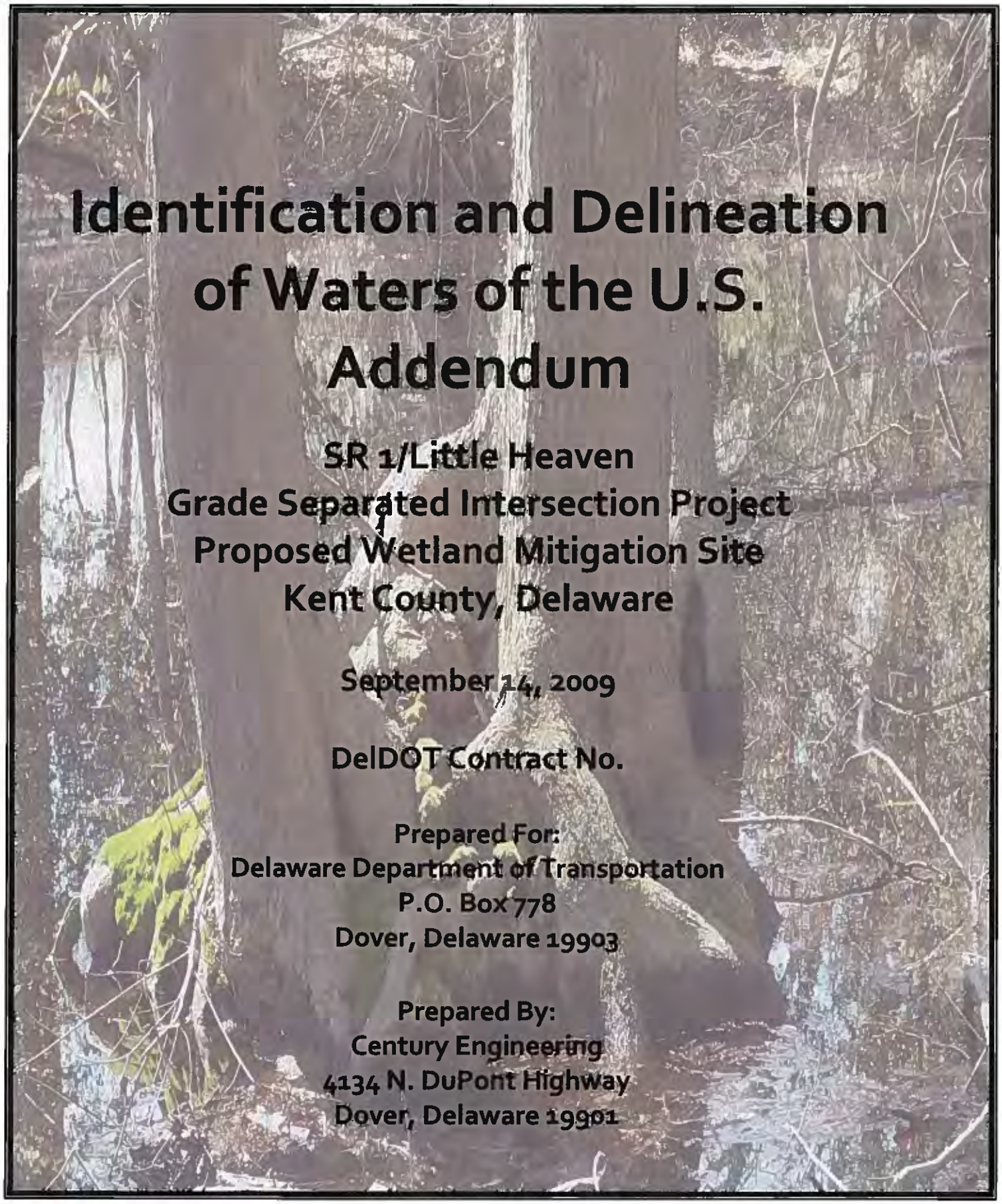

Identification and Delineation of Waters of the U.S. Addendum

SR 1/Little Heaven
Grade Separated Intersection Project
Proposed Wetland Mitigation Site
Kent County, Delaware

September 14, 2009

DelDOT Contract No.

Prepared For:
Delaware Department of Transportation
P.O. Box 778
Dover, Delaware 19903

Prepared By:
Century Engineering
4134 N. DuPont Highway
Dover, Delaware 19901

SR 1/Little Heaven
Grade Separated Intersection Project
Kent County, Delaware
September 14, 2009

WETLAND CERTIFICATION PAGE

"I Barbara Woleslagle Weedon do hereby state to the best of my professional ability that the information contained in the plans, specifications and reports have been prepared in accordance with accepted environmental practices, is true and correct, and is in conformance with U.S. Army Corps Wetland Delineation Manual (1987) and USACE Atlantic and Gulf Coastal Plain Interim Regional Supplement (2009).

Barbara W. Weedon DATE 7/20/09

Barbara Woleslagle Weedon
Professional Wetland Scientist No. 1619
Senior Environmental Specialist
Century Engineering

TABLE OF CONTENTS

APPENDICES

EXECUTIVE SUMMARY

Century Engineering (Century) was retained by the Delaware Department of Transportation (DelDOT) to perform an identification and delineation of Waters of the U.S. for the SR1/Little Heaven Grade Separated Intersection Project, located on the south end of the town of Little Heaven, in Kent County Delaware. This report is based on readily available secondary source information, as well as detailed field reconnaissance. The palustrine wetlands and waterways investigation was conducted by Century Engineering in accordance with the Routine On-Site Determination Method in accordance with the Corps of Engineers Wetlands Delineation Manual (USACOE, 1987) and additional guidance located in the USACOE Atlantic and Gulf Coastal Plain Interim Regional Supplement (2008). In addition to Federal Regulations, palustrine wetlands and waterways investigations were conducted in accordance with Delaware's "Wetland Act" (1973) and subsequent regulations adopted three (3) years later, as well as the Subaqueous Lands Act (1969).

SR1 serves as the main north-south highway to access the Delaware Beach resort areas. In addition to the resort traffic, eastern Sussex County and central Kent County have been experiencing a high rate of growth in year-round residential traffic and supporting commercial development. This has led to increased congestion and safety issues due to increased travel demand and the mixing of local and through traffic. A.D. Marble prepared the original Identification and Delineation of Waters of the U.S. for the SR 1/Little Heaven Grade Separated Intersection (December, 2008). However, a wetland mitigation site was identified for the project, but was not included as part of the original study. Therefore, this report addresses aquatic resources identified and delineated on the wetland mitigation site study area only.

An identification and delineation of "Waters of the US' was conducted for this project on April 16, 2009. No non-jurisdictional ditches were identified on the site, beyond the portion of the farm field ditch, identified by the USACE, during a previous field visit. The field reconnaissance identified two (2) palustrine wetlands (WL and WM) and two open water channels potentially regulated by Section 404 of the Clean Water Act.

1.0 INTRODUCTION

Century Engineering (Century) was retained by the Delaware Department of Transportation (DelDOT) to perform an identification and delineation of Waters of the U.S. for the SR1/Little Heaven Grade Separated Intersection Project wetland mitigation site, located to the south of the town of Little Heaven, in Kent County Delaware (Figure 1, Project Location Map). All figures are located in Appendix A. The purpose of this report is to document the methodology and results of the palustrine wetlands and waterway investigation, for the project study area. This report was prepared to assist in fulfilling the requirements of the U.S. Army Corps of Engineers (USACOE), which has jurisdictional authority over "Waters of the U.S." under the purview of Section 404 of the "Clean Water Act" and in accordance with Delaware Title 7, Chapter 66, "Wetlands Act", and Chapter 72, "Subaqueous Lands Act", administered by the Delaware Department of Natural Resources and Environmental Control (DNREC).

2.0 PROJECT DESCRIPTION

The original SR1/ Little Heaven Grade Separated Intersection Project study area is located in Kent County, Delaware, at the intersection of U.S. 113A/Clapham Road and SR 1. The project study area extends from the existing intersection of SR 1 and Clapham Road approximately 2,700.0 feet to the north along SR 1, 12,000.0 feet to the south along SR 1 south of the existing Barratts Chapel Road, 3,300.0 feet to the northwest along Clapham Road, 2,700.0 feet to the east along Mulberrie Point Road, and 400.0 feet east along Skeeter Neck Road. In addition, the project study area extends east 2,200.0 feet along Bowers Beach Road.

The additional project area, covered by this investigation, is located to the east of Bay Road (Rd 8) and to the north of Skeeter Neck Road (Rd 372). Current land use of the site consists of cultivated agricultural fields and wooded slopes. The project study area is approximately 32 acres in size. A central latitude and longitude of the project is 39° 01' 55.63" N and 75° 27' 17.67" W, respectively.

3.0 METHODOLOGY

3.1 Detailed On-Site Wetland Investigation

The following Identification and Delineation of Waters of the U.S. was conducted by Century in accordance with the Corps of Engineers Wetlands Delineation Manual (USACE, 1987) additional guidance located in the USACE Atlantic and Gulf Coastal Plain Interim Regional

Supplement (2009). The USACE Routine On-Site Determination Method was used to identify and delineate the wetlands within the project study area. The USACE manual utilizes the multiparameter concept to identify and delineate wetlands. Therefore, all three (3) parameters (hydric soil, hydrophytic vegetation, and wetland hydrology) must be present for an area to be determined a wetland. Once the field identification is performed, wetlands were classified according to the Cowardin System as described in A Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al. 1979).

A hydric soil is defined as "a soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophytic vegetation" (USACE, 1987). Field observations for soil focused on the determination of hydric soil characteristics within the top 20 inches of the surface. Color is often the most diagnostic indicator of hydric soil. Soil colors were recorded from observations made immediately below the A-horizon or 10 inches, whichever is shallower. The hue, value, and chroma of the soil were determined using the Munsell Soil Color Charts (Kollmorgen, 1992). Gleyed soils, mottled soils with a matrix chroma of two (2) or less, and unmottled soils with a matrix chroma of one (1) or less are considered to be hydric.

Hydrophytic vegetation is defined "as the sum total of macrophytic plant life that occurs in areas where the frequency and duration of inundation or soil saturation produce permanently or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present" (USACE, 1987). Hydrophytic vegetation has an indicator status of obligate (OBL), facultative wet (FACW), and facultative (FAC) and is typically adapted for life in anaerobic soil conditions. The presence of hydrophytic vegetation can be determined when any one of the following conditions is present: (1) more than 50 percent of the dominant species are OBL, FACW, or FAC; (2) visual observation of plant species growing in areas of prolonged inundation and/or soil saturation; or (3) morphological adaptations. Plant species indicator status were determined using the National List of Plant Species That Occur in Wetlands: Northeast (Region 1) (Reed, 1988).

The third parameter necessary to delineate an area as a wetland is "wetland hydrology". The USACE Corps of Engineers Wetlands Delineation Manual states that, "Areas with evident characteristics of wetland hydrology are those where the presence of water has an overriding influence on characteristics of vegetation and soils due to anaerobic and reducing conditions, respectively. Such characteristics are usually present in areas that are inundated or have soils that are saturated to the surface for sufficient duration to develop hydric soils and support vegetation typically adapted for life in periodically anaerobic soil conditions" (USACE, 1987). The following is a partial list of typical field indicators of wetland hydrology: (1) visual observation of inundation, (2) visual observation of soil saturation, (3) oxidized channels (rhizospheres) associated with living roots and rhizomes, (4) water marks, (5) drift lines, (6) water-borne sediment deposits, (7) water-

stained leaves, (8) surface scoured areas, (9) wetland drainage patterns, (10) morphological plant adaptations, and (11) hydric soil conditions.

3.2 Function and Value Assessment

A function and value assessment was conducted in accordance with a modified Corps Descriptive Method (CDM) Evaluation (USACE, 1995). Functions are self-sustaining properties of a wetland, while the values are benefits that are derived from the functions and physical characteristics associated with the wetland. The "Descriptive Approach" evaluates eight functions and five values for each wetland. The CDM evaluation determines if particular functions and values are present and why, and then determines which functions or values are of primary importance to the wetland ecosystem and why. For identified and delineated wetland systems, Wetland Function-Value Evaluation Forms are attached.

4.0 RESULTS

Information from several sources was reviewed to determine the presence of wetlands within the project study area. These sources and the information obtained are presented within this section. Secondary source information and field reconnaissance were used in concert with each other in order to evaluate the presence of wetlands.

4.1 Secondary Sources

A preliminary evaluation was performed prior to the field investigation through an examination of the United States Department of Agriculture, Natural Resources Conservation Services Soil Survey Mapper (http://www.soils.usda.gov), Kent County Soil Survey, and the National Wetlands Inventory (NWI) Map, U.S. Fish and Wildlife Service (USFWS), (Geo Spatial Data – Wetland Digital Data, http://www.fws.gov/wetlands/data/Mapper.html).

4.1.1 Soils

According to the Web Soil Survey for the project area, there are four (4) soil mapping units within the project study area. The soil mapping units include: Downer sandy loam, 5 to 10 percent (DoC); Fallsington loam soil (FgA) 0 to 2 percent slopes; Hammonton-Fallsington-Mullica complex, 0 to 2 percent (HoA) slopes; Ingleside loamy sand (IeA) 0 to 2 percent slope; and Unicorn loam (UlA) 1 to 2 percent slope. Figure 2 illustrates the mapped soils.

Soil descriptions

Downer sandy loam (DoC), 5 to 10 percent slope, is a well drained sandy loam soil with a seasonal high water table that is greater than 80 inches below the surface. Parent material is a loamy fluviomarine sediment. This soil is neither listed as flooded or ponded. Downer sandy loam is not listed as a hydric soil.

Fallsington loam (FgA), 0 to 2 percent slope, is a poorly drained loam/sandy clay loam with a seasonal high water table between 0 and 10 inches. Parent material is a loamy fluviomarine sediment. Though this soils as not flooding, it will pond on occasion. Fallsington loam is listed as partially hydric.

Hammonton-Fallsington-Mullica complex (HoA), 0 to 2 percent slope, is a moderately well drained soil to poorly drained complex with a seasonal high water table ranging from 0 to 10 inches to greater than 80 inches of the ground surface. Parent material for all three members of the complex is loamy fluviomarine sediments. Ponding is not listed as occurring but ponding is occasional. The Hammonton complex is listed as partially hydric.

Ingleside loamy sand (IeA), 0 to 2 percent slope/Unicorn loam (UlA) 0 to 2 percent slope, is a well drained loam/loamy sand to sandy loam with a seasonal high water table between 40 to 72 inches. Parent material is a fluviomarine sediment/high silt loamy eolain deposits over fluviomarine deposits. This soil is neither flooded nor ponded

4.1.2 National Wetlands Inventory Map

The National Wetland Inventory (NWI) mapping is used to inventory and classify wetlands using the Cowardin Classification System (USFWS, 1979). The wetlands on the NWI maps were identified from aerial photography and are not necessarily the only regulatory wetlands within a given area. These maps serve as a good first source to determine if wetlands exist within the given area and their general characteristics.

A review of the NWI map revealed one main wetland system within the project study area. Figure 3 (NWI Map) illustrates the NWI mapping for the project study area. The palustrine estuarine wetlands illustrated on the NWI map coincides with the field delineated Wetlands WL and WM.

4.2 Field Reconnaissance

The secondary source information, presented above, was used to guide and focus the detailed field investigation. Field reconnaissance was conducted on April 2009. The boundaries of the identified wetlands were marked with numbered flags for later survey. Figure 5

(Waters of the U.S.) shows the delineated wetlands. Photographs of the wetlands and data forms are located in Appendices B and C, respectively.

4.2.1 Waterways

Riverine habitat and watercourses were evaluated within the project area in conjunction with the identification and delineation of wetlands. Identification of watercourses required the confirmation of conveyances of surface water having a defined bed and banks, natural or artificial, with hydrologically sorted substrate material and the presence of an ordinary high water mark. Each system is also classified as perennial, intermittent or ephemeral. Stormwater outfalls and drainage swales are identified, but not labeled as "Waters of the U.S." if they do not meet the watercourse criteria. Photographs 1 through 4 illustrate the characteristics of the jurisdictional waterways within the project area.

The project area is located within the Murderkill River watershed, a traditional navigable water (TNW), which flows to the Delaware Bay. The Delaware Surface Water Quality Standards (July 2004), lists the Murderkill River as an industrial water supply source, primary contact recreation, secondary contact recreation, aquatic and terrestrial life habitat, and in the fresh sections, agricultural water supply. One unnamed tributary flows through Wetland WL, originating at a spring seep on the west side of the site closest to SR 1, to the Murderkill River. Flow is perennial, leaving the defined bed and banks during and post storm events.

4.2.2 Palustrine Wetlands

Photographs 5 through 10 illustrate the characteristics of the palustrine wetlands identified and delineated within the project area.

Wetland WL is a broadleaf deciduous forested wetland (PFO1C) that is seasonally flooded by the unnamed tributary that flows through the system. The wetland system is located on the outer limits of the project study area both along the east and north edge of the site. Wetland WL is hydrologically connected to the stream that flows through the system. The bed and banks of the unnamed tributary were difficult to dicern at times during the field reconnaissance due to recent rain events and inundation elevations within the wetland. However, based on channel flow on the south side of the site, and detailed survey information, an ordinary high water elevation was determined and is illustrated on the project mapping. Dominant vegetation within Wetland WL consisted of Red Maple (*Acer rubrum*), Skunk Cabbage (*Symplocarpus foetidus*), and Willow Oak (*Quercus phellos*). Data forms DP-1 and DP-2, document data gathered for Wetland L and the adjacent upland.

Soils within Wetland L were saturated at the surface, with free water in the test pit to the ground surface. The day of the field reconnaissance the wetland system was inundated, with 2 to 8 inches of surface water present. There were water-stained leaves and crayfish burrows evident throughout the wetland area. The top layer of soil, from 0 to 8 inches, had a color of 5YR 2.5/1, with a silt loam texture. At a depth of 8 to 18 inches, the soil had a color of 10YR 5/2 and the texture was sand.

Wetland WM is a seasonally inundated system, with strong vegetative morphological adaptations of the tree species and sparse ground cover. Wetland WM is a broadleaf deciduous forested wetland (PFO1C) that is seasonally flooded and is hydrologically connected to the unnamed tributary flowing through Wetland WL via a single outlet to the channel (Photograph 10). Dominant vegetation consisted of Red Maple and Silver Maple. Data Forms DP-3 and DP-4 document data collected for both the wetland and the adjacent upland.

Soils within Wetland M were saturated at the surface, with an 6-inch depth to free water in the test pit. There were water marks on the trees within the wetland, water-stained leaves evident throughout the wetland area, and morphologic adaptations. The tree species exhibited strong buttressing of the roots. The top layer of soil at 0-4 inches had a color of 10YR 2/1, with a sandy silt texture. At a depth of 4 to 8 inches the soil was sand with a color of 7.5YR 5/1 . At a depth of 8 to 18 inches, the matrix color was a 10 YR 6/1 sand.

Both wetlands combined to provide flood flow desyncronization, sediment retention, bank stabilization, as well as wildlife habitat as the primary functions and value. The persistent vegetation and level topography allow for slowing of surface runoff from the adjacent farm fields, collecting sediments, retaining hydrology. The diversity of vegetation, as well as the mix of upland, wetland, and open water habitats providing resting, nesting, roosting, feeding, and escape cover for numerous species of wildlife.

5.0 SUMMARY AND CONCLUSIONS

This Identification and Delineation of Waters of the U.S. Report is based on readily available secondary source information as well as detailed field reconnaissance. The Routine On-Site Determination Method in accordance with the Corps of Engineers Wetlands Delineation Manual (USACE, 1987) was used to identify and delineate the wetlands within the project study area. The presence of hydric soil, hydrophytic vegetation, and wetland hydrology was documented for each area determined to be a wetland. Century has identified and delineated two (2) palustrine forested wetlands within the project study area and one riverine systems. Federal and state permits will be necessary prior to initiating any fill or encroachment (e.g. filling, draining, crossing, etc.) activities in the identified wetlands.

6.0 LIST OF CONTRIBUTORS

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Professional Experience: 16 years
Responsibility: Field Delineation, Document Preparation

Ian Littlejohn
Environmental Specialist
Professional Experience: 3 years
Responsibility: Field Delineation

Laura Miller, P.E.
Project Manager
Professional Experience: 6 years
Responsibility: Document Review, QA/QC

William Conway, P.E.
Project Manager
Professional Experience: 13 years
Responsibility: QA/QC

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U.S. Fish and Wildlife Service (USFWS), National Wetland Inventory (NWI) Map,(Geo Spatial Data – Wetland Digital Data, http://www.fws.gov/wetlands/data/Mapper.html)

Appendix A

Figures

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DelDOT

SR1, LITTLE HEAVEN GRADE SEPARATED INTERSECTION

FIGURE 1
PROJECT LOCATION MAP

MAPPING IS BASED ON 2007 STATE OF DELAWARE ORTHO PHOTOS.
ALL INFORMATION SHOWN IS FOR DISPLAY PURPOSES ONLY.

500 SCALE
(17"X11")

N
W E
S

JULY 2009

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DelDOT

SR1, LITTLE HEAVEN GRADE SEPARATED INTERSECTION

FIGURE 2
SOIL CLASSIFICATION

MAPPING IS BASED ON 2007 STATE OF DELAWARE ORTHO PHOTOS.
ALL INFORMATION SHOWN IS FOR DISPLAY PURPOSES ONLY.

250 SCALE
(17" X 11")

N
W E
S

JULY 2009

1

SR1 SOUTHBOUND

SR1 NORTHBOUND

WETLAND STUDY AREA

SKEETER NECK ROAD

- HnA (Hammonton Sandy Loam, 0%-2 % slopes)
- IeA (Ingleside Loamy Sand, 0%-2% slopes)
- SSD (Sassafras Soils, 10%-15% slopes)
- UIA (Unicorn Loam, 0%-2% slopes)
- HoA (Hammonton-Fallsington-Mullica Complex, 0%-2% slopes)
- FgA (Fallsington Loam, 0%-2% slopes)
- IgB (Ingleside Sandy Loam, 2%-5% slopes)
- DoC (Downer Sandy Loam, 5%-10% slopes)

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SR1, LITTLE HEAVEN GRADE SEPARATED INTERSECTION

FIGURE 3
NATIONAL WETLAND INSTITUTE

MAPPING IS BASED ON 2007 STATE OF DELAWARE ORTHO PHOTOS.
ALL INFORMATION SHOWN IS FOR DISPLAY PURPOSES ONLY.

250 SCALE
(17" X 11")

N
W E
S

JULY 2009

Freshwater Forested/Shrub Wetland

ID	Wetland Code
1	PFO1A (1.058 ac)
2	PFO1A (0.941 ac)
3	PFO1C (20.399 ac)

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SR1, LITTLE HEAVEN GRADE SEPARATED INTERSECTION

FIGURE 4
WATERS OF THE U.S.

MAPPING IS BASED ON 2007 STATE OF DELAWARE ORTHO PHOTOS.
ALL INFORMATION SHOWN IS FOR DISPLAY PURPOSES ONLY.

250 SCALE
(17" X 11")

N
W E
S

JULY 2009

SR1 SOUTHBOUND

SR1 NORTHBOUND

WETLAND
WM

WETLAND
WL

WETLAND STUDY AREA

SKEETER NECK ROAD

LEGEND

1 → PHOTOGRAPH #

JURISDICTIONAL WETLANDS

ORDINARY HIGH WATER LINE

Appendix B

Photographs

Photograph 1: Channelized flow of the Unnamed Tributary.

Photograph 2: Unnamed Tributary channel at the western end near the head of the stream.

Photograph 3: Headwater of the Unnamed Tributary.

Photograph 4: Headwater of the Unnamed Tributary.

Photograph 5: View of Wetland WL along eastern edge of site.

Photograph 6: View of Wetland WL along north eastern edge of site.

Photograph 7: View of Wetland WL along eastern edge of site.

Photograph 8: View of Wetland WM, located on the north side of the study area.

Photograph 9: View of Wetland WM.

Photograph 10: View of hydrologic connection of Wetland WM to the unnamed tributary.

