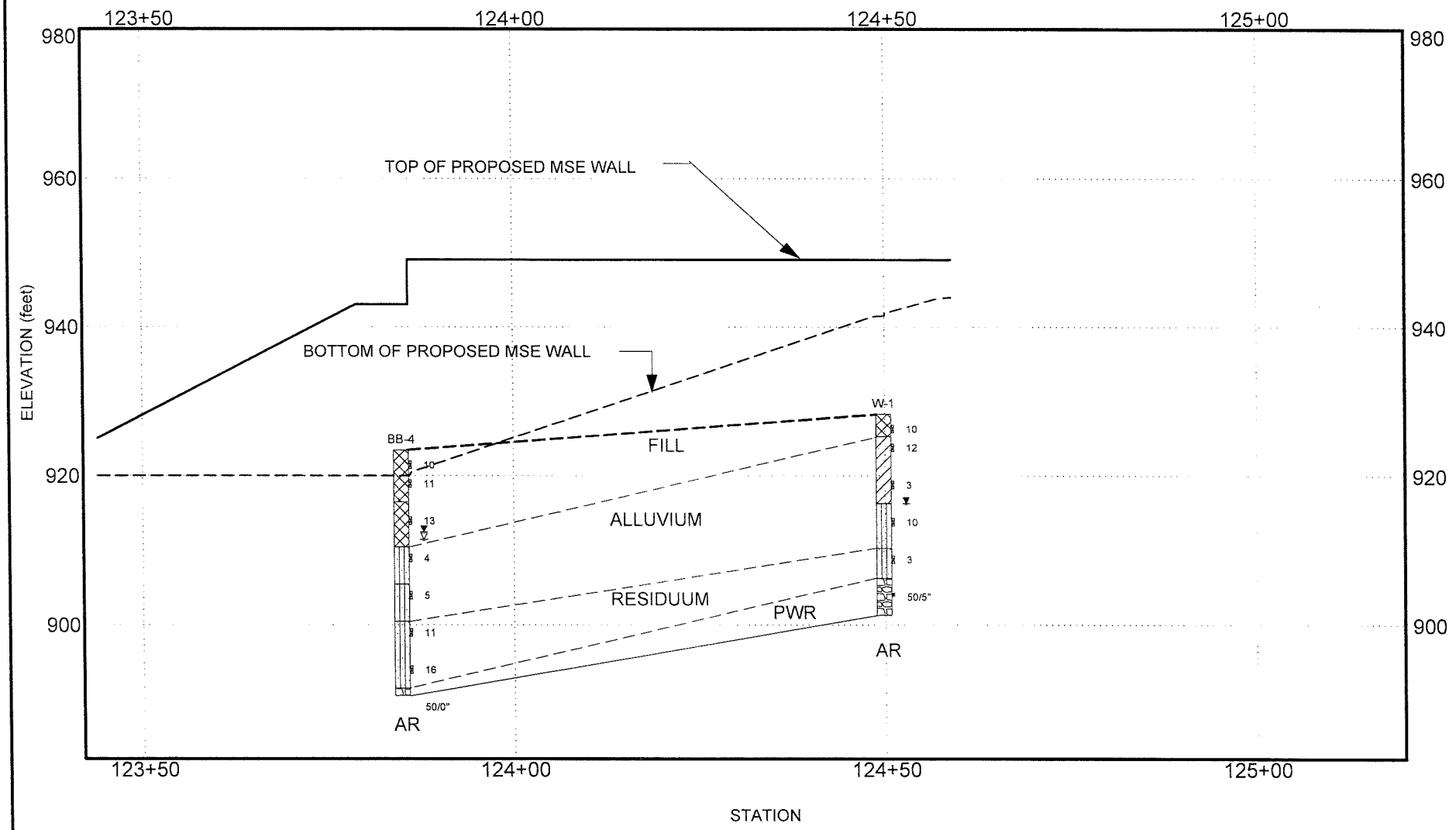
LEGEND:
- ▼ - Groundwater Table @ 24 hours
- ▽ - Groundwater Table @ Time of Boring
- AR - Auger Refusal
- CT - Coring Terminated
- PWR - Partially Weathered Rock
- REC - Recovery
- RQD - Rock Quality Description

SCALE : 1 inch = 20 feet (vertical)
1 inch = 25 feet (horizontal)

GENERALIZED SUBSURFACE PROFILE (BRIDGE)

I-575 Over Noonday Creek (South)
GDOT Project No.: CSNHS-0008-00(256)
PI No.: 0008256
Cobb County, Georgia

PROJECT #	DATE	FIGURE
171-3099B	August 20, 2008	3



LEGEND:
- Groundwater Table @ 24 hours
- Groundwater Table @ Time of Boring
AR - Auger Refusal
PWR - Partially Weathered Rock

SCALE : 1 inch = 20 feet (vertical)
1 inch = 20 feet (horizontal)

GENERALIZED SUBSURFACE PROFILE (MSE WALL)

I-575 Over Noonday Creek (South)
GDOT Project No.: CSNHS-0008-00(256)
PI No.: 0008256
Cobb County, Georgia

PROJECT #	DATE	FIGURE
171-3099B	Nov 12, 2007	4

APPENDIX

WILLMER ENGINEERING INC. | WE
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3772 Pleasantdale Road, Suite 165
Atlanta, Georgia 30340