Appendix C

Data Forms

Wetland L

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Little Heaven Wetland mit. City/County: Kent Sampling Date: April/16 2009
Applicant/Owner: Del DOT State: Del. Sampling Point: DP-1
Investigator(s): B.W. Weedon / I. Littlejohn Section, Township, Range: Little Heaven
Landform (hillslope, terrace, etc.): Coast - inland Local relief (concave, convex, none): level Slope (%): <0.5
Subregion (LRR or MLRA): LRRT Lat: 39°01'50.90" Long: -75°27'09.26" Datum: WSG84
Soil Map Unit Name: Fallsington loam 0-2% NWI classification: PEOIC
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)
Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____
Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ____	Is the Sampled Area within a Wetland?	Yes ✓ No ____
Hydric Soil Present?	Yes ✓ No ____		
Wetland Hydrology Present?	Yes ✓ No ____		

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) (LRR U)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ✓ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No 2-8" Depth (inches): 2-8"
Water Table Present? Yes ____ No ____ Depth (inches): 0"
Saturation Present? (includes capillary fringe) Yes ____ No ____ Depth (inches): 0"

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: DP-1

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 20x20)			
1. Carpinus caroliniana	20%	Y	FAC
2. Acer rubrum	20%	Y	FACt
3.			
4.			
5.			
6.			
7.			
	40% = Total Cover		
Sapling Stratum (Plot size: ——)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		
Shrub Stratum (Plot size: 20x20)			
1. Lindera benzoin	20%	Y	FACW-
2.			
3.			
4.			
5.			
6.			
7.			
	20% = Total Cover		
Herb Stratum (Plot size: 20x20)			
1. Symplocarpus foetidus	75%	Y	OBL
2. Pilea pumila	30%	Y	FACW
3. Mertensia virginica	15%	No	FACt
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	130% = Total Cover		
Woody Vine Stratum (Plot size: ——)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 83% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

__ Dominance Test is >50%

__ Prevalence Index is ≤3.0[1]

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: DP-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-8"	5YR 2.5/1	100%	—	—	—	—	Silt loam	granular
8-18"	10YR 5/2	100%	—	—	—	—	sand	Saturated

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) (LRR P, T, U)
- ___ 5 cm Mucky Mineral (A7) (LRR P, T, U)
- ___ Muck Presence (A8) (LRR U)
- ___ 1 cm Muck (A9) (LRR P, T)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) (MLRA 150A)
- ___ Sandy Mucky Mineral (S1) (LRR O, S)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ✓ Dark Surface (S7) (LRR P, S, T, U)
- ___ Polyvalue Below Surface (S8) (LRR S, T, U)
- ___ Thin Dark Surface (S9) (LRR S, T, U)
- ___ Loamy Mucky Mineral (F1) (LRR O)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (LRR U)
- ___ Depleted Ochric (F11) (MLRA 151)
- ___ Iron-Manganese Masses (F12) (LRR O, P, T)
- ___ Umbric Surface (F13) (LRR P, T, U)
- ___ Delta Ochric (F17) (MLRA 151)
- ___ Reduced Vertic (F18) (MLRA 150A, 150B)
- ___ Piedmont Floodplain Soils (F19) (MLRA 149A)
- ___ Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (LRR O)
- ___ 2 cm Muck (A10) (LRR S)
- ___ Reduced Vertic (F18) (outside MLRA 150A,B)
- ___ Piedmont Floodplain Soils (F19) (LRR P, S, T)
- ___ Anomalous Bright Loamy Soils (F20) (MLRA 153B)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12) (LRR T, U)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Little Heaven Wetland Mit. City/County: Kent Sampling Date: April 16, 2009

Applicant/Owner: Del DOT State: Del. Sampling Point: DP-2

Investigator(s): B.W. Weedon / J. Littlejohn Section, Township, Range: Little Heaven

Landform (hillslope, terrace, etc.): coast - inland Local relief (concave, convex, none): level Slope (%): <05

Subregion (LRR or MLRA): LRRT Lat: 39°01'57.23" Long: -75°27'09.96" Datum: WGS84

Soil Map Unit Name: Hammonton - Fallington - Mullica Complex NWI classification: Adj. upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No ✓	Is the Sampled Area within a Wetland? Yes ____ No ✓
Hydric Soil Present?	Yes ____	No ✓	
Wetland Hydrology Present?	Yes ____	No ✓	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) (LRR U)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No ✓	Depth (inches): ____
Water Table Present?	Yes ____	No ✓	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ✓	No ____	Depth (inches): 14"

Wetland Hydrology Present? Yes ____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

water in pit below 18"

soil damp

VEGETATION – Use scientific names of plants.

Sampling Point: DP 2

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 20×20)			
1. Liquidambar styraciflua	15%	Y	FAC
2. Ilex opaca	30%	Y	FACU
3.			
4.			
5.			
6.			
7.			
	45	= Total Cover	
Sapling Stratum (Plot size: —)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
		= Total Cover	
Shrub Stratum (Plot size: —)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
		= Total Cover	
Herb Stratum (Plot size: 20×20)			
1. Podophyllum peltatum	25%	Y	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	25	= Total Cover	
Woody Vine Stratum (Plot size: 20×20)			
1. Smilax rotundifolia	5%	Y	FAC
2.			
3.			
4.			
5.			
	5	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species 20%	x 3 =	60
FACU species 55	x 4 =	220
UPL species	x 5 =	
Column Totals: 75 (A)		280 (B)

Prevalence Index = B/A = 3.7

Hydrophytic Vegetation Indicators:

__ Dominance Test is >50%

__ Prevalence Index is ≤3.0[1]

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ____ No ✓

Remarks: (If observed, list morphological adaptations below).

Professional judgement is that a dominance of hydrophytic veg. not present because hydrophytic species are facultative, no FACW or OBL species present.

SOIL

Sampling Point: DP-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	7.5YR 2.5/1	100%					granular silt loam	
4-8	10YR 3/1	100%					granular silt loam	
8-18	2.5Y 5/3	100%					Sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) (LRR P, T, U)
- ___ 5 cm Mucky Mineral (A7) (LRR P, T, U)
- ___ Muck Presence (A8) (LRR U)
- ___ 1 cm Muck (A9) (LRR P, T)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) (MLRA 150A)
- ___ Sandy Mucky Mineral (S1) (LRR O, S)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (LRR P, S, T, U)
- ___ Polyvalue Below Surface (S8) (LRR S, T, U)
- ___ Thin Dark Surface (S9) (LRR S, T, U)
- ___ Loamy Mucky Mineral (F1) (LRR O)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (LRR U)
- ___ Depleted Ochric (F11) (MLRA 151)
- ___ Iron-Manganese Masses (F12) (LRR O, P, T)
- ___ Umbric Surface (F13) (LRR P, T, U)
- ___ Delta Ochric (F17) (MLRA 151)
- ___ Reduced Vertic (F18) (MLRA 150A, 150B)
- ___ Piedmont Floodplain Soils (F19) (MLRA 149A)
- ___ Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (LRR O)
- ___ 2 cm Muck (A10) (LRR S)
- ___ Reduced Vertic (F18) (outside MLRA 150A,B)
- ___ Piedmont Floodplain Soils (F19) (LRR P, S, T)
- ___ Anomalous Bright Loamy Soils (F20) (MLRA 153B)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12) (LRR T, U)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

Though the soils appear to be hydric, None of the soil indicators appear to apply.

Wetland M

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Little Heaven Wetland Mit City/County: Kent Sampling Date: April 16, 2009

Applicant/Owner: Del DoT State: Del. Sampling Point: DP-3

Investigator(s): B.W. Weedon / J. Littlejohn Section, Township, Range: Little Heaven

Landform (hillslope, terrace, etc.): Coast - inland Local relief (concave, convex, none): level Slope (%): 0-5

Subregion (LRR or MLRA): LRR T Lat: 39°01'58.39" Long: -75°27'14.41" Datum: WSG84

Soil Map Unit Name: Fallington loam 0-2% NWI classification: PFO1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	Is the Sampled Area within a Wetland? Yes ✓ No ____
Hydric Soil Present?	Yes ✓	No ____	
Wetland Hydrology Present?	Yes ✓	No ____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) (LRR U)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ✓	No ____	Depth (inches): +/- 8"
Water Table Present?	Yes ✓	No ____	Depth (inches): 16"
Saturation Present? (includes capillary fringe)	Yes ✓	No ____	Depth (inches): To Surface

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: DP-3

Tree Stratum (Plot size: 20 X 20)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubra	5%		FAC
2. Acer saccharinum	10%		FACW
3.			
4.			
5.			
6.			
7.			
	15% = Total Cover		
Sapling Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		
Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		
Herb Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	= Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals:	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks: (If observed, list morphological adaptations below).

SOIL Sampling Point: DP-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4"	10YR 2/1	100%					Silty Sand	granular
4-8"	7.5YR 5/1	100%					Sand	
8-18"	10YR 6/1	100%					Sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) (LRR P, T, U)
- ___ 5 cm Mucky Mineral (A7) (LRR P, T, U)
- ___ Muck Presence (A8) (LRR U)
- ___ 1 cm Muck (A9) (LRR P, T)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) (MLRA 150A)
- ___ Sandy Mucky Mineral (S1) (LRR O, S)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ✓ Dark Surface (S7) (LRR P, S, T, U)
- ___ Polyvalue Below Surface (S8) (LRR S, T, U)
- ___ Thin Dark Surface (S9) (LRR S, T, U)
- ___ Loamy Mucky Mineral (F1) (LRR O)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (LRR U)
- ___ Depleted Ochric (F11) (MLRA 151)
- ___ Iron-Manganese Masses (F12) (LRR O, P, T)
- ___ Umbric Surface (F13) (LRR P, T, U)
- ___ Delta Ochric (F17) (MLRA 151)
- ___ Reduced Vertic (F18) (MLRA 150A, 150B)
- ___ Piedmont Floodplain Soils (F19) (MLRA 149A)
- ___ Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (LRR O)
- ___ 2 cm Muck (A10) (LRR S)
- ___ Reduced Vertic (F18) (outside MLRA 150A,B)
- ___ Piedmont Floodplain Soils (F19) (LRR P, S, T)
- ___ Anomalous Bright Loamy Soils (F20) (MLRA 153B)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12) (LRR T, U)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Little Heaven Wetland Mit. City/County: Kent Sampling Date: April 16 2009
Applicant/Owner: Del DoT State: Del. Sampling Point: DP-4
Investigator(s): B.W. Weedon / L. Littlejohn Section, Township, Range: Little Heaven
Landform (hillslope, terrace, etc.): coast-inland Local relief (concave, convex, none): level Slope (%): 0-5
Subregion (LRR or MLRA): LRRT Lat: 39°01'58.45" Long: -75°27'13.77" Datum: WGS84
Soil Map Unit Name: Fallington loam 0-2% NWI classification: adj. upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)
Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____
Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No ✓	Is the Sampled Area within a Wetland? Yes ____ No ✓
Hydric Soil Present?	Yes ✓	No ____	
Wetland Hydrology Present?	Yes ✓	No ____	

Remarks:
Area is a fringe around a vernal pool.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) (LRR U)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No ✓	Depth (inches): ____	
Water Table Present?	Yes ✓	No ____	Depth (inches): 6"	
Saturation Present? (includes capillary fringe)	Yes ✓	No ____	Depth (inches): 2"	Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: DP-4

Tree Stratum (Plot size: 20 X 20)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum	10%	N	FAC
2. Liquidambar styraciflua	10%	N	FAC
3. Ilex opaca	45%	Y	FACU
4.			
5.			
6.			
7.			
	65 = Total Cover		

Sapling Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Herb Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	= Total Cover		

Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

__ Dominance Test is >50%

__ Prevalence Index is ≤3.0[1]

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size. Includes woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes ____ No ✓

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: DP-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4"	10YR3/1	100%					silty sand	granular
4-6"	10YR 2/2	100%					silty sand	granular
6-12"	10YR5/1	100%					sand	granular

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ✓ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12) **(LRR T, U)**
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

Appendix D

Wetland Function-Value Evaluation Forms

Wetland Function-Value Evaluation Form

Total area of wetland_____ Human made? No Is wetland part of a wildlife corridor? yes or a "habitat island"? —

Adjacent land use Agricultural Distance to nearest roadway or other development 500 to 1700'

Dominant wetland systems present PFO Contiguous undeveloped buffer zone present yes

Is the wetland a separate hydraulic system? No If not, where does the wetland lie in the drainage basin? fringe

How many tributaries contribute to the wetland? unknown (assuming several) Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. Wetland L 9 M

Latitude 39°01'36" Longitude 75°27'08"

Prepared by: BWW Date April 2009

Wetland Impact: Type NA Area_____

Evaluation based on: Office_____ Field ✓

Corps manual wetland delineation completed? Y ✓ N_____

Function/Value	Occurence Y	Occurence N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	✓		4,5,7,15,16		
Floodflow Alteration	✓		2,5,6,7,8,9,14,18	✓	
Fish and Shellfish Habitat					
Sediment/Toxicant Retention	✓		1,2,3,4,5,10,11,12,13,15,16	✓15,16	farmlands upslope
Nutrient Removal	✓		3,4,5,8,9,13,15		
Production Export	✓		2,10,11		
Sediment/Shoreline Stabilization	✓		2,3,6,8,13,14,15	✓	level topography and persistant vegetation
Wildlife Habitat	✓		1,3,4,5,6,8,9,10,11,14,15,19,20,21	✓21	mix of upland, wetland, and open water habitat
Recreation					
Educational Scientific Value					
Uniqueness/Heritage					
Visual Quality/Aesthetics					
ES Endangered Species Habitat		!			
Other					

Notes:

*Refer to back up list of numbered considerations.

Appendix E

Wetland and Waterway Delineation Flag Coordinates

Century Engineering

SR 1/Little Heaven
Grade Separated Intersection Project
Kent County, Delaware
September 14, 2009

ID	Northing	Easting	Elevation
WL-18	375353.4	645884.8	11.5280
WL-19	375382.8	645908.6	11.3831
WL-20	375404.0	645931.9	11.5092
WL-21	375421.7	645882.4	12.1850
WL-22	375441.4	645883.8	12.5580
WL-23	375446.1	645916.1	12.0352
WL-24	375441.6	645946.6	11.6374
WL-25	375426.6	645960.9	11.4349
WL-26	375422.5	645990.0	9.9506
WL-27	375448.7	646009.8	9.7161
WL-28	375490.9	646021.6	9.5300
WL-29	375540.0	646042.2	10.4046
WL-30	375580.2	646074.7	10.2621
WL-31	375614.3	646101.6	9.3782
WL-32	375665.0	646102.1	10.0126
WL-33	375729.8	646077.8	10.8933
WL-34	375807.2	646075.4	10.4776
WL-35	375870.8	646042.3	11.3812
WL-36	375891.2	646014.4	11.7554
WL-37	375916.9	645905.0	12.0800
WL-38	375940.1	645845.3	12.6969
WL-39	376003.3	645813.6	12.6633
WL-40	376073.0	645793.4	12.5512
WL-41	376132.1	645803.8	13.0022
WL-42	376145.0	645786.7	13.9336

ID	Northing	Easting	Elevation
WM-01	376279.1	645565.8	16.7789
WM-02	376248.6	645560.8	16.9360
WM-03	376208.0	645538.5	16.4914
WM-04	376168.5	645515.4	17.0767
WM-05	376129.2	645515.9	17.0487
WM-06	376094.0	645539.9	17.3515
WM-07	376081.2	645582.6	16.9856
WM-08	376088.9	645627.3	16.8130
WM-09	376101.8	645647.4	16.7834
WM-10	376130.4	645660.3	16.8990
WM-11	376169.7	645653.5	16.6249
WM-12	376200.4	645646.7	16.9895
WM-13	376220.6	645643.3	16.3299
WM-14	376239.7	645645.9	15.9412
WM-15	376232.4	645636.4	16.4065
WM-16	376203.4	645629.9	16.5570
WM-17	376215.2	645605.6	16.6816
WM-18	376234.1	645581.8	16.2833
WM-19	376256.9	645575.7	16.7445
WM-20	376274.7	645571.6	16.6619

Appendix F

Wetland Mitigation Site Soil Borings

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 1

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 0.5

Elevation: Source: LH-SWM # 12W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			663.30	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			615.09	
WT. OF WATER LOST:			48.21	POST-IGNITION
WT. OF BOTTLE:			87.85	DISH & SOIL:
WT. OF DRY SOIL:			527.24	
PERCENT OF WATER:			9.10	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 519

WT. OF TOTAL SAMPLE: 527.2 WT. OF WASH SAMPLE: 100.5

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
3/8"	0.0	0.0	0.0	100.0
#4	2.2	2.2	0.4	99.6
#10	8.1	5.9	1.1	98.5
#40	46.9	46.9	45.9	52.5
#200	80.9	34.0	33.3	19.2
PASS #200		19.6	19.2	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	80.8
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 2

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 2.0

Elevation: Source: LH-SWM # 12W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			561.80	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			491.75	
WT. OF WATER LOST:			70.05	POST-IGNITION
WT. OF BOTTLE:			76.52	DISH & SOIL:
WT. OF DRY SOIL:			415.23	
PERCENT OF WATER:			16.90	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 413

WT. OF TOTAL SAMPLE: 415.2 WT. OF WASH SAMPLE: 105.1

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
#4	0.0	0.0	0.0	100.0
#10	2.3	2.3	0.6	99.4
#40	59.9	59.9	56.7	42.8
#200	101.2	41.3	39.1	3.7
PASS #200		3.9	3.7	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	96.3
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 3

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 4.0

Elevation: Source: LH-SWM # 12W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			677.70	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			586.03	
WT. OF WATER LOST:			91.67	POST-IGNITION
WT. OF BOTTLE:			77.28	DISH & SOIL:
WT. OF DRY SOIL:			508.75	
PERCENT OF WATER:			18.00	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 465

WT. OF TOTAL SAMPLE: 508.8 WT. OF WASH SAMPLE: 108.8

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	27.4	27.4	5.4	94.6
#4	30.1	2.7	0.5	94.1
#10	43.5	13.4	2.6	91.4
#40	54.1	54.1	45.5	46.0
#200	93.8	39.7	33.4	12.6
PASS #200		15.0	12.6	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	87.4
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 4

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 6.0

Elevation: _____ Source: LH-SWM # 12W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			692.50	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			587.43	
WT. OF WATER LOST:			105.07	POST-IGNITION
WT. OF BOTTLE:			80.84	DISH & SOIL:
WT. OF DRY SOIL:			506.59	
PERCENT OF WATER:			20.70	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 505

WT. OF TOTAL SAMPLE: 506.6 WT. OF WASH SAMPLE: 113.8

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
#4	0.0	0.0	0.0	100.0
#10	1.8	1.8	0.4	99.6
#40	3.4	3.4	3.0	96.7
#200	87.8	84.4	73.9	22.8
PASS #200		26.0	22.8	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	77.2
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 5

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 8.0

Elevation: Source: LH-SWM # 12W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			830.20	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			698.66	
WT. OF WATER LOST:			131.54	POST-IGNITION
WT. OF BOTTLE:			98.20	DISH & SOIL:
WT. OF DRY SOIL:			600.46	
PERCENT OF WATER:			21.90	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 591

WT. OF TOTAL SAMPLE: 600.5 WT. OF WASH SAMPLE: 109.0

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	1.2	1.2	0.2	99.8
#4	3.4	2.2	0.4	99.4
#10	9.9	6.5	1.1	98.4
#40	24.7	24.7	22.3	76.1
#200	89.5	64.8	58.5	17.6
PASS #200		19.5	17.6	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	82.4
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 6

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 10.0

Elevation: Source: LH-SWM # 12W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			739.00	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			620.00	
WT. OF WATER LOST:			119.00	POST-IGNITION
WT. OF BOTTLE:			78.14	DISH & SOIL:
WT. OF DRY SOIL:			541.86	
PERCENT OF WATER:			22.00	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 529

WT. OF TOTAL SAMPLE: 541.9 WT. OF WASH SAMPLE: 105.8

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	8.6	8.6	1.6	98.4
#4	11.3	2.7	0.5	97.9
#10	12.9	1.6	0.3	97.6
#40	33.2	33.2	30.6	67.0
#200	90.9	57.7	53.2	13.7
PASS #200		14.9	13.7	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	86.3
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 7

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 12.0

Elevation: Source: LH-SWM # 12W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			726.50	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			624.89	
WT. OF WATER LOST:			101.61	POST-IGNITION
WT. OF BOTTLE:			81.80	DISH & SOIL:
WT. OF DRY SOIL:			543.09	
PERCENT OF WATER:			18.70	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 506

WT. OF TOTAL SAMPLE: 543.1 WT. OF WASH SAMPLE: 123.4

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	5.7	5.7	1.0	99.0
#4	16.9	11.2	2.1	96.9
#10	37.3	20.4	3.8	93.1
#40	81.1	81.1	61.2	31.9
#200	112.4	31.3	23.6	8.3
PASS #200		11.0	8.3	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	91.7
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 8

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 14.0

Elevation: _____ Source: LH-SWM # 12W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			659.00	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			570.11	
WT. OF WATER LOST:			88.89	POST-IGNITION
WT. OF BOTTLE:			78.93	DISH & SOIL:
WT. OF DRY SOIL:			491.18	
PERCENT OF WATER:			18.10	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 449

WT. OF TOTAL SAMPLE: 491.2 WT. OF WASH SAMPLE: 125.7

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	10.9	10.9	2.2	97.8
#4	22.7	11.8	2.4	95.4
#10	41.7	19.0	3.9	91.5
#40	88.8	88.8	64.6	26.9
#200	115.4	26.6	19.4	7.5
PASS #200		10.3	7.5	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	92.5
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 9

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 16.0

Elevation: _____ Source: LH-SWM # 12W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			726.30	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			666.75	
WT. OF WATER LOST:			59.55	POST-IGNITION
WT. OF BOTTLE:			76.35	DISH & SOIL:
WT. OF DRY SOIL:			590.40	
PERCENT OF WATER:			10.10	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 551

WT. OF TOTAL SAMPLE: 590.4 WT. OF WASH SAMPLE: 117.7

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
3/8"	0.0	0.0	0.0	100.0
#4	21.6	21.6	3.7	96.3
#10	39.8	18.2	3.1	93.3
#40	81.2	81.2	64.3	28.9
#200	108.0	26.8	21.2	7.7
PASS #200		9.7	7.7	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	92.3
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

F.A. Project: S.R. 1, Little Heaven Grade Separated Intersection **Boring No.:** LH-SWM # 12W

Contract: 24-122-02

Boring Location: Sta. 128+85.09, 1579.0183

Boring Surface Elev.: 4.4 **Reference:**

Wt. of Casing Hammer:		**Lbs.**	**Average Fall:**		**IN.**		
Wt. of Sample Hammer:	140	**Lbs.**	**Average Fall:**	30	**IN.**		
Type of: D-Sampler:	Split-Barrel	**O.D.**	**O.D. of Sampler:**	2	**IN.**		
S-Sampler:		**O.D.**	**O.D. of Samp. Tube:**		**IN.**		
U-Sampler:		**O.D.**	**O.D. of Samp. Tube:**		**IN.**		
Core Bit:		**O.D.**	**O.D. of Rock Core:**		**IN.**		

Casing Size: 3 1/4" **Inches** **From Depth of:** 0.0' **To:** 16.0'

Hollow Stem Auger: **From Depth of:** **To:**

Water Level Readings

Date	Time	Depth of Hole	Depth of Casing	Depth of Water	Elev. of Water
3/18/2009	9:00 a.m.	4.0'	2.0'	3.3'	1.1
					4.4
					4.4
					4.4

Pay Quantities:

2 1/2 in. Dia. Dry Sample Boring: 18.0 **Ft.;** **Dia. U-Sample Boring:** **Ft.**

No. of 2 in. Dia. Shelby Tubes: **;** **No. of: U-Samples:**

2 1/2 in. Dia. Contin. Sample Boring: **Ft.;** **Core Drilling in Rock:** **Ft.**

Boring Contractor: Walton Corporation

Driller: Cecil

Helpers: Hector & Billy

Depth (ft.)	Daily Progress	No.	Sample Depth	Blows/6"	Sample Description	Class./G.I.	Remarks
	3/18/09	1	0.5'	2 4 5	Moist loose brown coarse to fine sand w/some silt, trace of gravel.	A-2-4(0)	6" of topsoil, surface elevation 4.4'.
			2.0'		18" RECOVERY		
2.43		2	2.0'	5 6 6 9	Wet medium dense brownish gray coarse to fine sand w/trace of silt and gravel.	A-1-b	Water level 3.3'.
			4.0'		9" RECOVERY		
		3	4.0'	6 10 10 4	Wet medium dense brownish gray coarse to fine sand w/some silt, trace of gravel.	A-1-b	
4.86			6.0'		22" RECOVERY		
		4	6.0'	3 3 9 13	Saturated medium dense light brown silty fine sand w/trace of coarse sand.	A-2-4(0)	
7.29			8.0'		21" RECOVERY		
		5	8.0'	5 5 6 9	Saturated medium dense light brown fine to coarse sand w/some silt, trace of gravel.	A-2-4(0)	
9.72			10.0'		22" RECOVERY		
		6	10.0'	3 4 6 10	Saturated loose light brown fine to coarse sand w/some silt, trace of gravel.	A-2-4(0)	
12.15			12.0'		24" RECOVERY		
		7	12.0'	3 4 7 7	Saturated medium dense brown coarse to fine sand w/trace of silt and gravel.	A-1-b	
			14.0'		24" RECOVERY		

Remarks:

Reviewed By: Maureen Kelley **Soils Supervisor:** Randy Ferguson

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

F.A. Project: S.R. 1, Little Heaven Grade Separated Intersection **Boring No.:** LH-SWM # 12W
Contract: 24-122-02

Depth (ft.)	Daily Progress	No.	Sample Depth	Blows/6"	Sample Description	Class./G.I.	Remarks
14.58		8	14.0'	5 6 6 7	Saturated medium dense brown coarse sand w/some fine sand, trace of silt and gravel.	A-1-b	
			16.0'		24" RECOVERY		
		9	16.0'	6 8 8 10	Saturated medium dense brown coarse to fine sand w/trace of silt and gravel.	A-1-b	
17.01			18.0'		20" RECOVERY		
					End of Boring.		
19.44							
21.87							
24.3							
26.73							
29.16							
31.59							
34.02							
36.45							

KEY TO SYMBOLS

Symbol	Description
Strata symbols	
	Silty sand
	Poorly graded sand
	Well graded sand with silt
	Poorly graded sand with silt

Notes:

1. Exploratory borings were drilled on 3-18-2009 using a 3 1/4 - inch diameter hollow stem auger. Rig is a ATV CME 55.

2. No free water was encountered at the time of drilling or when re-checked the following day, unless recorded on 1st page.

3. Boring locations were taped from existing features and elevations extrapolated from survey unless otherwise reported.

4. These logs are subject to the limitations, conclusions, and recommendations in this report.

5. Results of tests conducted on samples recovered are reported on the logs.

6. All blow counts are uncorrected.

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 1

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 1.0

Elevation: Source: LH-SWM # 13

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			699.50	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			648.94	
WT. OF WATER LOST:			50.56	POST-IGNITION
WT. OF BOTTLE:			77.90	DISH & SOIL:
WT. OF DRY SOIL:			571.04	
PERCENT OF WATER:			8.90	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 561

WT. OF TOTAL SAMPLE: 571.0 WT. OF WASH SAMPLE: 119.6

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	2.3	2.3	0.4	99.6
#4	3.1	0.8	0.1	99.5
#10	9.9	6.8	1.2	98.3
#40	62.3	62.3	51.2	47.1
#200	92.0	29.7	24.4	22.7
PASS #200		27.6	22.7	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	77.3
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 2

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 2.0

Elevation: Source: LH-SWM # 13

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			622.30	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			567.90	
WT. OF WATER LOST:			54.40	POST-IGNITION
WT. OF BOTTLE:			78.37	DISH & SOIL:
WT. OF DRY SOIL:			489.53	
PERCENT OF WATER:			11.10	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 482

WT. OF TOTAL SAMPLE: 489.5 WT. OF WASH SAMPLE: 112.7

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	1.6	1.6	0.3	99.7
#4	2.6	1.0	0.2	99.5
#10	7.9	5.3	1.1	98.4
#40	78.5	78.5	68.5	29.9
#200	99.2	20.7	18.1	11.8
PASS #200		13.5	11.8	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	88.2
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 3

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 4.0

Elevation: Source: LH-SWM # 13

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			756.10	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			652.25	
WT. OF WATER LOST:			103.85	POST-IGNITION
WT. OF BOTTLE:			78.30	DISH & SOIL:
WT. OF DRY SOIL:			573.95	
PERCENT OF WATER:			18.10	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 568

WT. OF TOTAL SAMPLE: 574.0 WT. OF WASH SAMPLE: 114.2

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
#4	0.0	0.0	0.0	100.0
#10	6.3	6.3	1.1	98.9
#40	66.5	66.5	57.6	41.3
#200	102.6	36.1	31.3	10.0
PASS #200		11.6	10.0	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	90.0
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 4

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 6.0

Elevation: Source: LH-SWM # 13

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			712.10	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			616.45	
WT. OF WATER LOST:			95.65	POST-IGNITION
WT. OF BOTTLE:			97.36	DISH & SOIL:
WT. OF DRY SOIL:			519.09	
PERCENT OF WATER:			18.40	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 462

WT. OF TOTAL SAMPLE: 519.1 WT. OF WASH SAMPLE: 112.1

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	21.6	21.6	4.2	95.8
#4	39.4	17.8	3.4	92.4
#10	56.6	17.2	3.3	89.1
#40	50.1	50.1	39.8	49.3
#200	98.5	48.4	38.5	10.8
PASS #200		13.6	10.8	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	89.2
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 5

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 8.0

Elevation: _____ Source: LH-SWM # 13

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			889.80	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			708.67	
WT. OF WATER LOST:			181.13	POST-IGNITION
WT. OF BOTTLE:			79.58	DISH & SOIL:
WT. OF DRY SOIL:			629.09	
PERCENT OF WATER:			28.80	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 628

WT. OF TOTAL SAMPLE: 629.1 WT. OF WASH SAMPLE: 109.6

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
#4	0.0	0.0	0.0	100.0
#10	0.7	0.7	0.1	99.9
#40	9.0	9.0	8.2	91.7
#200	87.2	78.2	71.3	20.4
PASS #200		22.4	20.4	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	79.6
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 6

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 10.0

Elevation: Source: LH-SWM # 13

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			748.30	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			635.06	
WT. OF WATER LOST:			113.24	POST-IGNITION
WT. OF BOTTLE:			97.00	DISH & SOIL:
WT. OF DRY SOIL:			538.06	
PERCENT OF WATER:			21.00	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 525

WT. OF TOTAL SAMPLE: 538.1 WT. OF WASH SAMPLE: 102.1

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	2.7	2.7	0.5	99.5
#4	8.9	6.2	1.2	98.3
#10	12.9	4.0	0.7	97.6
#40	22.7	22.7	21.7	75.9
#200	85.2	62.5	59.7	16.2
PASS #200		16.9	16.2	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	83.8
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 7

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 12.0

Elevation: Source: LH-SWM # 13

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			742.90	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			655.40	
WT. OF WATER LOST:			87.50	POST-IGNITION
WT. OF BOTTLE:			77.79	DISH & SOIL:
WT. OF DRY SOIL:			577.61	
PERCENT OF WATER:			15.10	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 443

WT. OF TOTAL SAMPLE: 577.6 WT. OF WASH SAMPLE: 125.6

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	51.6	51.6	8.9	91.1
#4	76.2	24.6	4.3	86.8
#10	134.9	58.7	10.2	76.6
#40	79.7	79.7	48.6	28.0
#200	108.9	29.2	17.8	10.2
PASS #200		16.7	10.2	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	89.8
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 8

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 14.0

Elevation: _____ Source: LH-SWM # 13

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			854.40	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			755.12	
WT. OF WATER LOST:			99.28	POST-IGNITION
WT. OF BOTTLE:			75.56	DISH & SOIL:
WT. OF DRY SOIL:			679.56	
PERCENT OF WATER:			14.60	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 570

WT. OF TOTAL SAMPLE: 679.6 WT. OF WASH SAMPLE: 117.1

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	30.3	30.3	4.5	95.5
#4	41.8	11.5	1.7	93.8
#10	109.8	68.0	10.0	83.8
#40	78.6	78.6	56.3	27.6
#200	114.0	35.4	25.3	2.2
PASS #200		3.1	2.2	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	97.8
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 9

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 16.0

Elevation: _____ Source: LH-SWM # 13

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			742.80	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			644.23	
WT. OF WATER LOST:			98.57	POST-IGNITION
WT. OF BOTTLE:			88.56	DISH & SOIL:
WT. OF DRY SOIL:			555.67	
PERCENT OF WATER:			17.70	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 513

WT. OF TOTAL SAMPLE: 555.7 WT. OF WASH SAMPLE: 117.4

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
3/8"	0.0	0.0	0.0	100.0
#4	4.4	4.4	0.8	99.2
#10	42.8	38.4	6.9	92.3
#40	75.5	75.5	59.4	32.9
#200	110.5	35.0	27.5	5.4
PASS #200		6.9	5.4	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	94.6
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 10

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 18.0

Elevation: Source: LH-SWM # 13

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			810.10	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			698.96	
WT. OF WATER LOST:			111.14	POST-IGNITION
WT. OF BOTTLE:			79.25	DISH & SOIL:
WT. OF DRY SOIL:			619.71	
PERCENT OF WATER:			17.90	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 491

WT. OF TOTAL SAMPLE: 619.7 WT. OF WASH SAMPLE: 114.2

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	7.2	7.2	1.2	98.8
#4	39.4	32.2	5.2	93.6
#10	129.1	89.7	14.5	79.2
#40	80.4	80.4	55.7	23.4
#200	107.4	27.0	18.7	4.7
PASS #200		6.8	4.7	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	95.3
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 11

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 20.0

Elevation: Source: LH-SWM # 13

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			877.30	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			744.03	
WT. OF WATER LOST:			133.27	POST-IGNITION
WT. OF BOTTLE:			87.20	DISH & SOIL:
WT. OF DRY SOIL:			656.83	
PERCENT OF WATER:			20.30	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 504

WT. OF TOTAL SAMPLE: 656.8 WT. OF WASH SAMPLE: 108.8

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	19.6	19.6	3.0	97.0
#4	55.1	35.5	5.4	91.6
#10	152.7	97.6	14.9	76.8
#40	41.8	41.8	29.5	47.3
#200	87.7	45.9	32.4	14.9
PASS #200		21.1	14.9	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	85.1
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 12

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 22.0

Elevation: _____ Source: LH-SWM # 13

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			727.60	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			591.91	
WT. OF WATER LOST:			135.69	POST-IGNITION
WT. OF BOTTLE:			78.36	DISH & SOIL:
WT. OF DRY SOIL:			513.55	
PERCENT OF WATER:			26.40	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 498

WT. OF TOTAL SAMPLE: 513.5 WT. OF WASH SAMPLE: 102.0

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
3/8"	0.0	0.0	0.0	100.0
#4	4.1	4.1	0.8	99.2
#10	16.0	11.9	2.3	96.9
#40	18.4	18.4	17.5	79.4
#200	80.4	62.0	58.9	20.5
PASS #200		21.6	20.5	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	79.5
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 13

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 24.0

Elevation: Source: LH-SWM # 13

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			552.50	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			439.96	36.59
WT. OF WATER LOST:			112.54	POST-IGNITION
WT. OF BOTTLE:			78.52	DISH & SOIL:
WT. OF DRY SOIL:			361.44	36.35
PERCENT OF WATER:			31.10	DISH:
BLOWS REQUIRED FOR CLOSURE:				18.03
CORRECTED LIQUID LIMIT %:	NV			LOSS %: 1.29

WT PASSING #10 SIEVE: 357

WT. OF TOTAL SAMPLE: 361.4 WT. OF WASH SAMPLE: 101.0

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
#4	0.0	0.0	0.0	100.0
#10	4.1	4.1	1.1	98.9
#40	10.2	10.2	10.0	88.9
#200	75.4	65.2	63.8	25.1
PASS #200		25.6	25.1	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	74.9
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 14

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 26.0

Elevation: Source: LH-SWM # 13

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			609.50	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			498.83	41.46
WT. OF WATER LOST:			110.67	POST-IGNITION
WT. OF BOTTLE:			75.05	DISH & SOIL:
WT. OF DRY SOIL:			423.78	41.17
PERCENT OF WATER:			26.10	DISH:
BLOWS REQUIRED FOR CLOSURE:				18.04
CORRECTED LIQUID LIMIT %:	NV			LOSS %: 1.24

WT PASSING #10 SIEVE: 422

WT. OF TOTAL SAMPLE: 423.8 WT. OF WASH SAMPLE: 117.1

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
#4	0.0	0.0	0.0	100.0
#10	1.9	1.9	0.4	99.6
#40	11.3	11.3	9.6	89.9
#200	91.5	80.2	68.2	21.8
PASS #200		25.6	21.8	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	78.2
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 15

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 28.0

Elevation: Source: LH-SWM # 13

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:	37.36		544.80	DISH & SOIL:
WT. DRY SOIL & BOTTLE:	34.83		415.62	40.97
WT. OF WATER LOST:	2.53		129.18	POST-IGNITION
WT. OF BOTTLE:	23.46		76.59	DISH & SOIL:
WT. OF DRY SOIL:	11.37		339.03	40.54
PERCENT OF WATER:	22.30		38.10	DISH:
BLOWS REQUIRED FOR CLOSURE:	25			18.77
CORRECTED LIQUID LIMIT %:	22.3			LOSS %: 1.94

WT PASSING #10 SIEVE: 339

WT. OF TOTAL SAMPLE: 339.0 WT. OF WASH SAMPLE: 102.2

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
#10	0.0	0.0	0.0	100.0
#40	18.4	18.4	18.0	82.0
#200	68.4	50.0	48.9	33.1
PASS #200		33.8	33.1	

SUMMARY

LIQUID LIMIT:	22.3
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	66.9
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

F.A. Project: S.R. 1, Little Heaven Grade Separated Intersection **Boring No.:** LH-SWM # 13

Contract: 24-122-02

Boring Location: Sta. 130+67.47, 1574.3307

Boring Surface Elev.: 15.6 **Reference:**

Wt. of Casing Hammer:		**Lbs.**	**Average Fall:**		**IN.**		
Wt. of Sample Hammer:	140	**Lbs.**	**Average Fall:**	30	**IN.**		
Type of: D-Sampler:	Split-Barrel	**O.D.**	**O.D. of Sampler:**	2	**IN.**		
S-Sampler:		**O.D.**	**O.D. of Samp. Tube:**		**IN.**		
U-Sampler:		**O.D.**	**O.D. of Samp. Tube:**		**IN.**		
Core Bit:		**O.D.**	**O.D. of Rock Core:**		**IN.**		

Casing Size: 3 1/4" **Inches** **From Depth of:** 0.0' **To:** 28.0'
Hollow Stem Auger: **From Depth of:** **To:**

Water Level Readings

Date	Time	Depth of Hole	Depth of Casing	Depth of Water	Elev. of Water
4/17/2009	9:00 a.m.	6.0'	4.0'	4.6'	11.0
					15.6
					15.6
					15.6

Pay Quantities:
2 1/2 in. Dia. Dry Sample Boring: 30.0 **Ft.;** **Dia. U-Sample Boring:** **Ft.**
No. of 2 in. Dia. Shelby Tubes: **;** **No. of:** **U-Samples:**
2 1/2 in. Dia. Contin. Sample Boring: **Ft.;** **Core Drilling in Rock:** **Ft.**

Boring Contractor: Walton Corporation
Driller: Cecil
Helpers: Hector & Billy

Depth (ft.)	Daily Progress	No.	Sample Depth	Blows/6"	Sample Description	Class./G.I.	Remarks
	3/17/09	1	1.0'	3 4	Moist loose brown silty coarse to fine sand w/ trace of gravel.	A-1-b	12" of topsoil. Surface elevation 15.6'.
			2.0'		12" RECOVERY		
2.35		2	2.0'	3 5 4 5	Moist loose brown coarse sand w/some fine sand and silt, trace of gravel.	A-1-b	
			4.0'		23" RECOVERY		
4.7		3	4.0'	5 6 6 7	Wet medium dense brown coarse to fine sand w/trace of silt and gravel.	A-1-b	Water Level 4.6'.
			6.0'		18" RECOVERY		
7.05		4	6.0'	5 4 4 6	Wet loose dark brown coarse to fine sand w/ some silt and gravel.	A-1-b	
			8.0'		21" RECOVERY		
9.4		5	8.0'	1 1 1 1	Saturated very loose dark brown fine sand w/ some silt, trace of coarse sand.	A-2-4(0)	
			10.0'		24" RECOVERY		
11.75		6	10.0'	2 2 3 5	Saturated loose dark brown fine to coarse sand w/some silt, trace of gravel.	A-2-4(0)	
			12.0'		18" RECOVERY		
14.1		7	12.0'	3 4 5 6	Saturated loose light brown coarse sand and gravel w/some fine sand, trace of silt.	A-1-b	
			14.0'		22" RECOVERY		

Remarks:

Reviewed By: Maureen Kelley **Soils Supervisor:** Randy Ferguson

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

F.A. Project: S.R. 1, Little Heaven Grade Separated Intersection **Boring No.:** LH-SWM # 13
Contract: 24-122-02

Depth (ft.)	Daily Progress	No.	Sample Depth	Blows/6"	Sample Description	Class./G.I.	Remarks
		8	14.0'	3 3 3 3	Saturated loose light brown coarse to fine sand w/some gravel, trace of silt.	A-1-b	
			16.0'		20" RECOVERY		
16.45		9	16.0'	5 6 9 9	Saturated medium dense light brown coarse to fine sand w/trace of gravel and silt.	A-1-b	
			18.0'		13" RECOVERY		
		10	18.0'	4 5 5 6	Saturated loose brown coarse sand and gravel w/some fine sand, trace of silt.	A-1-b	
18.8			20.0'		18" RECOVERY		
		11	20.0'	8 4 4 6	Saturated loose brown fine to coarse sand and gravel w/some silt.	A-1-b	
21.15			22.0'		20" RECOVERY		
		12	22.0'	3 5 4 5	Saturated loose brownsilty fine sand w/some coarse sand, trace of gravel.	A-2-4(0)	
23.5			24.0'		18" RECOVERY		
		13	24.0'	4 5 5 5	Saturated loose gray silty fine sand w/trace of coarse sand, organic matter and gravel.	A-2-4(0)	Organic Matter present.
25.85			26.0'		24" RECOVERY		
		14	26.0'	3 9 5 7	Saturated medium dense gray silty fine sand w/trace of coarse sand and organic matter.	A-2-4(0)	Organic Matter present.
28.2			28.0'		24" RECOVERY		
		15	28.0'	5 6 7 6	Saturated medium dense gray silty fine sand w/some coarse sand, trace of organic matter.	A-2-4(0)	Organic Matter present.
			30.0'		23" RECOVERY		
30.55					End of Boring.		
32.9							
35.25							

KEY TO SYMBOLS

Symbol	Description
Strata symbols	
	Silty sand
	Poorly graded sand with silt
	Poorly graded sand
	Well graded sand with silt

Notes:

1. Exploratory borings were drilled on 4-17-2009 using a 3 1/4 - inch diameter hollow stem auger. Rig is a ATV CME 55.

2. No free water was encountered at the time of drilling or when re-checked the following day, unless recorded on 1st page.

3. Boring locations were taped from existing features and elevations extrapolated from survey unless otherwise reported.

4. These logs are subject to the limitations, conclusions, and recommendations in this report.

5. Results of tests conducted on samples recovered are reported on the logs.

6. All blow counts are uncorrected.

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 1

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 1.0

Elevation: _____ Source: LH-SWM # 14W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:	41.66	20.74	596.71	DISH & SOIL:
WT. DRY SOIL & BOTTLE:	38.40	19.66	537.37	
WT. OF WATER LOST:	3.26	1.08	59.34	POST-IGNITION
WT. OF BOTTLE:	22.08	13.26	97.16	DISH & SOIL:
WT. OF DRY SOIL:	16.32	6.40	440.21	
PERCENT OF WATER:	20.00	16.90	13.50	DISH:
BLOWS REQUIRED FOR CLOSURE:	25			
CORRECTED LIQUID LIMIT %:	20.0			LOSS %: _____

WT PASSING #10 SIEVE: 432

WT. OF TOTAL SAMPLE: 440.2 WT. OF WASH SAMPLE: 106.5

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
3/8"	0.0	0.0	0.0	100.0
#4	1.0	1.0	0.2	99.8
#10	8.2	7.2	1.6	98.1
#40	30.4	30.4	28.0	70.1
#200	70.0	39.6	36.5	33.6
PASS #200		36.5	33.6	

SUMMARY

LIQUID LIMIT:	20.0
PLASTIC LIMIT:	16.9
PLASTICITY INDEX:	3.1
% SAND AND GRAVEL:	66.4
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 2

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 2.0

Elevation: _____ Source: LH-SWM # 14W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			684.67	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			636.74	
WT. OF WATER LOST:			47.93	POST-IGNITION
WT. OF BOTTLE:			87.50	DISH & SOIL:
WT. OF DRY SOIL:			549.24	
PERCENT OF WATER:			8.70	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 548

WT. OF TOTAL SAMPLE: 549.2 WT. OF WASH SAMPLE: 105.1

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
#4	0.0	0.0	0.0	100.0
#10	1.0	1.0	0.2	99.8
#40	36.6	36.6	34.8	65.1
#200	85.2	48.6	46.2	18.9
PASS #200		19.9	18.9	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	81.1
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 3

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 4.0

Elevation: _____ Source: LH-SWM # 14W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			690.51	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			602.06	
WT. OF WATER LOST:			88.45	POST-IGNITION
WT. OF BOTTLE:			88.56	DISH & SOIL:
WT. OF DRY SOIL:			513.50	
PERCENT OF WATER:			17.20	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 502

WT. OF TOTAL SAMPLE: 513.5 WT. OF WASH SAMPLE: 103.0

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
3/8"	0.0	0.0	0.0	100.0
#4	1.6	1.6	0.3	99.7
#10	11.3	9.7	1.9	97.8
#40	45.6	45.6	43.3	54.5
#200	99.0	53.4	50.7	3.8
PASS #200		4.0	3.8	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	96.2
% SILT:	
% CLAY:	
CLASSIFICATION:	A-3

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 4

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 6.0

Elevation: _____ Source: LH-SWM # 14W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			860.56	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			751.42	
WT. OF WATER LOST:			109.14	POST-IGNITION
WT. OF BOTTLE:			78.58	DISH & SOIL:
WT. OF DRY SOIL:			672.84	
PERCENT OF WATER:			16.20	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 649

WT. OF TOTAL SAMPLE: 672.8 WT. OF WASH SAMPLE: 107.0

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
3/8"	0.0	0.0	0.0	100.0
#4	2.5	2.5	0.4	99.6
#10	23.8	21.3	3.2	96.5
#40	84.9	84.9	76.5	19.9
#200	103.9	19.0	17.1	2.8
PASS #200		3.1	2.8	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	97.2
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 5

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 8.0

Elevation: Source: LH-SWM # 14W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			763.18	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			640.05	
WT. OF WATER LOST:			123.13	POST-IGNITION
WT. OF BOTTLE:			87.15	DISH & SOIL:
WT. OF DRY SOIL:			552.90	
PERCENT OF WATER:			22.30	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 550

WT. OF TOTAL SAMPLE: 552.9 WT. OF WASH SAMPLE: 110.5

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
#4	0.0	0.0	0.0	100.0
#10	3.3	3.3	0.6	99.4
#40	35.6	35.6	32.0	67.4
#200	95.1	59.5	53.5	13.9
PASS #200		15.4	13.9	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	86.1
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 6