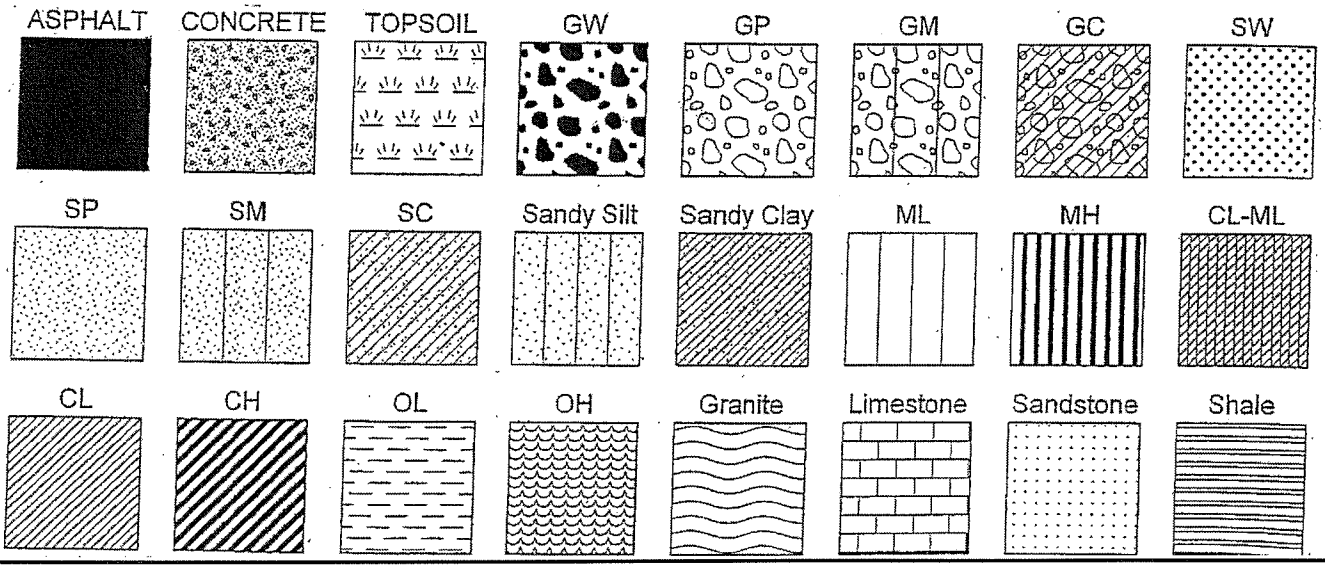
Boring Record Legend

GS- GROUP SYMBOL based on Unified Soil Classification System (Refer ASTM D-2844 and Table 1 of D-2487)

SPT – BLOWS PER FOOT – Standard Penetration Resistance blow count, N, the sum of the second and third 6-inch increments of the SPT test.

CONSISTENCY/RELATIVE DENSITY correlated with SPT blow count:

SILTS AND CLAYS		SANDS	
N, blows per foot	Consistency	N, blows per foot	Relative Density
0 – 2	Very Soft	0 – 4	Very Loose
3 – 4	Soft	5 – 10	Loose
5 – 8	Firm	11 – 30	Medium Dense
9 – 15	Stiff	30 – 50	Dense
16 – 30	Very Stiff	> 50	Very Dense
31 – 50	Hard		
> 50	Very Hard		



WILLMER ENGINEERING INC. | WE

Willmer Engineering Inc.
3772 Pleasantdale Road, Suite 165
Atlanta, Georgia 30340

UNIFIED SOIL CLASSIFICATION SYSTEM REFERENCE SHEET

MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN #200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED #4 SIEVE	CLEAN GRAVELS LITTLE OR NO FINES	(GW)	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
			(GP)	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES APPRECIABLE AMOUNT OF FINES	(GM)	SILTY GRAVELS and GRAVEL-SAND-SILT MIXTURES
			(GC)	CLAYEY GRAVELS and GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING #4 SIEVE	CLEAN SAND LITTLE OR NO FINES	(SW)	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			(SP)	POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES APPRECIABLE AMOUNT OF FINES	(SM)	SILTY SANDS and SAND-SILT MIXTURES
			(SC)	CLAYEY SANDS and SAND-CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN #200 SIEVE SIZE	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		(ML)	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR VERY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			(CL)	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			(OL)	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		(MH)	INORGANIC ELASTIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS
			(CH)	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			(OH)	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			(PT)	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

WILLMER ENGINEERING INC. | WE

ENGINEERING DESCRIPTION
OF
ROCK HARDNESS

Hardness	Description
Very hard	Cannot be scratched with knife or sharp pick. Breaking of hand specimens requires several hard blows of geologist's pick.
Hard	Can be scratched with knife or pick only with difficulty. Hard blow of hammer required to detach hand specimen.
Moderately hard	Can be scratched with knife or pick. can be excavated by hard blow of point of a geologist's pick. Hand specimens can be detached by moderate blow.
Medium	Can be grooved or gouged 1/16 inch deep by firm pressure on knife or pick point. Can be excavated in small chips to pieces about 1 inch maximum size by hard blows of the point of a geologist's pick.
Soft	Can be gouged or grooved readily with knife or pick point. Can be excavated in chips to pieces several inches in size by moderate blows of a pick point. Small thin pieces can be broken by finger pressure.
Very soft	Can be carved with knife. Can be excavated readily with point of pick. Pieces 1 inch or more in thickness can be broken with finger pressure. Can be scratched readily by fingernail.
Partially Weathered Rock	For engineering purposes, partially weathered rock (PWR) is locally defined as residual soils exhibiting Standard Penetration Test N-values in excess of 50 blows for 6 inches of penetration.