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 10.0

Elevation: _____ Source: LH-SWM # 14W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			797.51	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			686.68	
WT. OF WATER LOST:			110.83	POST-IGNITION
WT. OF BOTTLE:			87.57	DISH & SOIL:
WT. OF DRY SOIL:			599.11	
PERCENT OF WATER:			18.50	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 563

WT. OF TOTAL SAMPLE: 599.1 WT. OF WASH SAMPLE: 102.6

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	16.3	16.3	2.7	97.3
#4	22.5	6.2	1.0	96.2
#10	36.4	13.9	2.3	93.9
#40	45.8	45.8	41.9	52.0
#200	89.5	43.7	40.0	12.0
PASS #200		13.1	12.0	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	88.0
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 7

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 12.0

Elevation: Source: LH-SWM # 14W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			791.70	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			668.07	
WT. OF WATER LOST:			123.63	POST-IGNITION
WT. OF BOTTLE:			75.05	DISH & SOIL:
WT. OF DRY SOIL:			593.02	
PERCENT OF WATER:			20.80	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 580

WT. OF TOTAL SAMPLE: 593.0 WT. OF WASH SAMPLE: 126.6

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	3.5	3.5	0.6	99.4
#4	5.2	1.7	0.3	99.1
#10	13.1	7.9	1.3	97.8
#40	38.4	38.4	29.7	68.1
#200	110.5	72.1	55.7	12.4
PASS #200		16.1	12.4	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	87.6
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 8

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 14.0

Elevation: Source: LH-SWM # 14W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			555.91	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			470.46	
WT. OF WATER LOST:			85.45	POST-IGNITION
WT. OF BOTTLE:			77.90	DISH & SOIL:
WT. OF DRY SOIL:			392.56	
PERCENT OF WATER:			21.80	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 388

WT. OF TOTAL SAMPLE: 392.6 WT. OF WASH SAMPLE: 102.1

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	1.6	1.6	0.4	99.6
#4	3.0	1.4	0.4	99.2
#10	5.0	2.0	0.5	98.7
#40	41.4	41.4	40.0	58.7
#200	83.6	42.2	40.8	17.9
PASS #200		18.5	17.9	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	82.1
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 9

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 16.0

Elevation: _____ Source: LH-SWM # 14W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			804.37	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			681.64	
WT. OF WATER LOST:			122.73	POST-IGNITION
WT. OF BOTTLE:			86.40	DISH & SOIL:
WT. OF DRY SOIL:			595.24	
PERCENT OF WATER:			20.60	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 592

WT. OF TOTAL SAMPLE: 595.2 WT. OF WASH SAMPLE: 112.7

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
3/8"	0.0	0.0	0.0	100.0
#4	1.5	1.5	0.3	99.7
#10	3.6	2.1	0.4	99.4
#40	63.6	63.6	56.1	43.3
#200	94.3	30.7	27.1	16.2
PASS #200		18.4	16.2	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	83.8
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 10

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 18.0

Elevation: _____ Source: LH-SWM # 14W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			767.06	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			662.26	
WT. OF WATER LOST:			104.80	POST-IGNITION
WT. OF BOTTLE:			77.25	DISH & SOIL:
WT. OF DRY SOIL:			585.01	
PERCENT OF WATER:			17.90	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 536

WT. OF TOTAL SAMPLE: 585.0 WT. OF WASH SAMPLE: 101.5

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	27.6	27.6	4.7	95.3
#4	35.0	7.4	1.3	94.0
#10	49.5	14.5	2.5	91.5
#40	44.3	44.3	40.0	51.6
#200	82.1	37.8	34.1	17.5
PASS #200		19.4	17.5	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	82.5
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 11

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 20.0

Elevation: _____ Source: LH-SWM # 14W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			905.01	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			798.71	
WT. OF WATER LOST:			106.30	POST-IGNITION
WT. OF BOTTLE:			86.42	DISH & SOIL:
WT. OF DRY SOIL:			712.29	
PERCENT OF WATER:			14.90	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 577

WT. OF TOTAL SAMPLE: 712.3 WT. OF WASH SAMPLE: 101.1

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	76.6	76.6	10.8	89.2
#4	107.1	30.5	4.3	85.0
#10	135.7	28.6	4.0	80.9
#40	63.9	63.9	51.2	29.8
#200	92.6	28.7	23.0	6.8
PASS #200		8.5	6.8	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	93.2
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 12

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 22.0

Elevation: _____ Source: LH-SWM # 14W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			604.72	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			528.53	
WT. OF WATER LOST:			76.19	POST-IGNITION
WT. OF BOTTLE:			75.51	DISH & SOIL:
WT. OF DRY SOIL:			453.02	
PERCENT OF WATER:			16.80	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 402

WT. OF TOTAL SAMPLE: 453.0 WT. OF WASH SAMPLE: 104.6

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	16.7	16.7	3.7	96.3
#4	28.8	12.1	2.7	93.6
#10	51.0	22.2	4.9	88.7
#40	67.5	67.5	57.3	31.5
#200	96.6	29.1	24.7	6.8
PASS #200		8.0	6.8	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	93.2
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

F.A. Project: S.R. 1, Little Heaven Grade Separated Intersection **Boring No.:** LH-SWM # 14W

Contract: 24-122-02

Boring Location: Sta. 132+14.24, 1609.7507

Boring Surface Elev.: 17.5' **Reference:**

Wt. of Casing Hammer:		**Lbs.**	**Average Fall:**		**IN.**		
Wt. of Sample Hammer:	140	**Lbs.**	**Average Fall:**	30	**IN.**		
Type of: D-Sampler:	Split-Barrel	**O.D.**	**O.D. of Sampler:**	2	**IN.**		
S-Sampler:		**O.D.**	**O.D. of Samp. Tube:**		**IN.**		
U-Sampler:		**O.D.**	**O.D. of Samp. Tube:**		**IN.**		
Core Bit:		**O.D.**	**O.D. of Rock Core:**		**IN.**		

Casing Size: 3 1/4" **Inches** **From Depth of:** 0.0' **To:** 22.0'
Hollow Stem Auger: **From Depth of:** **To:**

Water Level Readings

Date	Time	Depth of Hole	Depth of Casing	Depth of Water	Elev. of Water
3/16/2009	9:00 a.m.	14.0'	12.0'	12.0'	5.5
					17.5
					17.5
					17.5

Pay Quantities:
2 1/2 in. Dia. Dry Sample Boring: 23.0 **Ft.;** **Dia. U-Sample Boring:** **Ft.**
No. of 2 in. Dia. Shelby Tubes: **;** **No. of:** **U-Samples:**
2 1/2 in. Dia. Contin. Sample Boring: **Ft.;** **Core Drilling in Rock:** **Ft.**

Boring Contractor: Walton Corporation
Driller: Cecil
Helpers: Billy

Depth (ft.)	Daily Progress	No.	Sample Depth	Blows/6"	Sample Description	Class./G.I.	Remarks
	3/16/09	1	1.0'	3 3	Moist loose brown fine to coarse sand w/trace of clay and gravel.	A-2-4(0)	12" of topsoil. Surface elevation 17.5'.
			2.0'		12" RECOVERY		
2.35		2	2.0'	3 3 3 4	Moist loose brown fine to coarse sand w/some silt.	A-2-4(0)	
			4.0'		18" RECOVERY		
		3	4.0'	4 4 5 9	Wet loose brown fine to coarse sand w/trace of silt and gravel.	A-3	
4.7			6.0'		18" RECOVERY		
		4	6.0'	6 7 8 9	Wet medium dense brownish orange coarse sand w/some fine sand, trace of silt and gravel.	A-1-b	
7.05			8.0'		19" RECOVERY		
		5	8.0'	2 2 2 2	Wet very loose brown fine to coarse sand w/ some silt, trace of gravel.	A-2-4(0)	
9.4			10.0'		17" RECOVERY		
		6	10.0'	2 2 3 3	Wet loose orange coarse to fine sand w/some silt, trace of gravel.	A-2-4(0)	
11.75			12.0'		18" RECOVERY		
		7	12.0'	1 1 1 1	Wet very loose brown fine to coarse sand w/ some silt, trace of gravel.	A-2-4(0)	Water @ 12.0'.
14.1			14.0'		18" RECOVERY		

Remarks:

Reviewed By: Maureen Kelley **Soils Supervisor:** Randy Ferguson

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

F.A. Project: S.R. 1, Little Heaven Grade Separated Intersection **Boring No.:** LH-SWM # 14W
Contract: 24-122-02

Depth (ft.)	Daily Progress	No.	Sample Depth	Blows/6"	Sample Description	Class./G.I.	Remarks
		8	14.0'	1 1 1 2	Saturated very loose brown fine to coarse sand w/some silt, trace of gravel.	A-2-4(0)	
			16.0'		12" RECOVERY		
16.45		9	16.0'	2 1 1 2	Saturated very loose brown coarse to fine sand w/some silt, trace of gravel.	A-1-b	
			18.0'		19" RECOVERY		
		10	18.0'	3 3 4 5	Saturated loose brownish orange coarse to fine sand w/some silt, trace of gravel.	A-2-4(0)	
18.8			20.0'		19" RECOVERY		
		11	20.0'	3 4 5 4	Saturated loose brown coarse to fine sand w/ some gravel, trace of silt.	A-1-b	
21.15			22.0'		18" RECOVERY		
		12	22.0'	2 2	Saturated very loose brownish orange coarse to fine sand w/some gravel, trace of silt.	A-1-b	
			23.0'		11" RECOVERY		
23.5					End of Boring.		
25.85							
28.2							
30.55							
32.9							
35.25							

KEY TO SYMBOLS

Symbol	Description
Strata symbols	
	Silty sand
	Poorly graded sand
	Poorly graded sand with silt
	Well graded sand with silt

Notes:

1. Exploratory borings were drilled on 3-16-2009 using a 3 1/4 - inch diameter hollow stem auger. Rig is a ATV CME 55.

2. No free water was encountered at the time of drilling or when re-checked the following day, unless recorded on 1st page.

3. Boring locations were taped from existing features and elevations extrapolated from survey unless otherwise reported.

4. These logs are subject to the limitations, conclusions, and recommendations in this report.

5. Results of tests conducted on samples recovered are reported on the logs.

6. All blow counts are uncorrected.

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 1

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 1.0

Elevation: Source: LH-SWM # 15W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			763.80	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			714.46	
WT. OF WATER LOST:			49.34	POST-IGNITION
WT. OF BOTTLE:			86.62	DISH & SOIL:
WT. OF DRY SOIL:			627.84	
PERCENT OF WATER:			7.90	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 609

WT. OF TOTAL SAMPLE: 627.8 WT. OF WASH SAMPLE: 102.3

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	1.4	1.4	0.2	99.8
#4	5.6	4.2	0.7	99.1
#10	18.4	12.8	2.0	97.1
#40	56.2	56.2	53.3	43.7
#200	85.4	29.2	27.7	16.0
PASS #200		16.9	16.0	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	84.0
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 2

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 2.0

Elevation: _____ Source: LH-SWM # 15W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			597.60	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			543.85	
WT. OF WATER LOST:			53.75	POST-IGNITION
WT. OF BOTTLE:			77.83	DISH & SOIL:
WT. OF DRY SOIL:			466.02	
PERCENT OF WATER:			11.50	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 443

WT. OF TOTAL SAMPLE: 466.0 WT. OF WASH SAMPLE: 104.2

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
3/8"	0.0	0.0	0.0	100.0
#4	5.5	5.5	1.2	98.8
#10	23.4	17.9	3.8	95.0
#40	76.0	76.0	69.3	25.7
#200	99.2	23.2	21.1	4.6
PASS #200		5.0	4.6	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	95.4
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 3

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 4.0

Elevation: _____ Source: LH-SWM # 15W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			894.60	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			773.43	
WT. OF WATER LOST:			121.17	POST-IGNITION
WT. OF BOTTLE:			86.56	DISH & SOIL:
WT. OF DRY SOIL:			686.87	
PERCENT OF WATER:			17.60	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 673

WT. OF TOTAL SAMPLE: 686.9 WT. OF WASH SAMPLE: 106.3

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
3/8"	0.0	0.0	0.0	100.0
#4	2.7	2.7	0.4	99.6
#10	13.7	11.0	1.6	98.0
#40	72.9	72.9	67.2	30.8
#200	101.0	28.1	25.9	4.9
PASS #200		5.3	4.9	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	95.1
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 4

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 6.0

Elevation: _____ Source: LH-SWM # 15W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			879.70	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			770.98	
WT. OF WATER LOST:			108.72	POST-IGNITION
WT. OF BOTTLE:			87.30	DISH & SOIL:
WT. OF DRY SOIL:			683.68	
PERCENT OF WATER:			15.90	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 679

WT. OF TOTAL SAMPLE: 683.7 WT. OF WASH SAMPLE: 103.8

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
#4	0.0	0.0	0.0	100.0
#10	4.3	4.3	0.6	99.4
#40	68.7	68.7	65.8	33.6
#200	98.2	29.5	28.2	5.4
PASS #200		5.6	5.4	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	94.6
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 5

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 8.0

Elevation: _____ Source: LH-SWM # 15W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			787.30	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			661.38	
WT. OF WATER LOST:			125.92	POST-IGNITION
WT. OF BOTTLE:			87.85	DISH & SOIL:
WT. OF DRY SOIL:			573.53	
PERCENT OF WATER:			22.00	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 540

WT. OF TOTAL SAMPLE: 573.5 WT. OF WASH SAMPLE: 104.6

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	3.9	3.9	0.7	99.3
#4	15.3	11.4	2.0	97.3
#10	33.6	18.3	3.2	94.1
#40	47.1	47.1	42.4	51.8
#200	92.3	45.2	40.7	11.1
PASS #200		12.3	11.1	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	88.9
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 6

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 10.0

Elevation: Source: LH-SWM # 15W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			816.70	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			698.35	
WT. OF WATER LOST:			118.35	POST-IGNITION
WT. OF BOTTLE:			75.24	DISH & SOIL:
WT. OF DRY SOIL:			623.11	
PERCENT OF WATER:			19.00	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 582

WT. OF TOTAL SAMPLE: 623.1 WT. OF WASH SAMPLE: 100.7

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	18.9	18.9	3.0	97.0
#4	26.9	8.0	1.3	95.7
#10	41.6	14.7	2.4	93.3
#40	55.4	55.4	51.3	42.0
#200	87.9	32.5	30.1	11.9
PASS #200		12.8	11.9	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	88.1
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 7

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 12.0

Elevation: _____ Source: LH-SWM # 15W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			733.40	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			629.24	
WT. OF WATER LOST:			104.16	POST-IGNITION
WT. OF BOTTLE:			78.52	DISH & SOIL:
WT. OF DRY SOIL:			550.72	
PERCENT OF WATER:			18.90	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 504

WT. OF TOTAL SAMPLE: 550.7 WT. OF WASH SAMPLE: 107.1

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	30.5	30.5	5.5	94.5
#4	36.0	5.5	1.0	93.5
#10	46.5	10.5	1.9	91.6
#40	65.1	65.1	55.7	35.9
#200	96.6	31.5	26.9	9.0
PASS #200		10.5	9.0	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	91.0
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 8

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 14.0

Elevation: _____ Source: LH-SWM # 15W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			467.80	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			410.15	
WT. OF WATER LOST:			57.65	POST-IGNITION
WT. OF BOTTLE:			78.95	DISH & SOIL:
WT. OF DRY SOIL:			331.20	
PERCENT OF WATER:			17.40	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 296

WT. OF TOTAL SAMPLE: 331.2 WT. OF WASH SAMPLE: 102.3

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	8.9	8.9	2.7	97.3
#4	23.0	14.1	4.3	93.1
#10	35.7	12.7	3.8	89.2
#40	83.8	83.8	73.1	16.1
#200	96.8	13.0	11.3	4.8
PASS #200		5.5	4.8	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	95.2
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 9

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 16.0

Elevation: Source: LH-SWM # 15W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			1001.70	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			863.39	
WT. OF WATER LOST:			138.31	POST-IGNITION
WT. OF BOTTLE:			87.60	DISH & SOIL:
WT. OF DRY SOIL:			775.79	
PERCENT OF WATER:			17.80	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 714

WT. OF TOTAL SAMPLE: 775.8 WT. OF WASH SAMPLE: 102.5

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	9.4	9.4	1.2	98.8
#4	34.2	24.8	3.2	95.6
#10	61.9	27.7	3.6	92.0
#40	80.8	80.8	72.5	19.5
#200	94.9	14.1	12.7	6.8
PASS #200		7.6	6.8	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	93.2
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

F.A. Project: S.R. 1, Little Heaven Grade Separated Intersection **Boring No.:** LH-SWM # 15W

Contract: 24-122-02

Boring Location: Sta. 128+01.34, 1388.6581

Boring Surface Elev.: 15.8' **Reference:**

Wt. of Casing Hammer:		**Lbs.**	**Average Fall:**		**IN.**		
Wt. of Sample Hammer:	140	**Lbs.**	**Average Fall:**	30	**IN.**		
Type of: D-Sampler:	Split-Barrel	**O.D.**	**O.D. of Sampler:**	2	**IN.**		
S-Sampler:		**O.D.**	**O.D. of Samp. Tube:**		**IN.**		
U-Sampler:		**O.D.**	**O.D. of Samp. Tube:**		**IN.**		
Core Bit:		**O.D.**	**O.D. of Rock Core:**		**IN.**		

Casing Size: 3 1/4" **Inches** **From Depth of:** 0.0' **To:** 16.0'

Hollow Stem Auger: **From Depth of:** **To:**

Water Level Readings

Date	Time	Depth of Hole	Depth of Casing	Depth of Water	Elev. of Water
3/11/2009	11:00 a.m.	6.0'	4.0'	5.9'	9.9
					15.8
					15.8
					15.8

Pay Quantities:

2 1/2 in. Dia. Dry Sample Boring:	18.0	**Ft.;**	**Dia. U-Sample Boring:**		**Ft.**
No. of 2 in. Dia. Shelby Tubes:		**;**	**No. of:**	**U-Samples:**	
2 1/2 in. Dia. Contin. Sample Boring:		**Ft.;**	**Core Drilling in Rock:**		**Ft.**

Boring Contractor: Walton Corporation
Driller: Jason
Helpers: Cecil & Hector

Depth (ft.)	Daily Progress	No.	Sample Depth	Blows/6"	Sample Description	Class./G.I.	Remarks
	3/11/09	1	1.0'	4 4	Moist loose brown coarse to fine sand w/some silt, trace of gravel.	A-1-b	11" of topsoil.
			2.0'		12" RECOVERY		
2.35		2	2.0'	5 4 5 4	Moist loose brown coarse to fine sand w/trace of silt and gravel.	A-1-b	
			4.0'		17" RECOVERY		
		3	4.0'	9 11 14 17	Wet medium dense brown coarse to fine sand w/trace of silt and gravel.	A-1-b	Water Level at 5.9'.
4.7			6.0'		21" RECOVERY		
		4	6.0'	9 11 17 22	Wet medium dense brown coarse to fine sand w/trace of silt and gravel.	A-1-b	
7.05			8.0'		24" RECOVERY		
		5	8.0'	5 7 6 5	Saturated medium dense brown coarse to fine sand w/some silt, trace of gravel.	A-2-4(0)	
9.4			10.0'		20" RECOVERY		
		6	10.0'	5 5 5 5	Saturated loose brown coarse to fine sand w/ some silt, trace of gravel.	A-1-b	
11.75			12.0'		24" RECOVERY		
		7	12.0'	2 3 3 4	Saturated loose brown coarse to fine sand w/ trace of silt and gravel.	A-1-b	
14.1			14.0'		16" RECOVERY		

Remarks:

Reviewed By: Maureen Kelley **Soils Supervisor:** Randy Ferguson

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

F.A. Project: S.R. 1, Little Heaven Grade Separated Intersection **Boring No.:** LH-SWM # 15W
Contract: 24-122-02

Depth (ft.)	Daily Progress	No.	Sample Depth	Blows/6"	Sample Description	Class./G.I.	Remarks
		8	14.0'	3 4 4 6	Saturated loose brown coarse sand w/some fine sand and gravel, trace of silt.	A-1-b	
			16.0'		12" RECOVERY		
16.45		9	16.0'	5 6 7 7	Saturated medium dense brown coarse sand w/some fine sand, trace of gravel and silt.	A-1-b	
			18.0'		23" RECOVERY		
18.8					End of Boring - Set Well		
21.15							
23.5							
25.85							
28.2							
30.55							
32.9							
35.25							

KEY TO SYMBOLS

Symbol	Description
Strata symbols	
	Silty sand
	Well graded sand
	Poorly graded sand
	Poorly graded sand with silt
	Well graded sand with silt

Notes:

1. Exploratory borings were drilled on 3-11-2009 using a 3 1/4 - inch diameter hollow stem auger. Rig is a ATV CME 55.

2. No free water was encountered at the time of drilling or when re-checked the following day, unless recorded on 1st page.