WILLMER ENGINEERING INC. | WE

Project: **I-575 Over Noonday Creek (South)**
Location: **Cobb County, Georgia**
Project Number: **171-3099B; GDOT Proj. # : CSNHS-0008-00(256); PI # : 0008256**

HOLE No. BB-1
Sheet 1 of 1
Location: **BENT -1, LT Bridge**

Azimuth: **--** Angle from Horizontal: **90** Surface Elevation (ft): **931.43** Station: **ST 122+16, 120' LT. of CL**
Drilling Equipment: **CME 550** Drilling Method: **HSA Auto Hammer**
Core Boxes: **--** Samples: **6** Overburden (ft): **26** Rock (ft): **--** Total Depth (ft): **26.0**
Logged By: **MK** Date Drilled: **9/25/07**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION		ELEVATION (feet)	N-VALUE
5		SS			FILL : Loose orange brown clayey medium to fine **SAND** with rock fragments (slightly micaceous)	FILL	931.4	
		SS					930	9
								9
							925	
10		SS			ALLUVIUM : Very loose tan and brown coarse to fine **SAND**	SP		1
							920	
15		SS			Loose gray coarse to fine **SAND** (slightly micaceous)	SM		6
							915	
20		SS			RESIDUUM : Dense gray, black and brown silty medium to fine **SAND**	SM		48
							910	
25		SS			PARTIALLY WEATHERED ROCK : Sampled as very dense gray, black and brown silty medium to fine **SAND**	PWR		50/4"

Auger refusal encountered @ 26 feet below existing ground surface.

Groundwater was encountered @ 9 feet below existing ground surface @ time of boring and 24 hours after completion of boring.

STANDARD PENETRATION TEST DATA (blows/foot)
5 10 20 40 60 80

SAMPLER TYPE
SS - Split Spoon
ST - Shelby Tube
NQ - Rock Core, 1-7/8"
NX - Rock Core, 2-1/8"
CU - Cuttings
CT - Continuous Tube

DRILLING METHOD
HSA - Hollow Stem Auger
CFA - Continuous Flight Augers
DC - Driving Casing
RW - Rotary Wash
RC - Rock Core

Hole No. **BB-1**

SPTN 171-3099B.GPJ 11/14/07

WILLMER ENGINEERING INC. | WE

Project: **I-575 Over Noonday Creek (South)**
Location: **Cobb County, Georgia**
Project Number: **171-3099B; GDOT Proj. # : CSNHS-0008-00(256); PI # : 0008256**

HOLE No. BB-2

Sheet 1 of 1
Location: **BENT -2 , CNTR Bridge**

Azimuth: **--** Angle from Horizontal: **90** Surface Elevation (ft): **928.72** Station: **ST 122+66, CL**
Drilling Equipment: **CME 550** Drilling Method: **HSA Auto Hammer**
Core Boxes: **1** Samples: **4** Overburden (ft): **13** Rock (ft): **7** Total Depth (ft): **20.0**
Logged By: **MK** Date Drilled: **9/24/07**

VERTICAL DEPTH (ft)	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION	ELEVATION (feet)
				TOPSOIL - 1 inch	SM 928.7
	SS			RESIDUUM : Medium dense brown and orange silty medium to fine **SAND** (slightly micaceous)	SM
5	SS			Medium dense black and brown silty medium to fine **SAND** (micaceous)	925
10	SS				920
	SS			PARTIALLY WEATHERED ROCK : No recovery	PWR 915
15	NQ	100	100	ROCK CORE : Very hard gray, black and white **GNEISS**	
	NQ	100	100		910
20					

STANDARD PENETRATION TEST DATA (blows/foot)

5 10 20 40 60 80

N-VALUE: 14, 16, 16, 50/0"

Auger refusal encountered @ 13 feet below existing ground surface.

Coring terminated @ 20 feet below existing ground surface.

Groundwater was encountered @ 12 feet below existing ground surface @ time of boring and 24 hours after completion of boring.

SAMPLER TYPE
SS - Split Spoon
ST - Shelby Tube
NQ - Rock Core, 1-7/8"
NX - Rock Core, 2-1/8"
CU - Cuttings
CT - Continuous Tube

DRILLING METHOD
HSA - Hollow Stem Auger
CFA - Continuous Flight Augers
DC - Driving Casing
RW - Rotary Wash
RC - Rock Core

Hole No. **BB-2**

SPTN 171-3099B.GPJ 11/14/07


I-575 over Noonday Creek (South)
GDOT Proj. # CSNHS -0008-00(256)
PI No. 0008256
WEI No. 171-3099B
BB-2
13' to 20'
PROJECT HOLE NO.
FROM TO BOX NO.
TOP 13'
15'
End 20'
HAMMER BLOWS
PROJECT HOLE NO.
FROM TO BOX NO.

WILLMER ENGINEERING INC. | WE

Project: **I-575 Over Noonday Creek (South)**
Location: **Cobb County, Georgia**
Project Number: **171-3099B; GDOT Proj. # : CSNHS-0008-00(256); PI # : 0008256**

HOLE No. BB-3
Sheet 1 of 1
Location: **BENT -3, LT Bridge**

Azimuth: -- Angle from Horizontal: **90** Surface Elevation (ft): **924.76** Station: **ST 123+35, 107' LT.of CL**
Drilling Equipment: **CME 550** Drilling Method: **HSA Auto Hammer**
Core Boxes: -- Samples: **7** Overburden (ft): **25** Rock (ft): -- Total Depth (ft): **25.0**
Logged By: **MK** Date Drilled: **9/25/07**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION		ELEVATION (feet)	STANDARD PENETRATION TEST DATA (blows/foot) 5 10 20 40 60 80	N-VALUE
		SS			TOPSOIL - 1 inch	FILL	924.8		16
					FILL : Medium dense brown silty medium to fine **SAND**				
		SS			ALLUVIUM : Loose brown and gray clayey medium to fine **SAND**	SC	920		6
5									
		SS			Very loose black, tan and brown silty medium to fine **SAND**	SM	915		1
10									
		SS			Loose gray and tan silty coarse to fine **SAND** with fine gravel (slightly micaceous)	SM	910		8
15									
		SS			RESIDUUM : Medium dense white, brown and black medium to fine **SAND** with silt (micaceous)	SM	905		13
20									
		SS			PARTIALLY WEATHERED ROCK : Sampled as very dense brown, black and white silty medium to fine **SAND** with rock fragments (slightly micaceous)	PWR	900		50/5"
25		SS							50/0"

Auger refusal encountered @ 25 feet below existing ground surface.