3. Boring locations were taped from existing features and elevations extrapolated from survey unless otherwise reported.

4. These logs are subject to the limitations, conclusions, and recommendations in this report.

5. Results of tests conducted on samples recovered are reported on the logs.

6. All blow counts are uncorrected.

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 1

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 0.5

Elevation: _____ Source: LH-SWM # 16W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			590.60	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			553.41	
WT. OF WATER LOST:			37.19	POST-IGNITION
WT. OF BOTTLE:			76.35	DISH & SOIL:
WT. OF DRY SOIL:			477.06	
PERCENT OF WATER:			7.80	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 472

WT. OF TOTAL SAMPLE: 477.1 WT. OF WASH SAMPLE: 109.1

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
#4	0.0	0.0	0.0	100.0
#10	5.0	5.0	1.0	99.0
#40	72.5	72.5	65.8	33.2
#200	92.5	20.0	18.1	15.1
PASS #200		16.6	15.1	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	84.9
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 2

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 2.0

Elevation: _____ Source: LH-SWM # 16W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			559.40	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			482.94	
WT. OF WATER LOST:			76.46	POST-IGNITION
WT. OF BOTTLE:			79.08	DISH & SOIL:
WT. OF DRY SOIL:			403.86	
PERCENT OF WATER:			18.90	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 398

WT. OF TOTAL SAMPLE: 403.9 WT. OF WASH SAMPLE: 109.7

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
#4	0.0	0.0	0.0	100.0
#10	5.9	5.9	1.5	98.5
#40	93.4	93.4	83.9	14.6
#200	107.1	13.7	12.3	2.3
PASS #200		2.6	2.3	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	97.7
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 3

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 4.0

Elevation: Source: LH-SWM # 16W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			752.50	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			650.00	
WT. OF WATER LOST:			102.50	POST-IGNITION
WT. OF BOTTLE:			77.79	DISH & SOIL:
WT. OF DRY SOIL:			572.21	
PERCENT OF WATER:			17.90	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 527

WT. OF TOTAL SAMPLE: 572.2 WT. OF WASH SAMPLE: 117.5

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
3/8"	0.0	0.0	0.0	100.0
#4	7.1	7.1	1.2	98.8
#10	45.0	37.9	6.6	92.1
#40	90.7	90.7	71.1	21.0
#200	115.0	24.3	19.1	2.0
PASS #200		2.5	2.0	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	98.0
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 4

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 6.0

Elevation: Source: LH-SWM # 16W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			793.80	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			690.87	
WT. OF WATER LOST:			102.93	POST-IGNITION
WT. OF BOTTLE:			79.07	DISH & SOIL:
WT. OF DRY SOIL:			611.80	
PERCENT OF WATER:			16.80	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 581

WT. OF TOTAL SAMPLE: 611.8 WT. OF WASH SAMPLE: 104.5

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	2.4	2.4	0.4	99.6
#4	6.5	4.1	0.7	98.9
#10	30.8	24.3	4.0	95.0
#40	68.3	68.3	62.1	32.9
#200	98.7	30.4	27.6	5.3
PASS				

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	94.7
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 5

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 8.0

Elevation: Source: LH-SWM # 16W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			659.70	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			553.14	
WT. OF WATER LOST:			106.56	POST-IGNITION
WT. OF BOTTLE:			76.52	DISH & SOIL:
WT. OF DRY SOIL:			476.62	
PERCENT OF WATER:			22.40	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 477

WT. OF TOTAL SAMPLE: 476.6 WT. OF WASH SAMPLE: 104.8

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
#10	0.0	0.0	0.0	100.0
#40	2.0	2.0	1.9	98.1
#200	84.2	82.2	78.4	19.7
PASS #200		20.6	19.7	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	80.3
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 6

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 10.0

Elevation: _____ Source: LH-SWM # 16W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			706.40	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			600.89	
WT. OF WATER LOST:			105.51	POST-IGNITION
WT. OF BOTTLE:			79.25	DISH & SOIL:
WT. OF DRY SOIL:			521.64	
PERCENT OF WATER:			20.20	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 522

WT. OF TOTAL SAMPLE: 521.6 WT. OF WASH SAMPLE: 113.5

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
#10	0.0	0.0	0.0	100.0
#40	4.4	4.4	3.9	96.1
#200	92.4	88.0	77.5	18.6
PASS #200		21.1	18.6	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	81.4
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 7

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 12.0

Elevation: Source: LH-SWM # 16W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			627.00	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			534.19	
WT. OF WATER LOST:			92.81	POST-IGNITION
WT. OF BOTTLE:			87.61	DISH & SOIL:
WT. OF DRY SOIL:			446.58	
PERCENT OF WATER:			20.80	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 437

WT. OF TOTAL SAMPLE: 446.6 WT. OF WASH SAMPLE: 111.3

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	2.4	2.4	0.5	99.5
#4	5.7	3.3	0.7	98.7
#10	9.3	3.6	0.8	97.9
#40	45.3	45.3	39.9	58.1
#200	97.4	52.1	45.8	12.2
PASS #200		13.9	12.2	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	87.8
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 8

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 14.0

Elevation: Source: LH-SWM # 16W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			725.30	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			632.06	
WT. OF WATER LOST:			93.24	POST-IGNITION
WT. OF BOTTLE:			87.32	DISH & SOIL:
WT. OF DRY SOIL:			544.74	
PERCENT OF WATER:			17.10	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 484

WT. OF TOTAL SAMPLE: 544.7 WT. OF WASH SAMPLE: 114.7

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	7.1	7.1	1.3	98.7
#4	25.2	18.1	3.3	95.4
#10	61.1	35.9	6.6	88.8
#40	73.8	73.8	57.1	31.7
#200	105.0	31.2	24.2	7.5
PASS #200		9.7	7.5	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	92.5
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 9

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 16.0

Elevation: _____ Source: LH-SWM # 16W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			895.00	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			805.68	
WT. OF WATER LOST:			89.32	POST-IGNITION
WT. OF BOTTLE:			77.28	DISH & SOIL:
WT. OF DRY SOIL:			728.40	
PERCENT OF WATER:			12.30	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 512

WT. OF TOTAL SAMPLE: 728.4 WT. OF WASH SAMPLE: 104.2

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	120.6	120.6	16.6	83.4
#4	155.9	35.3	4.8	78.6
#10	216.5	60.6	8.3	70.3
#40	89.7	89.7	60.5	9.8
#200	98.5	8.8	5.9	3.8
PASS #200		5.7	3.8	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	96.2
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

F.A. Project: S.R. 1, Little Heaven Grade Separated Intersection **Boring No.:** LH-SWM # 16W

Contract: 24-122-02

Boring Location: Sta. 130+20.87, 1416.9669

Boring Surface Elev.: 15.7' **Reference:**

Wt. of Casing Hammer:		**Lbs.**	**Average Fall:**		**IN.**		
Wt. of Sample Hammer:	140	**Lbs.**	**Average Fall:**	30	**IN.**		
Type of: D-Sampler:	Split-Barrel	**O.D.**	**O.D. of Sampler:**	2	**IN.**		
S-Sampler:		**O.D.**	**O.D. of Samp. Tube:**		**IN.**		
U-Sampler:		**O.D.**	**O.D. of Samp. Tube:**		**IN.**		
Core Bit:		**O.D.**	**O.D. of Rock Core:**		**IN.**		

Casing Size: 3 1/4" **Inches** **From Depth of:** 0.0' **To:** 16.0'

Hollow Stem Auger: **From Depth of:** **To:**

Water Level Readings

Date	Time	Depth of Hole	Depth of Casing	Depth of Water	Elev. of Water
3/12/2009	11:00 a.m.	8.0'	6.0'	7.6'	8.1
					15.7
					15.7
					15.7

Pay Quantities:

2 1/2 in. Dia. Dry Sample Boring:	18.0	**Ft.;**	**Dia. U-Sample Boring:**		**Ft.**
No. of 2 in. Dia. Shelby Tubes:		**;**	**No. of:**	**U-Samples:**	
2 1/2 in. Dia. Contin. Sample Boring:		**Ft.;**	**Core Drilling in Rock:**		**Ft.**

Boring Contractor: Walton Corporation
Driller: Jason
Helpers: Hector

Depth (ft.)	Daily Progress	No.	Sample Depth	Blows/6"	Sample Description	Class./G.I.	Remarks
	3/12/09	1	0.5'	2 3 4	Moist loose brown coarse sand w/some fine sand and silt, trace of gravel.	A-1-b	9" of topsoil.
			2.0'		18" RECOVERY		
2.43		2	2.0'	4 4 5 7	Wet loose brown coarse sand w/some fine sand, trace of silt and gravel.	A-1-b	
			4.0'		16" RECOVERY		
		3	4.0'	5 7 13 17	Wet medium dense brown coarse sand w/ some fine sand, trace of gravel and silt.	A-1-b	
4.86			6.0'		20" RECOVERY		
		4	6.0'	7 4 6 5	Wet loose brown coarse to fine sand w/trace of silt and gravel.	A-1-b	Water Level at 7.6'.
7.29			8.0'		24" RECOVERY		
		5	8.0'	3 2 3 3	Saturated loose brown fine sand w/some silt, trace of coarse sand.	A-2-4(0)	
9.72			10.0'		19" RECOVERY		
		6	10.0'	2 2 3 5	Saturated loose brown fine sand w/some silt, trace of coarse sand.	A-2-4(0)	
12.15			12.0'		24" RECOVERY		
		7	12.0'	2 2 3 5	Saturated loose brown fine to coarse sand w/ some silt, trace of gravel.	A-2-4(0)	
			14.0'		13" RECOVERY		

Remarks:

Reviewed By: Maureen Kelley **Soils Supervisor:** Randy Ferguson

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

F.A. Project: S.R. 1, Little Heaven Grade Separated Intersection **Boring No.:** LH-SWM # 16W
Contract: 24-122-02

Depth (ft.)	Daily Progress	No.	Sample Depth	Blows/6"	Sample Description	Class./G.I.	Remarks
14.58		8	14.0'	2 3 5 8	Saturated loose brown coarse to fine sand w/ some gravel, trace of silt.	A-1-b	
			16.0'		12" RECOVERY		
		9	16.0'	5 7 7 8	Saturated medium dense brown coarse sand and gravel w/trace of fine sand and silt.	A-1-b	
17.01							
			18.0'				
					End of Boring.		
19.44							
21.87							
24.3							
26.73							
29.16							
31.59							
34.02							
36.45							

KEY TO SYMBOLS

Symbol	Description
Strata symbols	
	Silty sand
	Poorly graded sand
	Well graded sand
	Poorly graded sand with silt
	Well graded sand with silt

Notes:

1. Exploratory borings were drilled on 3-12-2009 using a 3 1/4 - inch diameter hollow stem auger. Rig is a ATV CME 55.

2. No free water was encountered at the time of drilling or when re-checked the following day, unless recorded on 1st page.

3. Boring locations were taped from existing features and elevations extrapolated from survey unless otherwise reported.

4. These logs are subject to the limitations, conclusions, and recommendations in this report.

5. Results of tests conducted on samples recovered are reported on the logs.

6. All blow counts are uncorrected.

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 1

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 0.0

Elevation: Source: LH-SWM # 17W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:	43.85	23.24	730.40	DISH & SOIL:
WT. DRY SOIL & BOTTLE:	40.10	22.14	661.50	
WT. OF WATER LOST:	3.75	1.10	68.90	POST-IGNITION
WT. OF BOTTLE:	22.36	14.80	87.70	DISH & SOIL:
WT. OF DRY SOIL:	17.74	7.34	573.80	
PERCENT OF WATER:	21.10	15.00	12.00	DISH:
BLOWS REQUIRED FOR CLOSURE:	25			
CORRECTED LIQUID LIMIT %:	21.1			LOSS %:

WT PASSING #10 SIEVE: 531

WT. OF TOTAL SAMPLE: 573.8 WT. OF WASH SAMPLE: 100.5

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	19.2	19.2	3.3	96.7
#4	26.5	7.3	1.3	95.4
#10	42.9	16.4	2.9	92.5
#40	29.9	29.9	27.5	65.0
#200	65.0	35.1	32.3	32.7
PASS #200		35.5	32.7	

SUMMARY

LIQUID LIMIT:	21.1
PLASTIC LIMIT:	15.0
PLASTICITY INDEX:	6.1
% SAND AND GRAVEL:	67.3
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 2

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 2.0

Elevation: Source: LH-SWM # 17W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			470.60	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			448.03	
WT. OF WATER LOST:			22.57	POST-IGNITION
WT. OF BOTTLE:			86.65	DISH & SOIL:
WT. OF DRY SOIL:			361.38	
PERCENT OF WATER:			6.20	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 334

WT. OF TOTAL SAMPLE: 361.4 WT. OF WASH SAMPLE: 114.7

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	16.7	16.7	4.6	95.4
#4	19.8	3.1	0.9	94.5
#10	27.8	8.0	2.2	92.3
#40	42.4	42.4	34.1	58.2
#200	106.5	64.1	51.6	6.6
PASS #200		8.2	6.6	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	93.4
% SILT:	
% CLAY:	
CLASSIFICATION:	A-3

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 3

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 4.0

Elevation: Source: LH-SWM # 17W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			531.10	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			497.33	
WT. OF WATER LOST:			33.77	POST-IGNITION
WT. OF BOTTLE:			87.50	DISH & SOIL:
WT. OF DRY SOIL:			409.83	
PERCENT OF WATER:			8.20	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 406

WT. OF TOTAL SAMPLE: 409.8 WT. OF WASH SAMPLE: 111.8

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
#4	0.0	0.0	0.0	100.0
#10	4.2	4.2	1.0	99.0
#40	54.0	54.0	47.8	51.2
#200	107.5	53.5	47.4	3.8
PASS #200		4.3	3.8	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	96.2
% SILT:	
% CLAY:	
CLASSIFICATION:	A-3

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 4

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 6.0

Elevation: Source: LH-SWM # 17W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			766.30	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			671.36	
WT. OF WATER LOST:			94.94	POST-IGNITION
WT. OF BOTTLE:			87.57	DISH & SOIL:
WT. OF DRY SOIL:			583.79	
PERCENT OF WATER:			16.30	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 545

WT. OF TOTAL SAMPLE: 583.8 WT. OF WASH SAMPLE: 104.9

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	9.7	9.7	1.7	98.3
#4	22.1	12.4	2.1	96.2
#10	38.6	16.5	2.8	93.4
#40	69.9	69.9	62.2	31.2
#200	94.5	24.6	21.9	9.3
PASS #200		10.4	9.3	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	90.7
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 5

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 8.0

Elevation: _____ Source: LH-SWM # 17W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			761.00	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			620.96	
WT. OF WATER LOST:			140.04	POST-IGNITION
WT. OF BOTTLE:			87.10	DISH & SOIL:
WT. OF DRY SOIL:			533.86	
PERCENT OF WATER:			26.20	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 531

WT. OF TOTAL SAMPLE: 533.9 WT. OF WASH SAMPLE: 103.3

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
3/8"	0.0	0.0	0.0	100.0
#4	1.5	1.5	0.3	99.7
#10	2.9	1.4	0.3	99.5
#40	22.8	22.8	22.0	77.5
#200	80.3	57.5	55.4	22.1
PASS #200		23.0	22.1	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	77.9
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 6

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 10.0

Elevation: Source: LH-SWM # 17W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			800.60	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			685.83	
WT. OF WATER LOST:			114.77	POST-IGNITION
WT. OF BOTTLE:			86.90	DISH & SOIL:
WT. OF DRY SOIL:			598.93	
PERCENT OF WATER:			19.20	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 591

WT. OF TOTAL SAMPLE: 598.9 WT. OF WASH SAMPLE: 120.5

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
3/8"	0.0	0.0	0.0	100.0
#4	4.5	4.5	0.8	99.2
#10	7.7	3.2	0.5	98.7
#40	82.7	82.7	67.7	31.0
#200	107.4	24.7	20.2	10.7
PASS #200		13.1	10.7	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	89.3
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 7

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 12.0

Elevation: Source: LH-SWM # 17W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			736.00	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			617.87	
WT. OF WATER LOST:			118.13	POST-IGNITION
WT. OF BOTTLE:			87.11	DISH & SOIL:
WT. OF DRY SOIL:			530.76	
PERCENT OF WATER:			22.30	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 519

WT. OF TOTAL SAMPLE: 530.8 WT. OF WASH SAMPLE: 111.0

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	7.5	7.5	1.4	98.6
#4	9.7	2.2	0.4	98.2
#10	12.2	2.5	0.5	97.7
#40	57.3	57.3	50.4	47.3
#200	97.0	39.7	34.9	12.3
PASS #200		14.0	12.3	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	87.7
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 8

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 14.0

Elevation: _____ Source: LH-SWM # 17W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			776.50	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			653.96	
WT. OF WATER LOST:			122.54	POST-IGNITION
WT. OF BOTTLE:			88.31	DISH & SOIL:
WT. OF DRY SOIL:			565.65	
PERCENT OF WATER:			21.70	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 551

WT. OF TOTAL SAMPLE: 565.6 WT. OF WASH SAMPLE: 103.6

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	7.9	7.9	1.4	98.6
#4	9.2	1.3	0.2	98.4
#10	14.3	5.1	0.9	97.5
#40	64.6	64.6	60.8	36.7
#200	94.6	30.0	28.2	8.5
PASS #200		9.0	8.5	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	91.5
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 9

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 16.0

Elevation: Source: LH-SWM # 17W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			894.50	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			776.96	
WT. OF WATER LOST:			117.54	POST-IGNITION
WT. OF BOTTLE:			87.37	DISH & SOIL:
WT. OF DRY SOIL:			689.59	
PERCENT OF WATER:			17.00	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 593

WT. OF TOTAL SAMPLE: 689.6 WT. OF WASH SAMPLE: 100.5

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	40.8	40.8	5.9	94.1
#4	64.4	23.6	3.4	90.7
#10	96.6	32.2	4.7	86.0
#40	68.9	68.9	59.0	27.0
#200	89.9	21.0	18.0	9.1
PASS #200		10.6	9.1	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	90.9
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 10

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 18.0

Elevation: _____ Source: LH-SWM # 17W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			882.00	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			764.24	
WT. OF WATER LOST:			117.76	POST-IGNITION
WT. OF BOTTLE:			87.62	DISH & SOIL:
WT. OF DRY SOIL:			676.62	
PERCENT OF WATER:			17.40	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 621

WT. OF TOTAL SAMPLE: 676.6 WT. OF WASH SAMPLE: 103.7

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	12.9	12.9	1.9	98.1
#4	26.7	13.8	2.0	96.1
#10	55.4	28.7	4.2	91.8
#40	89.5	89.5	79.2	12.6
#200	98.5	9.0	8.0	4.6
PASS #200		5.2	4.6	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	95.4
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 11

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 20.0

Elevation: Source: LH-SWM # 17W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			671.30	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			594.49	
WT. OF WATER LOST:			76.81	POST-IGNITION
WT. OF BOTTLE:			86.50	DISH & SOIL:
WT. OF DRY SOIL:			507.99	
PERCENT OF WATER:			15.10	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 461

WT. OF TOTAL SAMPLE: 508.0 WT. OF WASH SAMPLE: 109.0

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	6.1	6.1	1.2	98.8
#4	23.6	17.5	3.4	95.4
#10	47.1	23.5	4.6	90.7
#40	92.7	92.7	77.2	13.6
#200	102.7	10.0	8.3	5.2
PASS #200		6.3	5.2	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	94.8
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 12

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 22.0

Elevation: _____ Source: LH-SWM # 17W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			741.30	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			646.36	
WT. OF WATER LOST:			94.94	POST-IGNITION
WT. OF BOTTLE:			87.50	DISH & SOIL:
WT. OF DRY SOIL:			558.86	
PERCENT OF WATER:			17.00	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 404

WT. OF TOTAL SAMPLE: 558.9 WT. OF WASH SAMPLE: 109.4

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	85.3	85.3	15.3	84.7
#4	114.4	29.1	5.2	79.5
#10	154.8	40.4	7.2	72.3
#40	79.3	79.3	52.4	19.9
#200	97.7	18.4	12.2	7.7
PASS #200		11.7	7.7	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	92.3
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

F.A. Project: S.R. 1, Little Heaven Grade Separated Intersection **Boring No.:** LH-SWM # 17W

Contract: 24-122-02

Boring Location: Sta. 128+10.59, 1190.7763

Boring Surface Elev.: 19.3' **Reference:**

Wt. of Casing Hammer:		**Lbs.**	**Average Fall:**		**IN.**		
Wt. of Sample Hammer:	140	**Lbs.**	**Average Fall:**	30	**IN.**		
Type of: D-Sampler:	Split-Barrel	**O.D.**	**O.D. of Sampler:**	2	**IN.**		
S-Sampler:		**O.D.**	**O.D. of Samp. Tube:**		**IN.**		
U-Sampler:		**O.D.**	**O.D. of Samp. Tube:**		**IN.**		
Core Bit:		**O.D.**	**O.D. of Rock Core:**		**IN.**		

Casing Size: 3 1/4" **Inches** **From Depth of:** 0.0' **To:** 22.0'

Hollow Stem Auger: **From Depth of:** **To:**

Water Level Readings

Date	Time	Depth of Hole	Depth of Casing	Depth of Water	Elev. of Water
3/17/2009	11:00 a.m.	10.0'	8.0'	9.9'	9.4
					19.3
					19.3
					19.3

Pay Quantities:

2 1/2 in. Dia. Dry Sample Boring:	24.0	**Ft.;**	**Dia. U-Sample Boring:**		**Ft.**
No. of 2 in. Dia. Shelby Tubes:		**;**	**No. of:**	**U-Samples:**	
2 1/2 in. Dia. Contin. Sample Boring:		**Ft.;**	**Core Drilling in Rock:**		**Ft.**

Boring Contractor: Walton Corporation
Driller: David
Helpers: Herberto

Depth (ft.)	Daily Progress	No.	Sample Depth	Blows/6"	Sample Description	Class./G.I.	Remarks
	3/17/09	1	0.0'	2 2 2 5	Moist very loose brown clayey fine to coarse sand w/trace of gravel.	A-2-4(0)	
			2.0'		21" RECOVERY		
2.53		2	2.0'	2 5 5 5	Moist loose orange fine to coarse sand w/trace of gravel and silt.	A-3	
			4.0'		14" RECOVERY		
		3	4.0'	3 4 4 5	Moist loose orange coarse to fine sand w/trace of silt and gravel.	A-3	
5.06			6.0'		20" RECOVERY		
		4	6.0'	3 6 6 5	Wet medium dense orangish brown coarse to fine sand w/trace of silt and gravel.	A-1-b	
7.59			8.0'		22" RECOVERY		
		5	8.0'	1 2 3 2	Wet loose orange silty fine to coarse sand.	A-2-4(0)	Water Level at 9.9'.
10.12			10.0'		23" RECOVERY		
		6	10.0'	2 3 5 6	Wet loose orange coarse sand w/some fine sand and silt, trace of gravel.	A-1-b	
			12.0'		23" RECOVERY		
12.65		7	12.0'	1 2 3 2	Saturated loose orange coarse to fine sand w/ some silt, trace of gravel.	A-1-b	
			14.0'		23" RECOVERY		

Remarks:

Reviewed By: Maureen Kelley **Soils Supervisor:** Randy Ferguson

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

F.A. Project: S.R. 1, Little Heaven Grade Separated Intersection **Boring No.:** LH-SWM # 17W
Contract: 24-122-02

Depth (ft.)	Daily Progress	No.	Sample Depth	Blows/6"	Sample Description	Class./G.I.	Remarks
		8	14.0'	2 2 3 2	Saturated loose gray coarse to fine sand w/ trace of silt and gravel.	A-1-b	
15.18			16.0'		19" RECOVERY		
		9	16.0'	6 5 5 9	Saturated loose gray coarse sand w/some fine sand and gravel, trace of silt.	A-1-b	
17.71			18.0'		23" RECOVERY		
		10	18.0'	7 5 8 12	Saturated medium dense brown coarse sand w/trace of fine sand, gravel and silt.	A-1-b	
20.24			20.0'		21" RECOVERY		
		11	20.0'	8 9 13 15	Saturated medium dense brown coarse sand w/trace of fine sand, gravel and silt.	A-1-b	
			22.0'		23" RECOVERY		
22.77		12	22.0'	10 8 12 21	Saturated medium dense brown coarse sand and gravel w/some fine sand, trace of silt.	A-1-b	
			24.0'		21" RECOVERY		
25.3					End of Boring.		
27.83							
30.36							
32.89							
35.42							
37.95							

KEY TO SYMBOLS

Symbol	Description
Strata symbols	
	Poorly graded clayey silty sand
	Poorly graded sand with silt
	Poorly graded sand
	Well graded sand with silt
	Silty sand

Notes:

1. Exploratory borings were drilled on 3-17-2009 using a 3 1/4 - inch diameter hollow stem auger. Rig is a ATV CME 55.

2. No free water was encountered at the time of drilling or when re-checked the following day, unless recorded on 1st page.

3. Boring locations were taped from existing features and elevations extrapolated from survey unless otherwise reported.

4. These logs are subject to the limitations, conclusions, and recommendations in this report.

5. Results of tests conducted on samples recovered are reported on the logs.

6. All blow counts are uncorrected.

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 1

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 0.0

Elevation: Source: LH-SWM # 18W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			622.50	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			575.21	
WT. OF WATER LOST:			47.29	POST-IGNITION
WT. OF BOTTLE:			78.20	DISH & SOIL:
WT. OF DRY SOIL:			497.01	
PERCENT OF WATER:			9.50	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 496

WT. OF TOTAL SAMPLE: 497.0 WT. OF WASH SAMPLE: 103.7

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
#4	0.0	0.0	0.0	100.0
#10	1.5	1.5	0.3	99.7
#40	28.8	28.8	27.7	72.0
#200	80.7	51.9	49.9	22.1
PASS #200		23.0	22.1	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	77.9
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 2

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 2.0

Elevation: Source: LH-SWM # 18W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			630.90	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			594.82	
WT. OF WATER LOST:			36.08	POST-IGNITION
WT. OF BOTTLE:			78.58	DISH & SOIL:
WT. OF DRY SOIL:			516.24	
PERCENT OF WATER:			7.00	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 497

WT. OF TOTAL SAMPLE: 516.2 WT. OF WASH SAMPLE: 107.7

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	2.0	2.0	0.4	99.6
#4	4.6	2.6	0.5	99.1
#10	18.8	14.2	2.8	96.4
#40	32.6	32.6	29.2	67.2
#200	91.5	58.9	52.7	14.5
PASS #200		16.2	14.5	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	85.5
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 3

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 4.0

Elevation: Source: LH-SWM # 18W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			483.00	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			464.37	
WT. OF WATER LOST:			18.63	POST-IGNITION
WT. OF BOTTLE:			77.29	DISH & SOIL:
WT. OF DRY SOIL:			387.08	
PERCENT OF WATER:			4.80	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 386

WT. OF TOTAL SAMPLE: 387.1 WT. OF WASH SAMPLE: 121.1

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
#4	0.0	0.0	0.0	100.0
#10	1.1	1.1	0.3	99.7
#40	18.9	18.9	15.6	84.2
#200	118.1	99.2	81.7	2.5
PASS #200		3.0	2.5	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	97.5
% SILT:	
% CLAY:	
CLASSIFICATION:	A-3

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 4

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 6.0

Elevation: _____ Source: LH-SWM # 18W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			745.90	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			659.64	
WT. OF WATER LOST:			86.26	POST-IGNITION
WT. OF BOTTLE:			77.83	DISH & SOIL:
WT. OF DRY SOIL:			581.81	
PERCENT OF WATER:			14.80	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 501

WT. OF TOTAL SAMPLE: 581.8 WT. OF WASH SAMPLE: 123.2

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	14.6	14.6	2.5	97.5
#4	22.7	8.1	1.4	96.1
#10	80.9	58.2	10.0	86.1
#40	84.7	84.7	59.2	26.9
#200	117.1	32.4	22.6	4.3
PASS #200		6.1	4.3	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	95.7
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 5

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 8.0

Elevation: Source: LH-SWM # 18W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			717.60	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			611.83	
WT. OF WATER LOST:			105.77	POST-IGNITION
WT. OF BOTTLE:			77.25	DISH & SOIL:
WT. OF DRY SOIL:			534.58	
PERCENT OF WATER:			19.80	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 488

WT. OF TOTAL SAMPLE: 534.6 WT. OF WASH SAMPLE: 113.5

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
3/8"	0.0	0.0	0.0	100.0
#4	16.9	16.9	3.2	96.8
#10	46.9	30.0	5.6	91.2
#40	44.5	44.5	35.8	55.5
#200	103.9	59.4	47.7	7.7
PASS #200		9.6	7.7	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	92.3
% SILT:	
% CLAY:	
CLASSIFICATION:	A-3

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 6

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 10.0

Elevation: Source: LH-SWM # 18W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			785.80	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			681.77	
WT. OF WATER LOST:			104.03	POST-IGNITION
WT. OF BOTTLE:			97.16	DISH & SOIL:
WT. OF DRY SOIL:			584.61	
PERCENT OF WATER:			17.80	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 547

WT. OF TOTAL SAMPLE: 584.6 WT. OF WASH SAMPLE: 109.2

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	1.2	1.2	0.2	99.8
#4	16.7	15.5	2.7	97.1
#10	38.1	21.4	3.7	93.5
#40	44.6	44.6	38.2	55.3
#200	102.1	57.5	49.2	6.1
PASS #200		7.1	6.1	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	93.9
% SILT:	
% CLAY:	
CLASSIFICATION:	A-3

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 7

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 12.0

Elevation: Source: LH-SWM # 18W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			654.40	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			530.07	
WT. OF WATER LOST:			124.33	POST-IGNITION
WT. OF BOTTLE:			78.95	DISH & SOIL:
WT. OF DRY SOIL:			451.12	
PERCENT OF WATER:			27.60	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 451

WT. OF TOTAL SAMPLE: 451.1 WT. OF WASH SAMPLE: 102.6

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
#10	0.0	0.0	0.0	100.0
#40	2.4	2.4	2.3	97.7
#200	83.0	80.6	78.6	19.1
PASS #200		19.6	19.1	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	80.9
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 8

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 14.0

Elevation: Source: LH-SWM # 18W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			687.30	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			558.18	
WT. OF WATER LOST:			129.12	POST-IGNITION
WT. OF BOTTLE:			80.76	DISH & SOIL:
WT. OF DRY SOIL:			477.42	
PERCENT OF WATER:			27.00	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 474

WT. OF TOTAL SAMPLE: 477.4 WT. OF WASH SAMPLE: 106.9

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	2.8	2.8	0.6	99.4
#4	2.8	0.0	0.0	99.4
#10	3.3	0.5	0.1	99.3
#40	2.5	2.5	2.3	97.0
#200	87.6	85.1	79.1	17.9
PASS #200		19.3	17.9	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	82.1
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 9

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 16.0

Elevation: Source: LH-SWM # 18W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			717.20	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			590.99	
WT. OF WATER LOST:			126.21	POST-IGNITION
WT. OF BOTTLE:			75.24	DISH & SOIL:
WT. OF DRY SOIL:			515.75	
PERCENT OF WATER:			24.50	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 510

WT. OF TOTAL SAMPLE: 515.8 WT. OF WASH SAMPLE: 105.1

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	5.1	5.1	1.0	99.0
#4	5.1	0.0	0.0	99.0
#10	5.8	0.7	0.1	98.9
#40	14.2	14.2	13.4	85.5
#200	87.4	73.2	68.9	16.7
PASS #200		17.7	16.7	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	83.3
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 10

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 18.0

Elevation: _____ Source: LH-SWM # 18W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			822.70	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			707.14	
WT. OF WATER LOST:			115.56	POST-IGNITION
WT. OF BOTTLE:			87.60	DISH & SOIL:
WT. OF DRY SOIL:			619.54	
PERCENT OF WATER:			18.70	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 548

WT. OF TOTAL SAMPLE: 619.5 WT. OF WASH SAMPLE: 117.3

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	31.9	31.9	5.1	94.9
#4	46.4	14.5	2.3	92.5
#10	71.6	25.2	4.1	88.4
#40	57.2	57.2	43.1	45.3
#200	103.7	46.5	35.1	10.3
PASS #200		13.6	10.3	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	89.7
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 11

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 20.0

Elevation: Source: LH-SWM # 18W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			759.90	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			662.94	
WT. OF WATER LOST:			96.96	POST-IGNITION
WT. OF BOTTLE:			86.40	DISH & SOIL:
WT. OF DRY SOIL:			576.54	
PERCENT OF WATER:			16.80	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 496

WT. OF TOTAL SAMPLE: 576.5 WT. OF WASH SAMPLE: 105.5

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	23.5	23.5	4.1	95.9
#4	46.6	23.1	4.0	91.9
#10	80.9	34.3	5.9	86.0
#40	57.9	57.9	47.2	38.8
#200	88.7	30.8	25.1	13.7
PASS #200		16.8	13.7	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	86.3
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 12

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 22.0

Elevation: Source: LH-SWM # 18W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			747.30	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			650.60	
WT. OF WATER LOST:			96.70	POST-IGNITION
WT. OF BOTTLE:			87.61	DISH & SOIL:
WT. OF DRY SOIL:			562.99	
PERCENT OF WATER:			17.20	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 432

WT. OF TOTAL SAMPLE: 563.0 WT. OF WASH SAMPLE: 127.8

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
2"	0.0	0.0	0.0	100.0
1"	23.3	23.3	4.1	95.9
3/8"	54.5	31.2	5.5	90.3
# 4	84.4	29.9	5.3	85.0
#10	131.1	46.7	8.3	76.7
#40	75.6	75.6	45.4	31.3
#200	108.6	33.0	19.8	11.5
PASS #200		19.2	11.5	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	88.5
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

F.A. Project: S.R. 1, Little Heaven Grade Separated Intersection **Boring No.:** LH-SWM # 18W

Contract: 24-122-02

Boring Location: Sta. 130+78.05, 1214.6631

Boring Surface Elev.: 19.9 **Reference:**

Wt. of Casing Hammer:		**Lbs.**	**Average Fall:**		**IN.**		
Wt. of Sample Hammer:	140	**Lbs.**	**Average Fall:**	30	**IN.**		
Type of: D-Sampler:	Split-Barrel	**O.D.**	**O.D. of Sampler:**	2	**IN.**		
S-Sampler:		**O.D.**	**O.D. of Samp. Tube:**		**IN.**		
U-Sampler:		**O.D.**	**O.D. of Samp. Tube:**		**IN.**		
Core Bit:		**O.D.**	**O.D. of Rock Core:**		**IN.**		

Casing Size: 3 1/4" **Inches** **From Depth of:** 0.0' **To:** 22.0'

Hollow Stem Auger: **From Depth of:** **To:**

Water Level Readings

Date	Time	Depth of Hole	Depth of Casing	Depth of Water	Elev. of Water
3/16/2009	11:00 a.m.	8.0'	6.0'	6.5'	13.4
					19.9
					19.9
					19.9

Pay Quantities:

2 1/2 in. Dia. Dry Sample Boring:	24.0	**Ft.;**	**Dia. U-Sample Boring:**		**Ft.**
No. of 2 in. Dia. Shelby Tubes:		**;**	**No. of:**	**U-Samples:**	
2 1/2 in. Dia. Contin. Sample Boring:		**Ft.;**	**Core Drilling in Rock:**		**Ft.**

Boring Contractor: Walton Corporation
Driller: David
Helpers: Herberto

Depth (ft.)	Daily Progress	No.	Sample Depth	Blows/6"	Sample Description	Class./G.I.	Remarks
		1	0.0'	2 4 3 2	Moist loose brown silty fine to coarse sand.	A-2-4(0)	Surface elevation 19.90'.
			2.0'				
2.53		2	2.0'	4 3 4 4	Moist loose orange fine to coarse sand w/ some silt, trace of gravel.	A-2-4(0)	
			4.0'		21" RECOVERY		
		3	4.0'	4 4 5 6	Moist loose orange fine sand w/some coarse sand, trace of silt.	A-3	
5.06			6.0'		20" RECOVERY		
		4	6.0'	7 8 14 16	Wet medium dense brown coarse to fine sand w/some gravel, trace of silt.	A-1-b	Water level at 6.5'.
7.59			8.0'		22" RECOVERY		
		5	8.0'	5 9 11 8	Wet medium dense brown fine to coarse sand w/trace of gravel and silt.	A-3	
10.12			10.0'		18" RECOVERY		
		6	10.0'	6 7 7 9	Wet medium dense brown fine to coarse sand w/trace of silt and gravel.	A-3	
			12.0'		24" RECOVERY		
12.65		7	12.0'	1 2 3 3	Saturated loose brown fine sand w/some silt, trace of coarse sand.	A-2-4(0)	
			14.0'		23" RECOVERY		

Remarks:

Reviewed By: Maureen Kelley **Soils Supervisor:** Randy Ferguson

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

F.A. Project: S.R. 1, Little Heaven Grade Separated Intersection **Boring No.:** LH-SWM # 18W
Contract: 24-122-02

Depth (ft.)	Daily Progress	No.	Sample Depth	Blows/6"	Sample Description	Class./G.I.	Remarks
		8	14.0'	1 2 2 3	Saturated very loose brown fine sand w/some silt, trace of coarse sand and gravel.	A-2-4(0)	
15.18			16.0'		23" RECOVERY		
		9	16.0'	2 3 5 9	Saturated loose brown fine sand w/some silt and coarse sand, trace of gravel.	A-2-4(0)	
17.71			18.0'				
		10	18.0'	3 4 5 5	Saturated loose brown coarse to fine sand w/ some gravel, trace of silt.	A-1-b	
20.24			20.0'		23" RECOVERY		
		11	20.0'	4 11 11 10	Saturated medium dense brown coarse to fine sand w/some silt and gravel.	A-1-b	
			22.0'		23" RECOVERY		
		12	22.0'	27 7 7 4	Saturated medium dense brown coarse sand and gravel w/some fine sand and silt.	A-1-b	
22.77			24.0'		17" RECOVERY		
					End of Boring.		
25.3							
27.83							
30.36							
32.89							
35.42							
37.95							

KEY TO SYMBOLS

Symbol	Description

Strata symbols

	Silty sand
	Poorly graded sand
	Poorly graded sand with silt

Notes:

1. Exploratory borings were drilled on 3-16-2009 using a 3 1/4 - inch diameter hollow stem auger. Rig is a ATV CME 55.

2. No free water was encountered at the time of drilling or when re-checked the following day, unless recorded on 1st page.

3. Boring locations were taped from existing features and elevations extrapolated from survey unless otherwise reported.

4. These logs are subject to the limitations, conclusions, and recommendations in this report.

5. Results of tests conducted on samples recovered are reported on the logs.

6. All blow counts are uncorrected.

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 1

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 0.0

Elevation: _____ Source: LH-SWM # 21W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			598.60	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			563.59	
WT. OF WATER LOST:			35.01	POST-IGNITION
WT. OF BOTTLE:			87.20	DISH & SOIL:
WT. OF DRY SOIL:			476.39	
PERCENT OF WATER:			7.30	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 474

WT. OF TOTAL SAMPLE: 476.4 WT. OF WASH SAMPLE: 106.8

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
#4	0.0	0.0	0.0	100.0
#10	2.2	2.2	0.5	99.5
#40	44.6	44.6	41.6	58.0
#200	93.1	48.5	45.2	12.8
PASS #200		13.7	12.8	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	87.2
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 2

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 2.0

Elevation: Source: LH-SWM # 21W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			461.20	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			442.16	
WT. OF WATER LOST:			19.04	POST-IGNITION
WT. OF BOTTLE:			78.14	DISH & SOIL:
WT. OF DRY SOIL:			364.02	
PERCENT OF WATER:			5.20	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 324

WT. OF TOTAL SAMPLE: 364.0 WT. OF WASH SAMPLE: 103.5

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	14.7	14.7	4.0	96.0
#4	30.3	15.6	4.3	91.7
#10	40.5	10.2	2.8	88.9
#40	54.4	54.4	46.7	42.2
#200	96.3	41.9	36.0	6.2
PASS #200		7.2	6.2	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	93.8
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 3

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 4.0

Elevation: Source: LH-SWM # 21W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			592.50	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			568.11	
WT. OF WATER LOST:			24.39	POST-IGNITION
WT. OF BOTTLE:			98.20	DISH & SOIL:
WT. OF DRY SOIL:			469.91	
PERCENT OF WATER:			5.20	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 460

WT. OF TOTAL SAMPLE: 469.9 WT. OF WASH SAMPLE: 106.2

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	3.0	3.0	0.6	99.4
#4	6.0	3.0	0.6	98.7
#10	9.8	3.8	0.8	97.9
#40	52.8	52.8	48.7	49.2
#200	97.2	44.4	40.9	8.3
PASS #200		9.0	8.3	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	91.7
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 4

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 6.0

Elevation: _____ Source: LH-SWM # 21W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			727.10	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			635.90	
WT. OF WATER LOST:			91.20	POST-IGNITION
WT. OF BOTTLE:			77.29	DISH & SOIL:
WT. OF DRY SOIL:			558.61	
PERCENT OF WATER:			16.30	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 547

WT. OF TOTAL SAMPLE: 558.6 WT. OF WASH SAMPLE: 112.4

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	3.8	3.8	0.7	99.3
#4	5.6	1.8	0.3	99.0
#10	11.4	5.8	1.0	98.0
#40	81.7	81.7	71.2	26.8
#200	109.0	27.3	23.8	3.0
PASS #200		3.4	3.0	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	97.0
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 5

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 8.0

Elevation: _____ Source: LH-SWM # 21W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			603.50	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			515.22	
WT. OF WATER LOST:			88.28	POST-IGNITION
WT. OF BOTTLE:			78.16	DISH & SOIL:
WT. OF DRY SOIL:			437.06	
PERCENT OF WATER:			20.20	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 432

WT. OF TOTAL SAMPLE: 437.1 WT. OF WASH SAMPLE: 107.2

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
3/8"	0.0	0.0	0.0	100.0
#4	1.8	1.8	0.4	99.6
#10	5.1	3.3	0.8	98.8
#40	81.8	81.8	75.4	23.4
#200	105.4	23.6	21.8	1.7
PASS #200		1.8	1.7	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	98.3
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 6

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 10.0

Elevation: _____ Source: LH-SWM # 21W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			844.20	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			741.54	
WT. OF WATER LOST:			102.66	POST-IGNITION
WT. OF BOTTLE:			78.37	DISH & SOIL:
WT. OF DRY SOIL:			663.17	
PERCENT OF WATER:			15.50	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 587

WT. OF TOTAL SAMPLE: 663.2 WT. OF WASH SAMPLE: 118.4

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	36.6	36.6	5.5	94.5
#4	56.7	20.1	3.0	91.5
#10	76.4	19.7	3.0	88.5
#40	83.9	83.9	62.7	25.8
#200	109.5	25.6	19.1	6.7
PASS #200		8.9	6.7	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	93.3
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 7

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 12.0

Elevation: Source: LH-SWM # 21W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			897.60	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			762.64	
WT. OF WATER LOST:			134.96	POST-IGNITION
WT. OF BOTTLE:			76.59	DISH & SOIL:
WT. OF DRY SOIL:			686.05	
PERCENT OF WATER:			19.70	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 680

WT. OF TOTAL SAMPLE: 686.0 WT. OF WASH SAMPLE: 102.7

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
3/8"	0.0	0.0	0.0	100.0
#4	1.9	1.9	0.3	99.7
#10	6.0	4.1	0.6	99.1
#40	27.8	27.8	26.8	72.3
#200	87.9	60.1	58.0	14.3
PASS #200		14.8	14.3	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	85.7
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 8

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 14.0

Elevation: Source: LH-SWM # 21W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			856.30	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			716.71	
WT. OF WATER LOST:			139.59	POST-IGNITION
WT. OF BOTTLE:			79.58	DISH & SOIL:
WT. OF DRY SOIL:			637.13	
PERCENT OF WATER:			21.90	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 633

WT. OF TOTAL SAMPLE: 637.1 WT. OF WASH SAMPLE: 105.9

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
3/8"	0.0	0.0	0.0	100.0
#4	0.8	0.8	0.1	99.9
#10	3.9	3.1	0.5	99.4
#40	44.1	44.1	41.4	58.0
#200	88.6	44.5	41.8	16.2
PASS #200		17.3	16.2	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	83.8
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 9

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 16.0

Elevation: _____ Source: LH-SWM # 21W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			509.70	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			436.42	
WT. OF WATER LOST:			73.28	POST-IGNITION
WT. OF BOTTLE:			81.80	DISH & SOIL:
WT. OF DRY SOIL:			354.62	
PERCENT OF WATER:			20.70	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 354

WT. OF TOTAL SAMPLE: 354.6 WT. OF WASH SAMPLE: 108.1

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
#4	0.0	0.0	0.0	100.0
#10	1.0	1.0	0.3	99.7
#40	24.1	24.1	22.2	77.5
#200	88.7	64.6	59.6	17.9
PASS #200		19.4	17.9	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	82.1
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 10

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 18.0

Elevation: Source: LH-SWM # 21W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			711.80	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			624.46	
WT. OF WATER LOST:			87.34	POST-IGNITION
WT. OF BOTTLE:			78.20	DISH & SOIL:
WT. OF DRY SOIL:			546.26	
PERCENT OF WATER:			16.00	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 444

WT. OF TOTAL SAMPLE: 546.3 WT. OF WASH SAMPLE: 102.7

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	34.5	34.5	6.3	93.7
#4	63.2	28.7	5.3	88.4
#10	101.9	38.7	7.1	81.3
#40	84.9	84.9	67.2	14.1
#200	96.1	11.2	8.9	5.2
PASS #200		6.6	5.2	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	94.8
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 11

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 20.0

Elevation: _____ Source: LH-SWM # 21W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			999.90	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			888.45	
WT. OF WATER LOST:			111.45	POST-IGNITION
WT. OF BOTTLE:			86.10	DISH & SOIL:
WT. OF DRY SOIL:			802.35	
PERCENT OF WATER:			13.90	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 682

WT. OF TOTAL SAMPLE: 802.4 WT. OF WASH SAMPLE: 105.3

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	51.6	51.6	6.4	93.6
#4	87.3	35.7	4.4	89.1
#10	119.9	32.6	4.1	85.1
#40	70.6	70.6	57.0	28.0
#200	95.6	25.0	20.2	7.8
PASS #200		9.7	7.8	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	92.2
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 12

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 22.0

Elevation: Source: LH-SWM # 21W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			875.40	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			757.76	
WT. OF WATER LOST:			117.64	POST-IGNITION
WT. OF BOTTLE:			80.76	DISH & SOIL:
WT. OF DRY SOIL:			677.00	
PERCENT OF WATER:			17.40	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 500

WT. OF TOTAL SAMPLE: 677.0 WT. OF WASH SAMPLE: 109.5

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	34.3	34.3	5.1	94.9
#4	87.6	53.3	7.9	87.1
#10	177.4	89.8	13.3	73.8
#40	101.6	101.6	68.5	5.3
#200	106.9	5.3	3.6	1.8
PASS #200		2.6	1.8	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	98.2
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 13

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 24.0

Elevation: _____ Source: LH-SWM # 21W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			649.60	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			561.84	
WT. OF WATER LOST:			87.76	POST-IGNITION
WT. OF BOTTLE:			86.70	DISH & SOIL:
WT. OF DRY SOIL:			475.14	
PERCENT OF WATER:			18.50	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 374

WT. OF TOTAL SAMPLE: 475.1 WT. OF WASH SAMPLE: 109.5

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	23.4	23.4	4.9	95.1
#4	58.6	35.2	7.4	87.7
#10	101.2	42.6	9.0	78.7
#40	98.1	98.1	70.5	8.2
#200	104.6	6.5	4.7	3.5
PASS #200		4.9	3.5	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	96.5
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 14

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 26.0

Elevation: _____ Source: LH-SWM # 21W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/20/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			1004.70	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			868.24	
WT. OF WATER LOST:			136.46	POST-IGNITION
WT. OF BOTTLE:			84.96	DISH & SOIL:
WT. OF DRY SOIL:			783.28	
PERCENT OF WATER:			17.40	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 496

WT. OF TOTAL SAMPLE: 783.3 WT. OF WASH SAMPLE: 104.2

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	62.9	62.9	8.0	92.0
#4	169.8	106.9	13.6	78.3
#10	287.2	117.4	15.0	63.3
#40	73.1	73.1	44.4	18.9
#200	92.1	19.0	11.5	7.4
PASS #200		12.1	7.4	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	92.6
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

F.A. Project: S.R. 1, Little Heaven Grade Separated Intersection **Boring No.:** LH-SWM # 21W

Contract: 24-122-02

Boring Location: Sta. 133+45.52,1238.5499

Boring Surface Elev.: **Reference:**

Wt. of Casing Hammer:		**Lbs.**	**Average Fall:**		**IN.**
Wt. of Sample Hammer:	140	**Lbs.**	**Average Fall:**	30	**IN.**
Type of: D-Sampler:	Split-Barrel	**O.D.**	**O.D. of Sampler:**	2	**IN.**
S-Sampler:		**O.D.**	**O.D. of Samp. Tube:**		**IN.**
U-Sampler:		**O.D.**	**O.D. of Samp. Tube:**		**IN.**
Core Bit:		**O.D.**	**O.D. of Rock Core:**		**IN.**

Casing Size: 3 1/4" **Inches** **From Depth of:** 0.0' **To:** 26.0'
Hollow Stem Auger: **From Depth of:** **To:**

Water Level Readings

Date	Time	Depth of Hole	Depth of Casing	Depth of Water	Elev. of Water
3/13/2009	1:00 p.m.	10.0'	8.0'	9.7'	-9.7

Pay Quantities:
2 1/2 in. Dia. Dry Sample Boring: 28.0 **Ft.;** **Dia. U-Sample Boring:** **Ft.**
No. of 2 in. Dia. Shelby Tubes: **;** **No. of:** **U-Samples:**
2 1/2 in. Dia. Contin. Sample Boring: **Ft.;** **Core Drilling in Rock:** **Ft.**

Boring Contractor: Walton Corporation
Driller: David
Helpers: Herberto & John

Depth (ft.)	Daily Progress	No.	Sample Depth	Blows/6"	Sample Description	Class./G.I.	Remarks
	3/13/09	1	0.0'	2 3 3 2	Moist loose light brown fine to coarse sand w/ some silt.	A-2-4(0)	
			2.0'		18" RECOVERY		
2.53		2	2.0'	4 4 4 4	Moist loose light brown coarse to fine sand w/ some gravel, trace of silt.	A-1-b	
			4.0'		9" RECOVERY		
		3	4.0'	3 3 2 3	Moist loose light brown coarse to fine sand w/ trace of silt and gravel.	A-1-b	
5.06			6.0'		17" RECOVERY		
		4	6.0'	5 4 5 7	Wet loose light gray coarse to fine sand w/ trace of silt and gravel.	A-1-b	
7.59			8.0'		18" RECOVERY		
		5	8.0'	4 6 9 13	Wet medium dense light gray coarse to fine sand w/trace of silt and gravel.	A-1-b	Water Level at 9.7'.
10.12			10.0'		18" RECOVERY		
		6	10.0'	9 7 7 10	Wet medium dense light gray coarse sand w/ some fine sand and gravel, trace of silt.	A-1-b	
			12.0'		22" RECOVERY		
12.65		7	12.0'	5 6 6 5	Wet medium dense brownish gray fine to coarse sand w/some silt, trace of gravel.	A-2-4(0)	
			14.0'		24" RECOVERY		

Remarks:

Reviewed By: Maureen Kelley **Soils Supervisor:** Randy Ferguson

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

F.A. Project: S.R. 1, Little Heaven Grade Separated Intersection **Boring No.:** LH-SWM # 21W
Contract: 24-122-02

Depth (ft.)	Daily Progress	No.	Sample Depth	Blows/6"	Sample Description	Class./G.I.	Remarks
		8	14.0'	2 3 2 3	Saturated loose brown and black fine to coarse sand w/some silt, trace of gravel.	A-2-4(0)	
15.18			16.0'		22" RECOVERY		
		9	16.0'	4 5 4 4	Saturated loose brown and black fine to coarse sand w/some silt.	A-2-4(0)	
17.71			18.0'				
		10	18.0'	5 5 6 6	Saturated medium dense brown and black coarse sand w/some gravel, trace of fine sand and silt.	A-1-b	
20.24			20.0'		20" RECOVERY		
		11	20.0'	5 7 8 9	Saturated medium dense brown and black coarse sand w/some fine sand and gravel, trace of silt.	A-1-b	
			22.0'		22" RECOVERY		
		12	22.0'	8 8 9 12	Saturated medium dense brown and black coarse sand and gravel w/trace of fine sand and silt.	A-1-b	
22.77			24.0'		23" RECOVERY		
		13	24.0'	8 12 11 13	Saturated medium dense brown and black coarse sand and gravel w/trace of fine sand and silt.	A-1-b	
25.3			26.0'		18" RECOVERY		
		14	26.0'	12 8 8 8	Saturated medium dense brown and black coarse sand and gravel w/some fine sand, trace of silt.	A-1-b	
27.83			28.0'		23" RECOVERY		
					End of Boring.		
30.36							
32.89							
35.42							
37.95							

KEY TO SYMBOLS

Symbol	Description
Strata symbols	
	Silty sand
	Well graded sand with silt
	Poorly graded sand
	Poorly graded sand with silt

Notes:

1. Exploratory borings were drilled on 3-13-2009 using a 3 1/4 - inch diameter hollow stem auger. Rig is a ATV CME 55.

2. No free water was encountered at the time of drilling or when re-checked the following day, unless recorded on 1st page.