Groundwater was encountered @ 8 feet below existing ground surface @ time of boring and 24 hours after completion of boring.

SAMPLER TYPE
SS - Split Spoon
ST - Shelby Tube
NQ - Rock Core, 1-7/8"
NX - Rock Core, 2-1/8"
CU - Cuttings
CT - Continuous Tube

DRILLING METHOD
HSA - Hollow Stem Auger
CFA - Continuous Flight Augers
DC - Driving Casing
RW - Rotary Wash
RC - Rock Core

Hole No. **BB-3**

SPTN 171-3099B.GPJ 11/14/07

WILLMER ENGINEERING INC. | WE

Project: **I-575 Over Noonday Creek (South)**
Location: **Cobb County, Georgia**
Project Number: **171-3099B; GDOT Proj. # : CSNHS-0008-00(256); PI # : 0008256**

HOLE No. BB-4

Sheet 1 of 1
Location: **BENT -4, RT Bridge**

Azimuth: -- Angle from Horizontal: **90** Surface Elevation (ft): **923.44** Station: **ST 123+86, 105' RT. of CL**
Drilling Equipment: **CME 550** Drilling Method: **HSA Auto Hammer**
Core Boxes: -- Samples: **8** Overburden (ft): **33** Rock (ft): -- Total Depth (ft): **33.0**
Logged By: **PT** Date Drilled: **10/8/07**

VERTICAL DEPTH (ft)	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION		ELEVATION (feet)
	SS			FILL : Stiff reddish brown medium to fine sandy **CLAY**	FILL	923.4
5	SS					920
				Stiff reddish brown medium to fine sandy **SILT** with organic odor (micaceous)	FILL	915
10	SS					
				ALLUVIUM: Very loose gray silty medium to fine **SAND**	SM	910
15	SS					
				Loose gray silty coarse to fine **SAND** (slightly micaceous)	SM	905
20	SS					
				RESIDUUM : Medium dense gray and white silty medium to fine **SAND** (slightly micaceous)	SM	900
25	SS					
30	SS					895
				PARTIALLY WEATHERED ROCK : No recovery	PWR	
	SS					

Auger refusal encountered @ 33 feet below existing ground surface.

Groundwater was encountered @ 12 feet below existing ground surface @ time of boring and 24 hours after completion of boring.

Hole caved in to 15 feet below the existing ground surface @ 24 hours after completion of boring.

STANDARD PENETRATION TEST DATA (blows/foot)

5	10	20	40	60	80	N-VALUE
						10
						11
						13
						4
						5
						11
						16
						50/0"

Bottom of MSE Wall

SAMPLER TYPE
SS - Split Spoon
ST - Shelby Tube
NQ - Rock Core, 1-7/8"
NX - Rock Core, 2-1/8"
CU - Cuttings
CT - Continuous Tube

DRILLING METHOD
HSA - Hollow Stem Auger
CFA - Continuous Flight Augers
DC - Driving Casing
RW - Rotary Wash
RC - Rock Core

Hole No. **BB-4**

SPTN 171-3099B.GPJ 11/14/07

WILLMER ENGINEERING INC. | WE

Project: **I-575 Over Noonday Creek (South)**
Location: **Cobb County, Georgia**
Project Number: **171-3099B; GDOT Proj. # : CSNHS-0008-00(256); PI # : 0008256**

HOLE No. W-1
Sheet 1 of 1
Location: **MSE Wall No. 1**

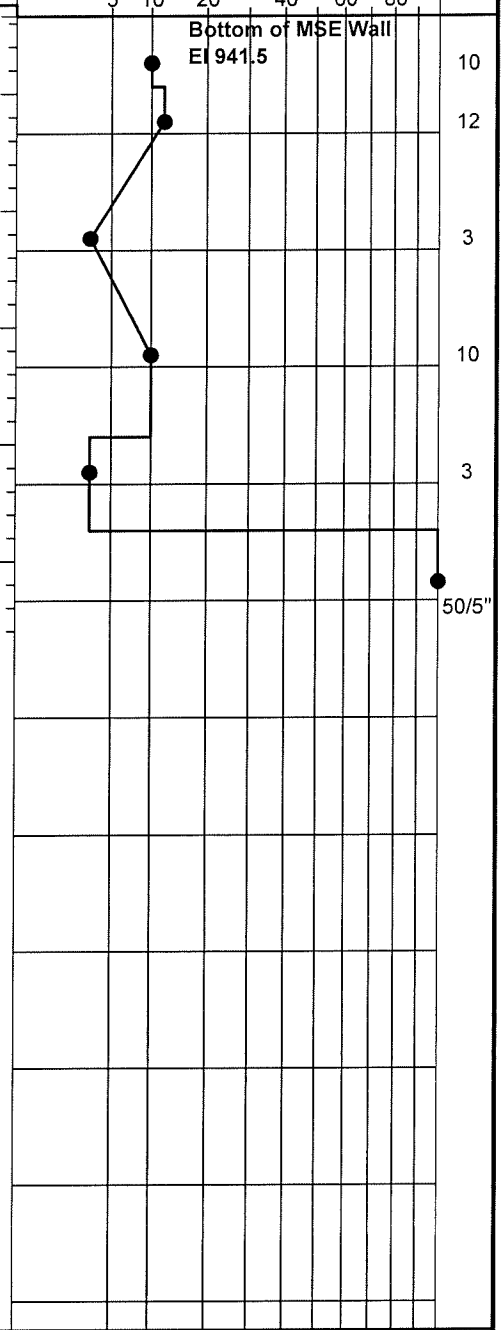
Azimuth: -- Angle from Horizontal: **90** Surface Elevation (ft): **928.30** Station: **ST 124+50, 117' Rt. of CL**
Drilling Equipment: **CME 550** Drilling Method: **HSA Auto Hammer**
Core Boxes: -- Samples: **6** Overburden (ft): **27** Rock (ft): -- Total Depth (ft): **27.0**
Logged By: **PT** Date Drilled: **10/8/07**