3. Boring locations were taped from existing features and elevations extrapolated from survey unless otherwise reported.

4. These logs are subject to the limitations, conclusions, and recommendations in this report.

5. Results of tests conducted on samples recovered are reported on the logs.

6. All blow counts are uncorrected.

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

F.A. Project: S.R. 1, Little Heaven Grade Separated Intersection **Boring No.:** LH-SWM # 22

Contract: 24-122-02

Boring Location: Sta. 128+70.39, 973.3670

Boring Surface Elev.: 23.0 **Reference:**

Wt. of Casing Hammer:		**Lbs.**	**Average Fall:**		**IN.**		
Wt. of Sample Hammer:	140	**Lbs.**	**Average Fall:**	30	**IN.**		
Type of: D-Sampler:	Split-Barrel	**O.D.**	**O.D. of Sampler:**	2	**IN.**		
S-Sampler:		**O.D.**	**O.D. of Samp. Tube:**		**IN.**		
U-Sampler:		**O.D.**	**O.D. of Samp. Tube:**		**IN.**		
Core Bit:		**O.D.**	**O.D. of Rock Core:**		**IN.**		
Casing Size:	3 1/4"	**Inches**	**From Depth of:**	0.0'	**To:**	28.0'	
Hollow Stem Auger:			**From Depth of:**		**To:**		

Water Level Readings

Date	Time	Depth of Hole	Depth of Casing	Depth of Water	Elev. of Water
3/11/2009	1:00 p.m.	10.0'	8.0'	8.0'	15.0
					23.0
					23.0
					23.0

Pay Quantities:

2 1/2 in. Dia. Dry Sample Boring:	30.0	**Ft.;**	**Dia. U-Sample Boring:**		**Ft.**
No. of 2 in. Dia. Shelby Tubes:		**;**	**No. of:**	**U-Samples:**	
2 1/2 in. Dia. Contin. Sample Boring:		**Ft.;**	**Core Drilling in Rock:**		**Ft.**

Boring Contractor: Walton Corporation
Driller: David
Helpers: Herberto & John

Depth (ft.)	Daily Progress	No.	Sample Depth	Blows/6"	Sample Description	Class./G.I.	Remarks
	3/11/09	1	0.5'	3 3 3	Moist firm brown fine sandy clay w/some coarse sand, trace of gravel.	A-6(2)	Topsoil - 6".
			2.0'		14" RECOVERY		
2.43		2	2.0'	4 4 4 4	Moist loose brown fine sand w/some clay and gravel, trace of coarse sand.	A-2-4(0)	
			4.0'		18" RECOVERY		
4.86		3	4.0'	2 6 7 4	Moist medium dense orangish brown coarse sand w/some gravel, silt and fine sand.	A-1-b	
			6.0'		17" RECOVERY		
		4	6.0'	6 7	Wet medium dense orangish brown silty coarse to fine sand w/trace of gravel.	A-1-b	
			7.0'		10" RECOVERY		
7.29		4A	7.0'	7 9	Wet medium dense brown coarse sand w/ some fine sand, trace of gravel and silt.	A-1-b	
			8.0'		9" RECOVERY		
		5	8.0'	2 4 5 3	Wet loose brownish orange coarse sand w/ some fine sand, trace of gravel and silt.	A-1-b	Water @ 8.0'.
9.72			10.0'		16" RECOVERY		
		6	10.0'	11 5 5 4	Wet loose brownish orange coarse sand w/ some fine sand, trace of silt and gravel.	A-1-b	
12.15			12.0'		20" RECOVERY		
		7	12.0'	1 1 1 2	Saturated very loose light brown silty fine sand w/trace of coarse sand.	A-2-4(0)	
			14.0'		21" RECOVERY		

Remarks:

Reviewed By: Maureen Kelley **Soils Supervisor:** Randy Ferguson

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

F.A. Project: S.R. 1, Little Heaven Grade Separated Intersection **Boring No.:** LH-SWM # 22
Contract: 24-122-02

Depth (ft.)	Daily Progress	No.	Sample Depth	Blows/6"	Sample Description	Class./G.I.	Remarks
14.58		8	14.0' 16.0'	1 1 1 3	Saturated very loose light brown fine to coarse sand w/some silt, trace of gravel. 19" RECOVERY	A-2-4(0)	
17.01		9	16.0' 18.0'	4 8 8 7	Saturated medium dense light brown coarse sand w/some fine sand, trace of silt and gravel.	A-1-b	
19.44		10	18.0' 20.0'	3 4 8 9	Saturated medium dense brownish orange coarse to fine sand w/trace of silt and gravel. 17" RECOVERY	A-1-b	
21.87		11	20.0' 22.0'	6 10 12 13	Saturated medium dense brownish orange coarse sand w/some fine sand, trace of silt and gravel. 16" RECOVERY	A-1-b	
24.3		12	22.0' 24.0'	6 17 16 15	Saturated dense orangish brown coarse sand w/some gravel and fine sand, trace of silt. 19" RECOVERY	A-1-b	
26.73		13	24.0' 26.0'	11 19 18 7	Saturated dense orangish brown coarse sand and gravel w/trace of fine sand and silt. 15" RECOVERY	A-1-b	
		14	26.0' 27.0'	12 8	Saturated medium dense orangish brown silty coarse sand w/some gravel, trace of fine sand. 10" RECOVERY	A-1-b	
		14A	27.0' 28.0'	8 7	Saturated stiff orangish brown coarse sandy clay w/some fine sand, trace of gravel. 10" RECOVERY	A-7-6(14)	
29.16		15	28.0' 30.0'	3 2 3 4	Saturated loose dark brownish gray coarse to fine sand and gravel w/trace of silt. 9" RECOVERY	A-1-b	
31.59					End of Boring		
34.02							
36.45							

KEY TO SYMBOLS

Symbol	Description
Strata symbols	
	Clayey sand
	Poorly graded clayey silty sand
	Silty sand
	Well graded sand
	Well graded sand with silt
	Poorly graded sand with silt
	Low plasticity clay

Notes:

1. Exploratory borings were drilled on 3-11-2009 using a 3 1/4 - inch diameter hollow stem auger. Rig is a ATV CME 55.

2. No free water was encountered at the time of drilling or when re-checked the following day, unless recorded on 1st page.

3. Boring locations were taped from existing features and elevations extrapolated from survey unless otherwise reported.

4. These logs are subject to the limitations, conclusions, and recommendations in this report.

5. Results of tests conducted on samples recovered are reported on the logs.

6. All blow counts are uncorrected.

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 1

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 0.0

Elevation: Source: LH-SWM # 23W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:	38.50		884.89	DISH & SOIL:
WT. DRY SOIL & BOTTLE:	36.07		809.61	
WT. OF WATER LOST:	2.43		75.28	POST-IGNITION
WT. OF BOTTLE:	20.65		86.71	DISH & SOIL:
WT. OF DRY SOIL:	15.42		722.90	
PERCENT OF WATER:	15.80		10.40	DISH:
BLOWS REQUIRED FOR CLOSURE:	25			
CORRECTED LIQUID LIMIT %:	15.8			LOSS %:

WT PASSING #10 SIEVE: 695

WT. OF TOTAL SAMPLE: 722.9 WT. OF WASH SAMPLE: 127.4

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	3.0	3.0	0.4	99.6
#4	8.5	5.5	0.8	98.8
#10	27.5	19.0	2.6	96.2
#40	33.8	33.8	25.5	70.7
#200	88.6	54.8	41.4	29.3
PASS #200		38.8	29.3	

SUMMARY

LIQUID LIMIT:	15.8
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	70.7
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 2

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 2.0

Elevation: Source: LH-SWM # 23W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			691.88	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			626.44	
WT. OF WATER LOST:			65.44	POST-IGNITION
WT. OF BOTTLE:			86.65	DISH & SOIL:
WT. OF DRY SOIL:			539.79	
PERCENT OF WATER:			12.10	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 527

WT. OF TOTAL SAMPLE: 539.8 WT. OF WASH SAMPLE: 100.0

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	3.1	3.1	0.6	99.4
#4	4.6	1.5	0.3	99.1
#10	13.0	8.4	1.6	97.6
#40	26.1	26.1	25.5	72.1
#200	75.6	49.5	48.3	23.8
PASS #200		24.4	23.8	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	76.2
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 3

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 4.0

Elevation: Source: LH-SWM # 23W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			549.87	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			518.73	
WT. OF WATER LOST:			31.14	POST-IGNITION
WT. OF BOTTLE:			86.88	DISH & SOIL:
WT. OF DRY SOIL:			431.85	
PERCENT OF WATER:			7.20	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 314

WT. OF TOTAL SAMPLE: 431.9 WT. OF WASH SAMPLE: 102.3

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	60.9	60.9	14.1	85.9
#4	88.7	27.8	6.4	79.5
#10	118.2	29.5	6.8	72.6
#40	48.1	48.1	34.1	38.5
#200	87.6	39.5	28.0	10.4
PASS #200		14.7	10.4	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	89.6
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 4

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 6.0

Elevation: _____ Source: LH-SWM # 23W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:	41.23		890.05	DISH & SOIL:
WT. DRY SOIL & BOTTLE:	37.93		781.12	
WT. OF WATER LOST:	3.30		108.93	POST-IGNITION
WT. OF BOTTLE:	21.88		87.01	DISH & SOIL:
WT. OF DRY SOIL:	16.05		694.11	
PERCENT OF WATER:	20.60		15.70	DISH:
BLOWS REQUIRED FOR CLOSURE:	25			
CORRECTED LIQUID LIMIT %:	20.6			LOSS %: _____

WT PASSING #10 SIEVE: 680

WT. OF TOTAL SAMPLE: 694.1 WT. OF WASH SAMPLE: 100.3

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	1.4	1.4	0.2	99.8
#4	3.6	2.2	0.3	99.5
#10	14.0	10.4	1.5	98.0
#40	4.2	4.2	4.1	93.9
#200	66.1	61.9	60.5	33.4
PASS #200		34.2	33.4	

SUMMARY

LIQUID LIMIT:	20.6
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	66.6
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 5

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 8.0

Elevation: _____ Source: LH-SWM # 23W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:	31.69		830.92	DISH & SOIL:
WT. DRY SOIL & BOTTLE:	29.61		722.31	
WT. OF WATER LOST:	2.08		108.61	POST-IGNITION
WT. OF BOTTLE:	18.98		89.39	DISH & SOIL:
WT. OF DRY SOIL:	10.63		632.92	
PERCENT OF WATER:	19.60		17.20	DISH:
BLOWS REQUIRED FOR CLOSURE:	25			
CORRECTED LIQUID LIMIT %:	19.6			LOSS %: _____

WT PASSING #10 SIEVE: 633

WT. OF TOTAL SAMPLE: 632.9 WT. OF WASH SAMPLE: 100.3

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
#10	0.0	0.0	0.0	100.0
#40	4.7	4.7	4.7	95.3
#200	68.1	63.4	63.2	32.1
PASS #200		32.2	32.1	

SUMMARY

LIQUID LIMIT:	19.6
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	67.9
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 6

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 10.0

Elevation: Source: LH-SWM # 23W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			922.11	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			779.32	
WT. OF WATER LOST:			142.79	POST-IGNITION
WT. OF BOTTLE:			86.46	DISH & SOIL:
WT. OF DRY SOIL:			692.86	
PERCENT OF WATER:			20.60	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 690

WT. OF TOTAL SAMPLE: 692.9 WT. OF WASH SAMPLE: 101.6

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
#4	0.0	0.0	0.0	100.0
#10	2.6	2.6	0.4	99.6
#40	10.9	10.9	10.7	88.9
#200	76.0	65.1	63.8	25.1
PASS #200		25.6	25.1	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	74.9
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 7

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 12.0

Elevation: Source: LH-SWM # 23W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			725.35	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			603.46	
WT. OF WATER LOST:			121.89	POST-IGNITION
WT. OF BOTTLE:			87.08	DISH & SOIL:
WT. OF DRY SOIL:			516.38	
PERCENT OF WATER:			23.60	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 516

WT. OF TOTAL SAMPLE: 516.4 WT. OF WASH SAMPLE: 109.1

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
#10	0.0	0.0	0.0	100.0
#40	8.6	8.6	7.9	92.1
#200	83.9	75.3	69.0	23.1
PASS #200		25.2	23.1	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	76.9
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 8

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 14.0

Elevation: _____ Source: LH-SWM # 23W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:	37.30		832.32	DISH & SOIL:
WT. DRY SOIL & BOTTLE:	34.19		682.29	
WT. OF WATER LOST:	3.11		150.03	POST-IGNITION
WT. OF BOTTLE:	19.34		76.70	DISH & SOIL:
WT. OF DRY SOIL:	14.85		605.59	
PERCENT OF WATER:	20.90		24.80	DISH:
BLOWS REQUIRED FOR CLOSURE:	25			
CORRECTED LIQUID LIMIT %:	20.9			LOSS %: _____

WT PASSING #10 SIEVE: 604

WT. OF TOTAL SAMPLE: 605.6 WT. OF WASH SAMPLE: 106.3

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
#4	0.0	0.0	0.0	100.0
#10	1.3	1.3	0.2	99.8
#40	14.3	14.3	13.4	86.4
#200	75.2	60.9	57.2	29.2
PASS #200		31.1	29.2	

SUMMARY

LIQUID LIMIT:	20.9
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	70.8
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 9

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 16.0

Elevation: Source: LH-SWM # 23W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			869.25	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			732.88	
WT. OF WATER LOST:			136.37	POST-IGNITION
WT. OF BOTTLE:			87.01	DISH & SOIL:
WT. OF DRY SOIL:			645.87	
PERCENT OF WATER:			21.10	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 643

WT. OF TOTAL SAMPLE: 645.9 WT. OF WASH SAMPLE: 117.2

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
3/8"	0.0	0.0	0.0	100.0
#4	1.5	1.5	0.2	99.8
#10	3.2	1.7	0.3	99.5
#40	17.7	17.7	15.0	84.5
#200	96.9	79.2	67.2	17.2
PASS #200		20.3	17.2	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	82.8
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 10

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 18.0

Elevation: _____ Source: LH-SWM # 23W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			748.09	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			641.64	
WT. OF WATER LOST:			106.45	POST-IGNITION
WT. OF BOTTLE:			86.80	DISH & SOIL:
WT. OF DRY SOIL:			554.84	
PERCENT OF WATER:			19.20	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 544

WT. OF TOTAL SAMPLE: 554.8 WT. OF WASH SAMPLE: 104.4

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
3/8"	0.0	0.0	0.0	100.0
#4	3.0	3.0	0.5	99.5
#10	11.2	8.2	1.5	98.0
#40	78.3	78.3	73.5	24.5
#200	92.9	14.6	13.7	10.8
PASS #200		11.5	10.8	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	89.2
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 11

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 20.0

Elevation: Source: LH-SWM # 23W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			661.78	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			585.07	
WT. OF WATER LOST:			76.71	POST-IGNITION
WT. OF BOTTLE:			86.22	DISH & SOIL:
WT. OF DRY SOIL:			498.85	
PERCENT OF WATER:			15.40	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 484

WT. OF TOTAL SAMPLE: 498.9 WT. OF WASH SAMPLE: 107.2

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	0.7	0.7	0.1	99.9
#4	6.6	5.9	1.2	98.7
#10	15.2	8.6	1.7	97.0
#40	90.8	90.8	82.1	14.8
#200	98.5	7.7	7.0	7.9
PASS #200		8.7	7.9	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	92.1
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 12

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 22.0

Elevation: _____ Source: LH-SWM # 23W

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			785.41	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			678.90	
WT. OF WATER LOST:			106.51	POST-IGNITION
WT. OF BOTTLE:			86.22	DISH & SOIL:
WT. OF DRY SOIL:			592.68	
PERCENT OF WATER:			18.00	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 573

WT. OF TOTAL SAMPLE: 592.7 WT. OF WASH SAMPLE: 106.6

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	12.7	12.7	2.1	97.9
#4	15.0	2.3	0.4	97.5
#10	19.9	4.9	0.8	96.6
#40	93.6	93.6	84.9	11.8
#200	102.3	8.7	7.9	3.9
PASS #200		4.3	3.9	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	96.1
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 13

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 24.0

Elevation: Source: LH-SWM # 23W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			640.96	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			558.09	
WT. OF WATER LOST:			82.87	POST-IGNITION
WT. OF BOTTLE:			87.40	DISH & SOIL:
WT. OF DRY SOIL:			470.69	
PERCENT OF WATER:			17.60	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 449

WT. OF TOTAL SAMPLE: 470.7 WT. OF WASH SAMPLE: 114.7

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	9.4	9.4	2.0	98.0
#4	14.1	4.7	1.0	97.0
#10	21.8	7.7	1.6	95.4
#40	90.4	90.4	75.2	20.2
#200	106.3	15.9	13.2	7.0
PASS #200		8.4	7.0	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	93.0
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 14

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 26.0

Elevation: Source: LH-SWM # 23W

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			716.48	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			635.55	
WT. OF WATER LOST:			80.93	POST-IGNITION
WT. OF BOTTLE:			88.22	DISH & SOIL:
WT. OF DRY SOIL:			547.33	
PERCENT OF WATER:			14.80	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 464

WT. OF TOTAL SAMPLE: 547.3 WT. OF WASH SAMPLE: 108.4

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	31.4	31.4	5.7	94.3
#4	57.9	26.5	4.8	89.4
#10	83.4	25.5	4.7	84.8
#40	87.8	87.8	68.7	16.1
#200	101.0	13.2	10.3	5.8
PASS #200		7.4	5.8	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	94.2
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

F.A. Project: S.R. 1, Little Heaven Grade Separated Intersection **Boring No.:** LH-SWM # 23W

Contract: 24-122-02

Boring Location: Sta. 130+60.21, 901.1047

Boring Surface Elev.: 24.70 **Reference:**

Wt. of Casing Hammer:		**Lbs.**	**Average Fall:**		**IN.**		
Wt. of Sample Hammer:	140	**Lbs.**	**Average Fall:**	30	**IN.**		
Type of: D-Sampler:	Split-Barrel	**O.D.**	**O.D. of Sampler:**	2	**IN.**		
S-Sampler:		**O.D.**	**O.D. of Samp. Tube:**		**IN.**		
U-Sampler:		**O.D.**	**O.D. of Samp. Tube:**		**IN.**		
Core Bit:		**O.D.**	**O.D. of Rock Core:**		**IN.**		

Casing Size: 3 1/4" **Inches** **From Depth of:** 0.0' **To:** 26.0'

Hollow Stem Auger: **From Depth of:** **To:**

Water Level Readings

Date	Time	Depth of Hole	Depth of Casing	Depth of Water	Elev. of Water
3/12/2009	1:00 p.m.	12.0'	10.0'	10.9'	13.8
					24.7
					24.7
					24.7

Pay Quantities:

2 1/2 in. Dia. Dry Sample Boring:	28.0	**Ft.;**	**Dia. U-Sample Boring:**		**Ft.**
No. of 2 in. Dia. Shelby Tubes:		**;**	**No. of:**	**U-Samples:**	
2 1/2 in. Dia. Contin. Sample Boring:		**Ft.;**	**Core Drilling in Rock:**		**Ft.**

Boring Contractor: Walton Corporation
Driller: David
Helpers: Herberto

Depth (ft.)	Daily Progress	No.	Sample Depth	Blows/6"	Sample Description	Class./G.I.	Remarks
		1	0.0'	2 3 4 4	Moist loose brown silty fine to coarse sand w/ trace of gravel.	A-2-4(0)	
			2.0'		21" RECOVERY		
2.53		2	2.0'	3 3 6 7	Moist loose brown silty fine to coarse sand w/ trace of gravel.	A-2-4(0)	
			4.0'		21" RECOVERY		
5.06		3	4.0'	2 10 6 8	Moist medium dense brown coarse to fine sand and gravel w/trace of silt.	A-1-b	
			6.0'		14" RECOVERY		
7.59		4	6.0'	5 6 10 17	Wet medium dense orange silty fine sand w/ trace of coarse sand and gravel.	A-2-4(0)	
			8.0'		22" RECOVERY		
10.12		5	8.0'	2 6 8 10	Wet medium dense orange silty fine sand w/ trace of coarse sand.	A-2-4(0)	
			10.0'		21" RECOVERY		
		6	10.0'	6 7 7 7	Wet medium dense orange silty fine sand w/ some coarse sand.	A-2-4(0)	Water @ 10.9'.
			12.0'		24" RECOVERY		
12.65		7	12.0'	3 6 7 9	Wet medium dense orange silty fine sand w/ trace of coarse sand.	A-2-4(0)	
			14.0'		23" RECOVERY		

Remarks:

Reviewed By: Maureen Kelley **Soils Supervisor:** Randy Ferguson

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

F.A. Project: S.R. 1, Little Heaven Grade Separated Intersection **Boring No.:** LH-SWM # 23W
Contract: 24-122-02

Depth (ft.)	Daily Progress	No.	Sample Depth	Blows/6"	Sample Description	Class./G.I.	Remarks
		8	14.0'	2 4 7 6	Wet medium dense orange silty fine sand w/ some coarse sand.	A-2-4(0)	
15.18			16.0'		24" RECOVERY		
		9	16.0'	6 8 12 16	Wet medium dense orange fine sand w/some silt and coarse sand.	A-2-4(0)	
17.71			18.0'		24" RECOVERY		
		10	18.0'	2 3 4 9	Wet loose brownish orange coarse sand w/ some fine sand and silt, trace of gravel.	A-1-b	
20.24			20.0'		19" RECOVERY		
		11	20.0'	8 9 11 12	Wet medium dense brownish orange coarse sand w/trace of silt, fine sand and gravel.	A-1-b	
			22.0'		24" RECOVERY		
		12	22.0'	6 7 8 9	Wet medium dense brown coarse sand w/ trace of fine sand, silt and gravel.	A-1-b	
22.77			24.0'		23" RECOVERY		
		13	24.0'	8 5 9 17	Wet medium dense brown coarse sand w/ some fine sand, trace of silt and gravel.	A-1-b	
25.3			26.0'		24" RECOVERY		
		14	26.0'	18 24 25 27	Wet dense brown coarse sand w/some gravel, trace of fine sand and silt.	A-1-b	
27.83			28.0'		24" RECOVERY		
					End of Boring		
30.36							
32.89							
35.42							
37.95							

KEY TO SYMBOLS

Symbol	Description
Strata symbols	
	Silty sand
	Poorly graded sand with silt
	Well graded sand with silt
	Poorly graded sand

Notes:

1. Exploratory borings were drilled on 3-12-2009 using a 3 1/4 - inch diameter hollow stem auger. Rig is a ATV CME 55.

2. No free water was encountered at the time of drilling or when re-checked the following day, unless recorded on 1st page.