VERTICAL DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE	REC%	RQD %	MATERIAL DESCRIPTION		ELEVATION (feet)
		SS			FILL : Loose orange and reddish brown silty medium to fine **SAND** (slightly micaceous)	FILL	928.3
5		SS			ALLUVIUM : Medium dense to very loose brown and orange brown clayey medium to fine **SAND** with organic odor	SC	925
10		SS					920
15		SS			Loose gray and tan silty coarse to fine **SAND** with medium to fine gravel	SM	915
20		SS			RESIDUUM: Very loose gray and brown silty medium to fine **SAND** (slightly micaceous)	SM	910
25		SS			PARTIALLY WEATHERED ROCK : Very dense black, gray and brown silty medium to fine **SAND** (slightly micaceous)	PWR	905

Auger refusal encountered @ 27 feet below existing ground surface.

Groundwater was encountered @ 12 feet below existing ground surface @ time of boring and @ 11 feet below existing ground surface @ 24 hours after completion of boring.

STANDARD PENETRATION TEST DATA (blows/foot)



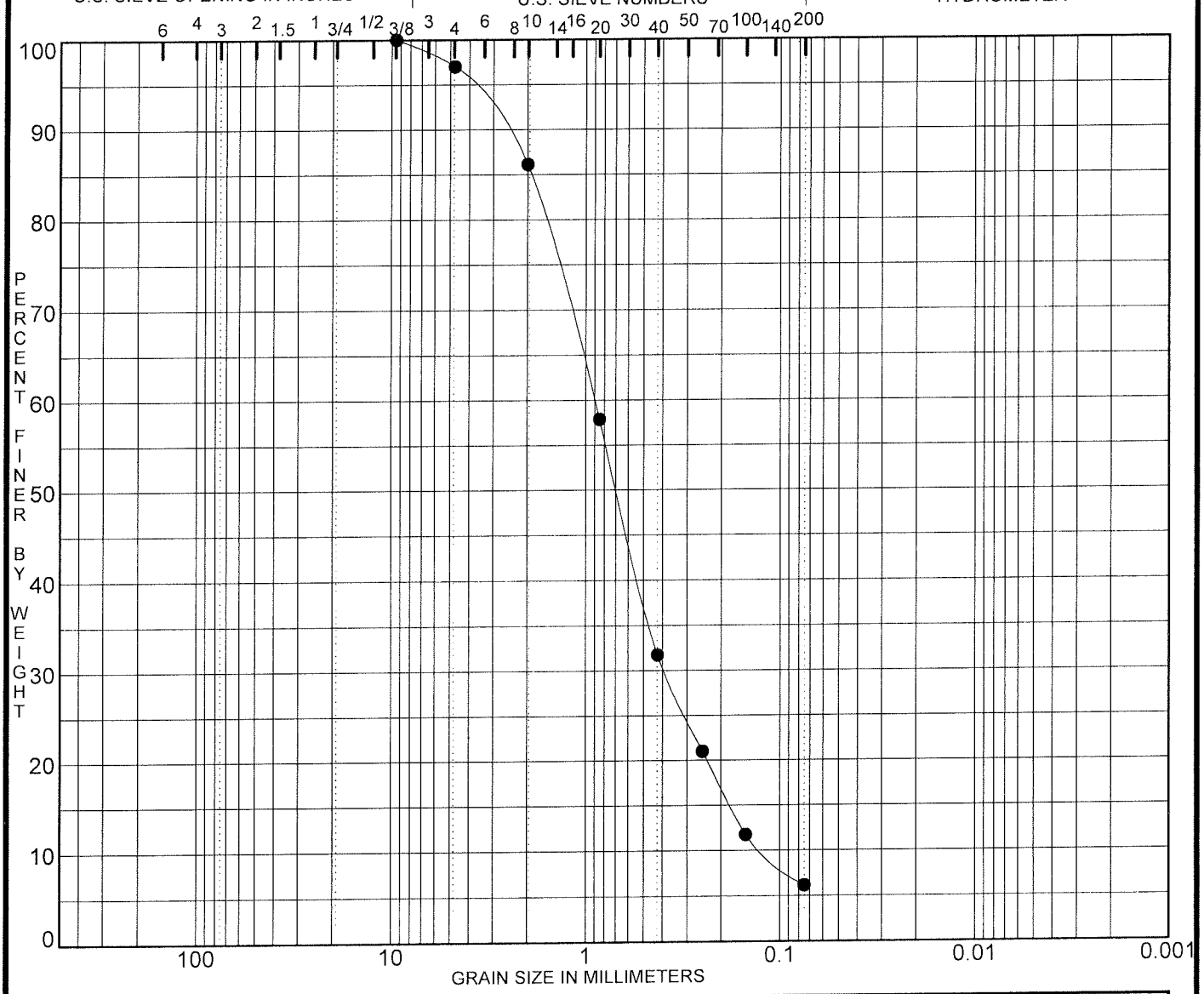
N-VALUE

SAMPLER TYPE
SS - Split Spoon
ST - Shelby Tube
NQ - Rock Core, 1-7/8"
NX - Rock Core, 2-1/8"
CU - Cuttings
CT - Continuous Tube

DRILLING METHOD
HSA - Hollow Stem Auger
CFA - Continuous Flight Augers
DC - Driving Casing
RW - Rotary Wash
RC - Rock Core

Hole No. **W-1**

SPTN 171-3099B.GPJ 11/14/07



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Soil Description	MC%	LL	PL	PI	Cc	Cu
● **BB-1 (S-4) (13.5-15 ft)**	**Gray coarse to fine SAND (slightly micaceous)**					**1.39**	**7.5**

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● **3509**	**9.50**	**0.91**	**0.390**	**0.1208**	**3.0**	**90.9**	**6.1**	

PROJECT I - 575 over Noonday Creek (South), Cobb Co., GA
GDOT Proj # : CSNHS-0008-00(256); PI # : 0008256

JOB NO. 171-3099 B
DATE 11/16/07

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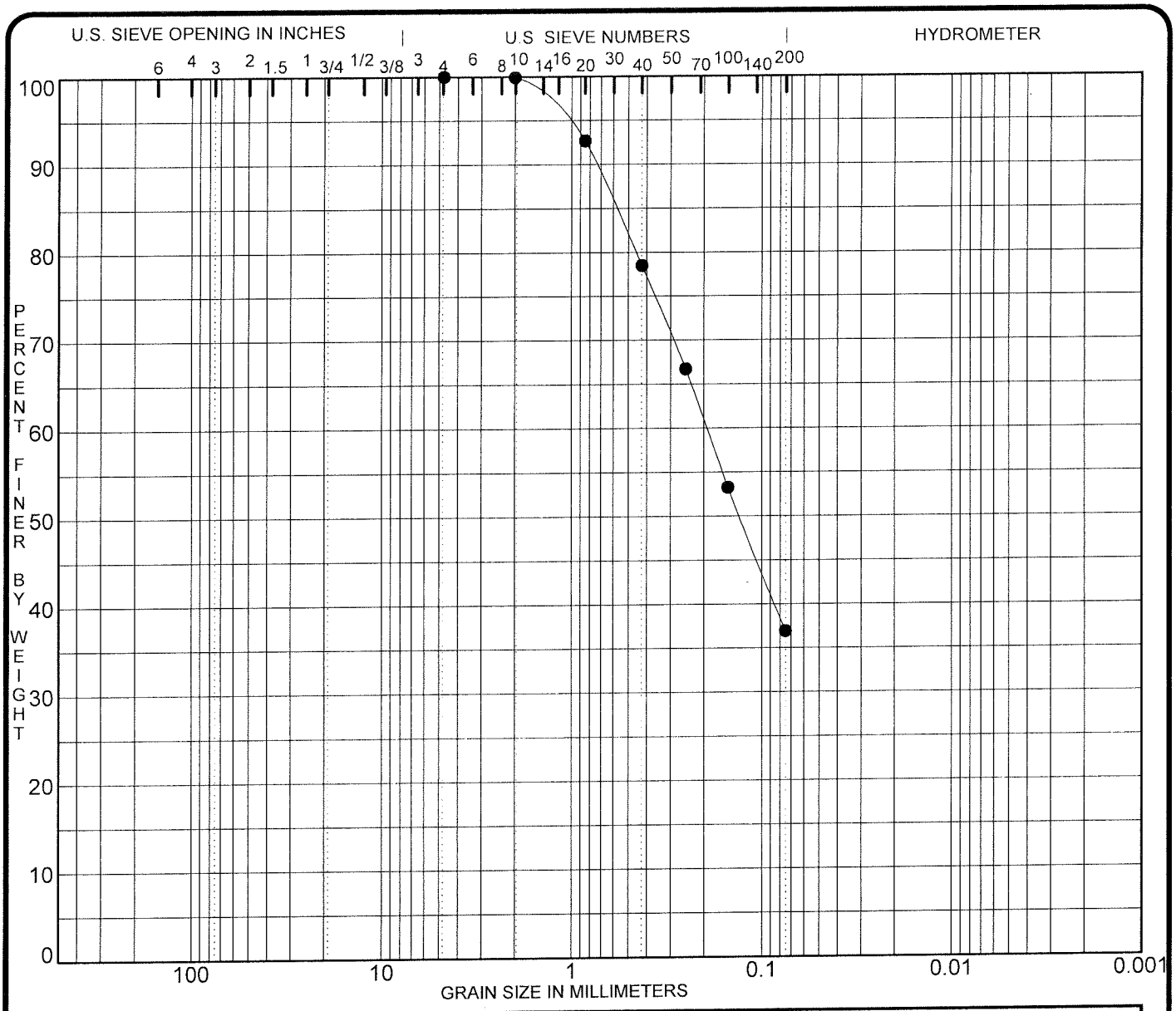
GRADATION CURVE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Soil Description	MC%	LL	PL	PI	Cc	Cu
● BB-2 (S-2) (3-5 ft)	Black and brown silty medium to fine SAND (micaceous)						

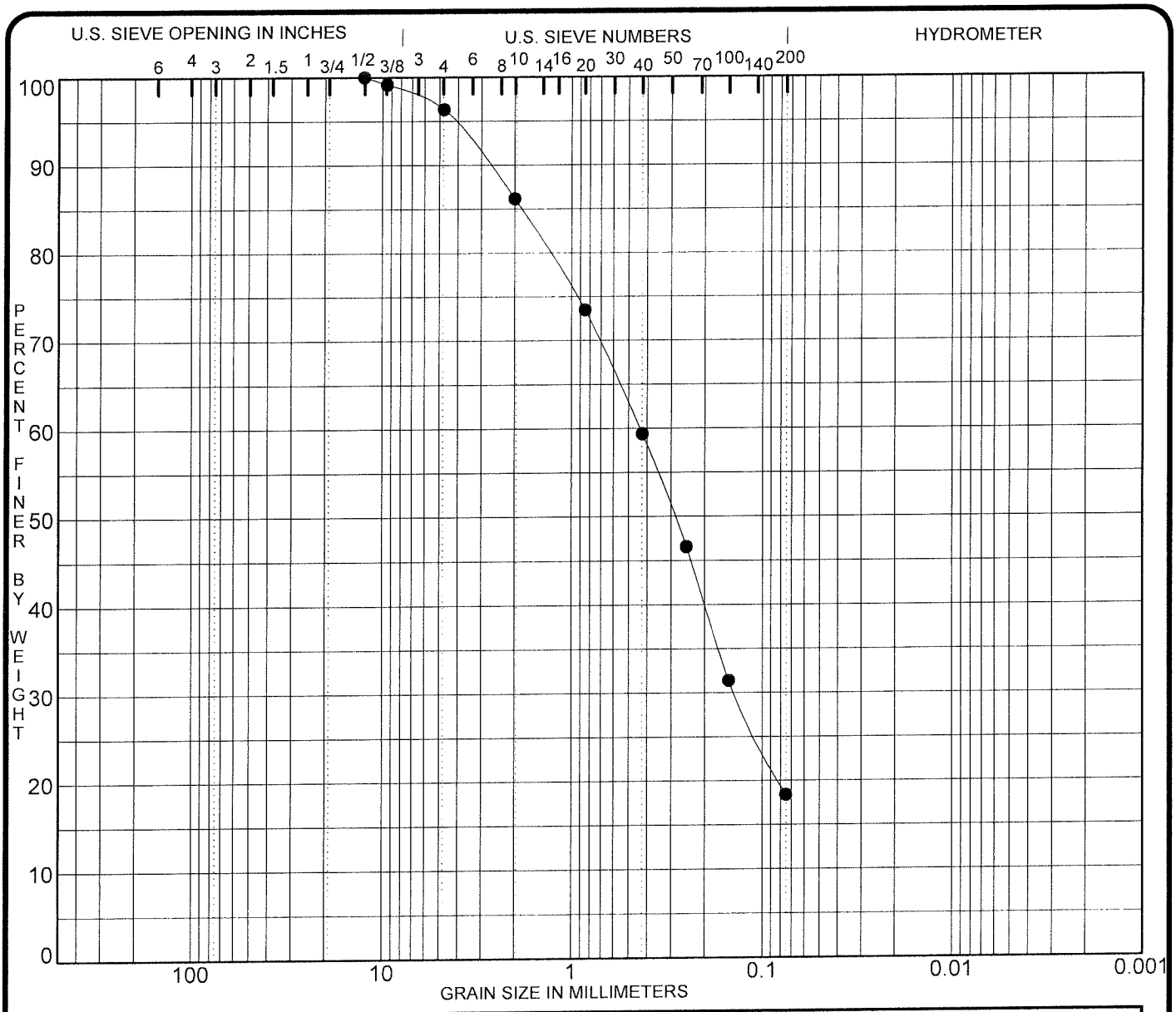
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● 3510	4.75	0.19			0.0	63.1	36.9	

PROJECT I - 575 over Noonday Creek (South), Cobb Co., GA
GDOT Proj # : CSNHS-0008-00(256); PI # : 0008256

JOB NO. 171-3099 B
DATE 11/16/07

WILLMER ENGINEERING INC. WE

GRADATION CURVE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Soil Description	MC%	LL	PL	PI	Cc	Cu
● BB-3 (S-5) (18.5-20 ft)	White, black and brown medium to fine SAND with silt (micaceous)						

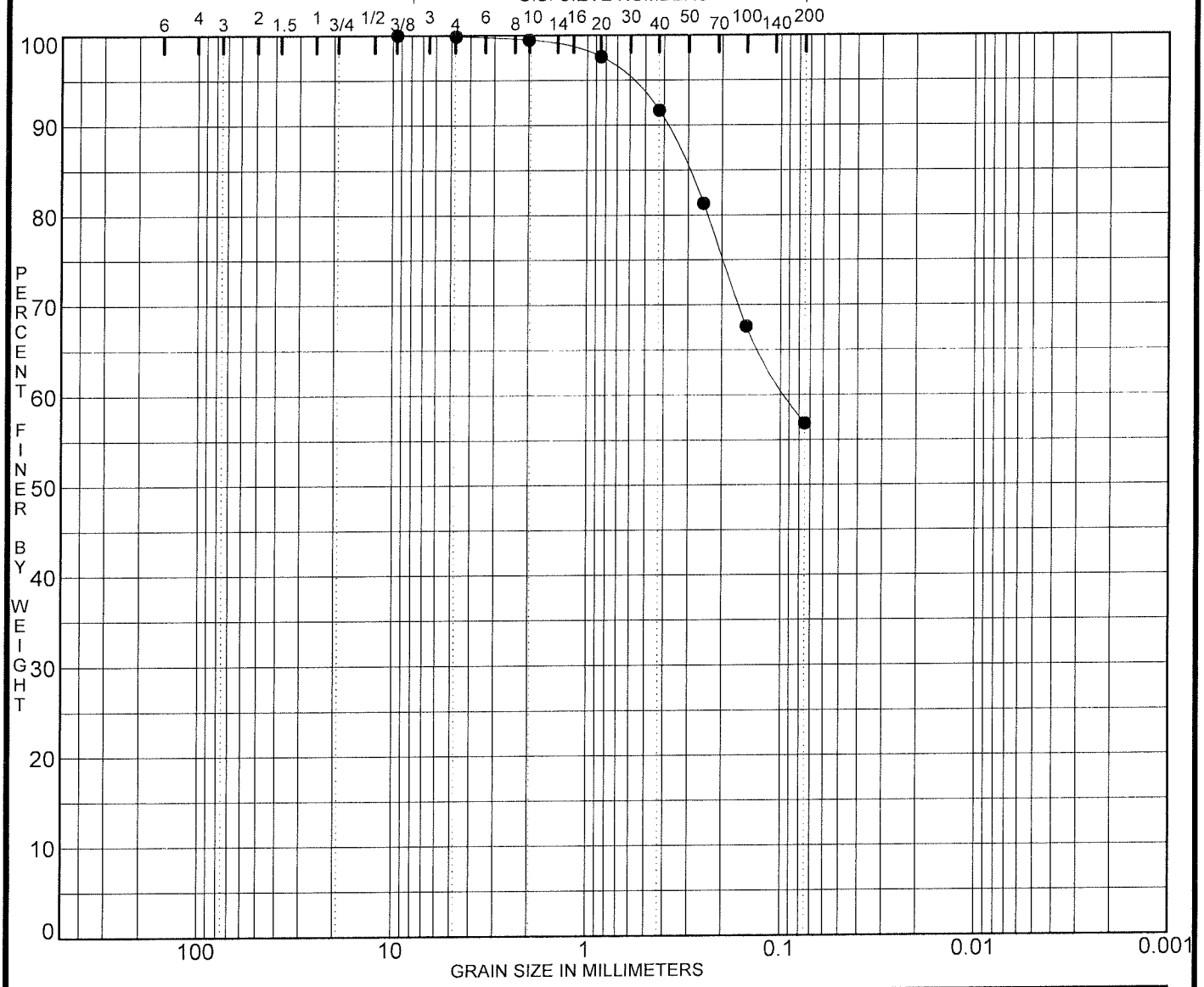
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● 3511	12.50	0.44	0.139		3.6	78.0	18.4	

PROJECT I - 575 over Noonday Creek (South), Cobb Co., GA
GDOT Proj # : CSNHS-0008-00(256); PI # : 0008256

JOB NO. 171-3099 B
DATE 11/16/07

WILLAMS ENGINEERING INC. WE

GRADATION CURVE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Soil Description	MC%	LL	PL	PI	Cc	Cu
● **BB-4 (S-3) (8.5-10 ft)**	**Reddish brown medium to fine sandy SILT (micaceous)**						

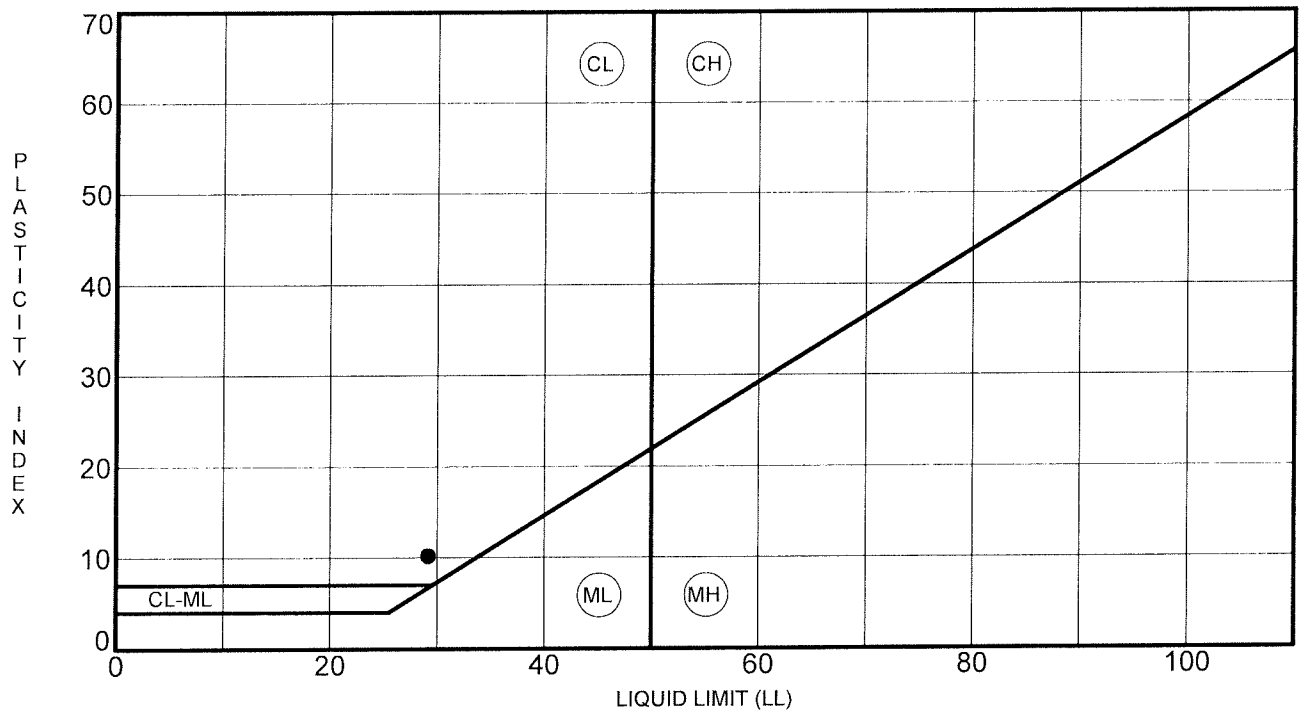
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● **3512**	**9.50**	**0.09**			**0.1**	**43.0**	**56.8**	

PROJECT I - 575 over Noonday Creek (South), Cobb Co., GA
GDOT Proj # : CSNHS-0008-00(256); PI # : 0008256

JOB NO. **171-3099 B**
DATE **11/16/07**

WILLMER ENGINEERING INC. WE

GRADATION CURVE



Specimen Identification	LL	PL	PI	Fines	Classification
● BB-4 (S-2)	29	19	10		Reddish brown medium to fine sandy CLAY (CL); NMC = 16.9%

PROJECT I - 575 over Noonday Creek (South), Cobb Co., GA
GDOT Proj # :CSNHS-0008-00(256); PI # : 0008256

JOB NO. 171-3099 B
DATE 11/19/07

WILLMER ENGINEERING, INC. WE

ATTERBERG LIMIT RESULTS