3. Boring locations were taped from existing features and elevations extrapolated from survey unless otherwise reported.

4. These logs are subject to the limitations, conclusions, and recommendations in this report.

5. Results of tests conducted on samples recovered are reported on the logs.

6. All blow counts are uncorrected.

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 1

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 0.0

Elevation: Source: LH-SWM # 24

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			697.65	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			641.84	
WT. OF WATER LOST:			55.81	POST-IGNITION
WT. OF BOTTLE:			78.40	DISH & SOIL:
WT. OF DRY SOIL:			563.44	
PERCENT OF WATER:			9.90	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 558

WT. OF TOTAL SAMPLE: 563.4 WT. OF WASH SAMPLE: 103.4

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	1.5	1.5	0.3	99.7
#4	1.5	0.0	0.0	99.7
#10	5.8	4.3	0.8	99.0
#40	27.1	27.1	25.9	73.0
#200	69.5	42.4	40.6	32.4
PASS #200		33.9	32.4	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	67.6
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 2

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 2.0

Elevation: _____ Source: LH-SWM # 24

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			647.94	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			618.39	
WT. OF WATER LOST:			29.55	POST-IGNITION
WT. OF BOTTLE:			77.49	DISH & SOIL:
WT. OF DRY SOIL:			540.90	
PERCENT OF WATER:			5.50	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 500

WT. OF TOTAL SAMPLE: 540.9 WT. OF WASH SAMPLE: 107.8

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	6.5	6.5	1.2	98.8
#4	20.3	13.8	2.6	96.2
#10	41.3	21.0	3.9	92.4
#40	48.9	48.9	41.9	50.5
#200	94.5	45.6	39.1	11.4
PASS #200		13.3	11.4	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	88.6
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 3

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 4.0

Elevation: Source: LH-SWM # 24

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			506.89	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			478.54	
WT. OF WATER LOST:			28.35	POST-IGNITION
WT. OF BOTTLE:			80.84	DISH & SOIL:
WT. OF DRY SOIL:			397.70	
PERCENT OF WATER:			7.10	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 395

WT. OF TOTAL SAMPLE: 397.7 WT. OF WASH SAMPLE: 108.4

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	2.8	2.8	0.7	99.3
#4	2.8	0.0	0.0	99.3
#10	2.8	0.0	0.0	99.3
#40	21.8	21.8	20.0	79.3
#200	89.9	68.1	62.4	16.9
PASS #200		18.5	16.9	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	83.1
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 4

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 6.0

Elevation: Source: LH-SWM # 24

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			873.49	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			791.35	
WT. OF WATER LOST:			82.14	POST-IGNITION
WT. OF BOTTLE:			86.71	DISH & SOIL:
WT. OF DRY SOIL:			704.64	
PERCENT OF WATER:			11.70	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 699

WT. OF TOTAL SAMPLE: 704.6 WT. OF WASH SAMPLE: 107.6

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
3/8"	0.0	0.0	0.0	100.0
#4	2.9	2.9	0.4	99.6
#10	5.3	2.4	0.3	99.2
#40	40.2	40.2	37.1	62.2
#200	82.0	41.8	38.6	23.6
PASS #200		25.6	23.6	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	76.4
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 5

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 8.0

Elevation: Source: LH-SWM # 24

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			676.95	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			622.49	
WT. OF WATER LOST:			54.46	POST-IGNITION
WT. OF BOTTLE:			87.82	DISH & SOIL:
WT. OF DRY SOIL:			534.67	
PERCENT OF WATER:			10.20	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 335

WT. OF TOTAL SAMPLE: 534.7 WT. OF WASH SAMPLE: 102.3

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	75.5	75.5	14.1	85.9
#4	137.8	62.3	11.7	74.2
#10	199.5	61.7	11.5	62.7
#40	64.6	64.6	39.6	23.1
#200	86.4	21.8	13.4	9.7
PASS #200		15.9	9.7	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	90.3
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 6

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 10.0

Elevation: _____ Source: LH-SWM # 24

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			961.57	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			809.81	
WT. OF WATER LOST:			151.76	POST-IGNITION
WT. OF BOTTLE:			87.51	DISH & SOIL:
WT. OF DRY SOIL:			722.30	
PERCENT OF WATER:			21.00	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 709

WT. OF TOTAL SAMPLE: 722.3 WT. OF WASH SAMPLE: 103.3

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
3/8"	0.0	0.0	0.0	100.0
#4	4.4	4.4	0.6	99.4
#10	13.1	8.7	1.2	98.2
#40	44.5	44.5	42.3	55.9
#200	83.3	38.8	36.9	19.0
PASS #200		20.0	19.0	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	81.0
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 7

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 12.0

Elevation: Source: LH-SWM # 24

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			765.40	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			648.55	
WT. OF WATER LOST:			116.85	POST-IGNITION
WT. OF BOTTLE:			87.85	DISH & SOIL:
WT. OF DRY SOIL:			560.70	
PERCENT OF WATER:			20.80	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 549

WT. OF TOTAL SAMPLE: 560.7 WT. OF WASH SAMPLE: 124.6

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
3/8"	0.0	0.0	0.0	100.0
#4	5.5	5.5	1.0	99.0
#10	12.0	6.5	1.2	97.9
#40	75.4	75.4	59.2	38.6
#200	105.9	30.5	24.0	14.7
PASS #200		18.7	14.7	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	85.3
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 8

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 14.0

Elevation: Source: LH-SWM # 24

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			814.04	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			680.19	
WT. OF WATER LOST:			133.85	POST-IGNITION
WT. OF BOTTLE:			87.19	DISH & SOIL:
WT. OF DRY SOIL:			593.00	
PERCENT OF WATER:			22.60	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 582

WT. OF TOTAL SAMPLE: 593.0 WT. OF WASH SAMPLE: 106.1

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
3/8"	0.0	0.0	0.0	100.0
#4	6.7	6.7	1.1	98.9
#10	11.5	4.8	0.8	98.1
#40	36.9	36.9	34.1	64.0
#200	90.4	53.5	49.4	14.5
PASS #200		15.7	14.5	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	85.5
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 9

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 16.0

Elevation: _____ Source: LH-SWM # 24

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			1017.12	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			873.34	
WT. OF WATER LOST:			143.78	POST-IGNITION
WT. OF BOTTLE:			87.13	DISH & SOIL:
WT. OF DRY SOIL:			786.21	
PERCENT OF WATER:			18.30	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 778

WT. OF TOTAL SAMPLE: 786.2 WT. OF WASH SAMPLE: 113.0

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
3/8"	0.0	0.0	0.0	100.0
#4	2.3	2.3	0.3	99.7
#10	8.6	6.3	0.8	98.9
#40	28.3	28.3	24.8	74.1
#200	96.0	67.7	59.3	14.9
PASS #200		17.0	14.9	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	85.1
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 10

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 18.0

Elevation: _____ Source: LH-SWM # 24

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:	35.51	21.78	761.10	DISH & SOIL:
WT. DRY SOIL & BOTTLE:	32.77	20.72	611.11	
WT. OF WATER LOST:	2.74	1.06	149.99	POST-IGNITION
WT. OF BOTTLE:	19.41	12.94	78.30	DISH & SOIL:
WT. OF DRY SOIL:	13.36	7.78	532.81	
PERCENT OF WATER:	20.50	13.60	28.20	DISH:
BLOWS REQUIRED FOR CLOSURE:	25			
CORRECTED LIQUID LIMIT %:	20.5			LOSS %: _____

WT PASSING #10 SIEVE: 533

WT. OF TOTAL SAMPLE: 532.8 WT. OF WASH SAMPLE: 104.6

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
#10	0.0	0.0	0.0	100.0
#40	3.7	3.7	3.5	96.5
#200	69.1	65.4	62.5	33.9
PASS #200		35.5	33.9	

SUMMARY

LIQUID LIMIT:	20.5
PLASTIC LIMIT:	13.6
PLASTICITY INDEX:	6.9
% SAND AND GRAVEL:	66.1
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 11

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 20.0

Elevation: _____ Source: LH-SWM # 24

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			737.68	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			597.87	
WT. OF WATER LOST:			139.81	POST-IGNITION
WT. OF BOTTLE:			86.80	DISH & SOIL:
WT. OF DRY SOIL:			511.07	
PERCENT OF WATER:			27.40	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 511

WT. OF TOTAL SAMPLE: 511.1 WT. OF WASH SAMPLE: 110.5

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
#10	0.0	0.0	0.0	100.0
#40	3.1	3.1	2.8	97.2
#200	108.0	104.9	94.9	2.3
PASS #200		2.5	2.3	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	97.7
% SILT:	
% CLAY:	
CLASSIFICATION:	A-3

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 12

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 22.0

Elevation: Source: LH-SWM # 24

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			690.14	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			573.59	
WT. OF WATER LOST:			116.55	POST-IGNITION
WT. OF BOTTLE:			86.93	DISH & SOIL:
WT. OF DRY SOIL:			486.66	
PERCENT OF WATER:			23.90	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 487

WT. OF TOTAL SAMPLE: 486.7 WT. OF WASH SAMPLE: 107.4

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
#10	0.0	0.0	0.0	100.0
#40	5.7	5.7	5.3	94.7
#200	87.8	82.1	76.4	18.2
PASS #200		19.6	18.2	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	81.8
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 13

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 24.0

Elevation: Source: LH-SWM # 24

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			763.82	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			624.78	
WT. OF WATER LOST:			139.04	POST-IGNITION
WT. OF BOTTLE:			87.34	DISH & SOIL:
WT. OF DRY SOIL:			537.44	
PERCENT OF WATER:			25.90	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 537

WT. OF TOTAL SAMPLE: 537.4 WT. OF WASH SAMPLE: 100.9

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
#10	0.0	0.0	0.0	100.0
#40	5.4	5.4	5.4	94.6
#200	82.5	77.1	76.4	18.2
PASS #200		18.4	18.2	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	81.8
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 14

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 26.0

Elevation: Source: LH-SWM # 24

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			601.68	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			512.57	
WT. OF WATER LOST:			89.11	POST-IGNITION
WT. OF BOTTLE:			87.16	DISH & SOIL:
WT. OF DRY SOIL:			425.41	
PERCENT OF WATER:			20.90	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 398

WT. OF TOTAL SAMPLE: 425.4 WT. OF WASH SAMPLE: 109.0

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	3.3	3.3	0.8	99.2
#4	9.0	5.7	1.3	97.9
#10	27.1	18.1	4.3	93.6
#40	66.2	66.2	56.9	36.8
#200	100.4	34.2	29.4	7.4
PASS #200		8.6	7.4	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	92.6
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 15

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 28.0

Elevation: _____ Source: LH-SWM # 24

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			832.60	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			680.57	
WT. OF WATER LOST:			152.03	POST-IGNITION
WT. OF BOTTLE:			86.60	DISH & SOIL:
WT. OF DRY SOIL:			593.97	
PERCENT OF WATER:			25.60	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 488

WT. OF TOTAL SAMPLE: 594.0 WT. OF WASH SAMPLE: 103.2

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	18.4	18.4	3.1	96.9
#4	51.9	33.5	5.6	91.3
#10	105.8	53.9	9.1	82.2
#40	36.6	36.6	29.1	53.0
#200	81.4	44.8	35.7	17.4
PASS #200		21.8	17.4	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	82.6
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

F.A. Project: S.R. 1, Little Heaven Grade Separated Intersection **Boring No.:** LH-SWM # 24

Contract: 24-122-02

Boring Location: Sta. 132+70.38, 975.3086

Boring Surface Elev.: 24.8 **Reference:**

Wt. of Casing Hammer:		**Lbs.**	**Average Fall:**		**IN.**		
Wt. of Sample Hammer:	140	**Lbs.**	**Average Fall:**	30	**IN.**		
Type of: D-Sampler:	Split-Barrel	**O.D.**	**O.D. of Sampler:**	2	**IN.**		
S-Sampler:		**O.D.**	**O.D. of Samp. Tube:**		**IN.**		
U-Sampler:		**O.D.**	**O.D. of Samp. Tube:**		**IN.**		
Core Bit:		**O.D.**	**O.D. of Rock Core:**		**IN.**		

Casing Size: 3 1/4" **Inches** **From Depth of:** 0.0' **To:** 28.0'

Hollow Stem Auger: **From Depth of:** **To:**

Water Level Readings

Date	Time	Depth of Hole	Depth of Casing	Depth of Water	Elev. of Water
3/13/2009	1:00 p.m.	10.0'	8.0'	9.9'	14.9
					24.8
					24.8
					24.8

Pay Quantities:

2 1/2 in. Dia. Dry Sample Boring: 30.0 **Ft.;** **Dia. U-Sample Boring:** **Ft.**

No. of 2 in. Dia. Shelby Tubes: **;** **No. of: U-Samples:**

2 1/2 in. Dia. Contin. Sample Boring: **Ft.;** **Core Drilling in Rock:** **Ft.**

Boring Contractor: Walton Corporation
Driller: David
Helpers: Herberto & Hector

Depth (ft.)	Daily Progress	No.	Sample Depth	Blows/6"	Sample Description	Class./G.I.	Remarks
	3/12/09	1	0.0'	2 2 2 2	Moist very loose brown silty fine to coarse sand w/trace of gravel.	A-2-4(0)	
			2.0'		18" RECOVERY		
2.53		2	2.0'	2 4 5 6	Moist loose brown coarse to fine sand w/some silt, trace of gravel.	A-1-b	
			4.0'		19" RECOVERY		
		3	4.0'	2 8 9 13	Moist medium dense brown fine sand w/some coarse sand and silt, trace of gravel.	A-2-4(0)	
5.06			6.0'		16" RECOVERY		
		4	6.0'	10 8 9 15	Moist medium dense brown silty fine to coarse sand w/trace of gravel.	A-2-4(0)	
7.59			8.0'		19" RECOVERY		
		5	8.0'	5 15 7 9	Moist medium dense brown coarse sand and gravel w/some fine sand, trace of silt.	A-1-b	
10.12			10.0'		19" RECOVERY		
		6	10.0'	4 5 7 7	Wet medium dense brown coarse to fine sand w/some silt, trace of gravel.	A-2-4(0)	Water @ 9.9'.
			12.0'		20" RECOVERY		
12.65		7	12.0'	3 4 4 11	Wet loose brownish orange coarse to fine sand w/some silt, trace of gravel.	A-1-b	
			14.0'		18" RECOVERY		

Remarks:

Reviewed By: Maureen Kelley **Soils Supervisor:** Randy Ferguson

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

F.A. Project: S.R. 1, Little Heaven Grade Separated Intersection **Boring No.:** LH-SWM # 24
Contract: 24-122-02

Depth (ft.)	Daily Progress	No.	Sample Depth	Blows/6"	Sample Description	Class./G.I.	Remarks
		8	14.0'	3 4 3 2	Wet loose brownish black fine to coarse sand w/some silt, trace of gravel.	A-2-4(0)	
15.18			16.0'		24" RECOVERY		
		9	16.0'	4 7 9 12	Wet medium dense brownish black fine to coarse sand w/some silt, trace of gravel.	A-2-4(0)	
17.71			18.0'				
	3/13/09	10	18.0'	3 3 5 6	Saturated loose brownish black clayey fine sand w/trace of coarse sand.	A-2-4(0)	
20.24			20.0'		24" RECOVERY		
		11	20.0'	3 3 5 6	Saturated loose brownish black fine sand w/ trace of coarse sand and silt.	A-3	
			22.0'		24" RECOVERY		
		12	22.0'	3 4 5 5	Saturated loose brownish black fine sand w/ some silt, trace of coarse sand.	A-2-4(0)	
22.77			24.0'		24" RECOVERY		
		13	24.0'	3 3 3 3	Saturated loose light brown fine sand w/some silt, trace of coarse sand.	A-2-4(0)	
25.3			26.0'		19" RECOVERY		
		14	26.0'	3 4 5 7	Saturated loose light brown coarse to fine sand w/trace of silt and gravel.	A-1-b	
27.83			28.0'		21" RECOVERY		
		15	28.0'	7 4 4 5	Saturated loose light brownish gray fine to coarse sand w/some gravel and silt.	A-2-4(0)	
			30.0'		24" RECOVERY		
30.36					End of Boring		
32.89							
35.42							
37.95							

KEY TO SYMBOLS

Symbol	Description
Strata symbols	
	Silty sand
	Poorly graded sand with silt
	Well graded sand with silt
	Poorly graded clayey silty sand
	Poorly graded sand

Notes:

1. Exploratory borings were drilled on 3-13-2009 using a 3 1/4 - inch diameter hollow stem auger. Rig is a ATV CME 55.

2. No free water was encountered at the time of drilling or when re-checked the following day, unless recorded on 1st page.

3. Boring locations were taped from existing features and elevations extrapolated from survey unless otherwise reported.

4. These logs are subject to the limitations, conclusions, and recommendations in this report.

5. Results of tests conducted on samples recovered are reported on the logs.

6. All blow counts are uncorrected.

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 1

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 0.0

Elevation: _____ Source: LH-SWM # 25

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			682.73	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			626.63	
WT. OF WATER LOST:			56.10	POST-IGNITION
WT. OF BOTTLE:			88.40	DISH & SOIL:
WT. OF DRY SOIL:			538.23	
PERCENT OF WATER:			10.40	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 538

WT. OF TOTAL SAMPLE: 538.2 WT. OF WASH SAMPLE: 116.2

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
#10	0.0	0.0	0.0	100.0
#40	30.6	30.6	26.3	73.7
#200	87.7	57.1	49.1	24.5
PASS #200		28.5	24.5	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	75.5
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 2

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 2.0

Elevation: _____ Source: LH-SWM # 25

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			820.64	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			744.88	
WT. OF WATER LOST:			75.76	POST-IGNITION
WT. OF BOTTLE:			87.23	DISH & SOIL:
WT. OF DRY SOIL:			657.65	
PERCENT OF WATER:			11.50	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 644

WT. OF TOTAL SAMPLE: 657.6 WT. OF WASH SAMPLE: 110.4

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	4.6	4.6	0.7	99.3
#4	5.7	1.1	0.2	99.1
#10	14.0	8.3	1.3	97.9
#40	27.8	27.8	24.6	73.2
#200	72.7	44.9	39.8	33.4
PASS #200		37.7	33.4	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	66.6
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 3

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 4.0

Elevation: _____ Source: LH-SWM # 25

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			860.71	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			758.74	
WT. OF WATER LOST:			101.97	POST-IGNITION
WT. OF BOTTLE:			88.56	DISH & SOIL:
WT. OF DRY SOIL:			670.18	
PERCENT OF WATER:			15.20	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 651

WT. OF TOTAL SAMPLE: 670.2 WT. OF WASH SAMPLE: 115.7

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
3/8"	0.0	0.0	0.0	100.0
#4	4.7	4.7	0.7	99.3
#10	19.5	14.8	2.2	97.1
#40	31.1	31.1	26.1	71.0
#200	87.3	56.2	47.2	23.8
PASS #200		28.4	23.8	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	76.2
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 4

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 6.0

Elevation: _____ Source: LH-SWM # 25

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			787.08	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			663.07	
WT. OF WATER LOST:			124.01	POST-IGNITION
WT. OF BOTTLE:			87.60	DISH & SOIL:
WT. OF DRY SOIL:			575.47	
PERCENT OF WATER:			21.50	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 573

WT. OF TOTAL SAMPLE: 575.5 WT. OF WASH SAMPLE: 114.0

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
#4	0.0	0.0	0.0	100.0
#10	2.6	2.6	0.5	99.5
#40	15.5	15.5	13.5	86.0
#200	97.4	81.9	71.5	14.5
PASS #200		16.6	14.5	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	85.5
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 5

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 8.0

Elevation: _____ Source: LH-SWM # 25

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			712.87	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			600.67	
WT. OF WATER LOST:			112.20	POST-IGNITION
WT. OF BOTTLE:			98.20	DISH & SOIL:
WT. OF DRY SOIL:			502.47	
PERCENT OF WATER:			22.30	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 459

WT. OF TOTAL SAMPLE: 502.5 WT. OF WASH SAMPLE: 104.2

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	17.1	17.1	3.4	96.6
#4	23.0	5.9	1.2	95.4
#10	43.0	20.0	4.0	91.4
#40	27.7	27.7	24.3	67.1
#200	85.8	58.1	51.0	16.1
PASS #200		18.4	16.1	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	83.9
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 6

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 10.0

Elevation: Source: LH-SWM # 25

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			789.10	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			662.81	
WT. OF WATER LOST:			126.29	POST-IGNITION
WT. OF BOTTLE:			76.59	DISH & SOIL:
WT. OF DRY SOIL:			586.22	
PERCENT OF WATER:			21.50	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 583

WT. OF TOTAL SAMPLE: 586.2 WT. OF WASH SAMPLE: 108.7

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	1.6	1.6	0.3	99.7
#4	2.1	0.5	0.1	99.6
#10	3.3	1.2	0.2	99.4
#40	16.3	16.3	14.9	84.5
#200	90.2	73.9	67.6	16.9
PASS #200		18.5	16.9	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	83.1
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 7

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 12.0

Elevation: _____ Source: LH-SWM # 25

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			759.44	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			641.97	
WT. OF WATER LOST:			117.47	POST-IGNITION
WT. OF BOTTLE:			87.61	DISH & SOIL:
WT. OF DRY SOIL:			554.36	
PERCENT OF WATER:			21.20	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 552

WT. OF TOTAL SAMPLE: 554.4 WT. OF WASH SAMPLE: 116.8

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
3/8"	0.0	0.0	0.0	100.0
#4	0.3	0.3	0.1	99.9
#10	2.2	1.9	0.3	99.6
#40	35.8	35.8	30.5	69.1
#200	91.4	55.6	47.4	21.7
PASS #200		25.4	21.7	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	78.3
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 8

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 14.0

Elevation: Source: LH-SWM # 25

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			724.40	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			608.96	
WT. OF WATER LOST:			115.44	POST-IGNITION
WT. OF BOTTLE:			81.80	DISH & SOIL:
WT. OF DRY SOIL:			527.16	
PERCENT OF WATER:			21.90	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 524

WT. OF TOTAL SAMPLE: 527.2 WT. OF WASH SAMPLE: 127.9

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
#4	0.0	0.0	0.0	100.0
#10	3.3	3.3	0.6	99.4
#40	43.6	43.6	33.9	65.5
#200	116.8	73.2	56.9	8.6
PASS #200		11.1	8.6	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	91.4
% SILT:	
% CLAY:	
CLASSIFICATION:	A-3

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 9

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 16.0

Elevation: _____ Source: LH-SWM # 25

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			888.58	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			768.64	
WT. OF WATER LOST:			119.94	POST-IGNITION
WT. OF BOTTLE:			77.43	DISH & SOIL:
WT. OF DRY SOIL:			691.21	
PERCENT OF WATER:			17.40	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 687

WT. OF TOTAL SAMPLE: 691.2 WT. OF WASH SAMPLE: 103.6

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	1.6	1.6	0.2	99.8
#4	2.2	0.6	0.1	99.7
#10	4.7	2.5	0.4	99.3
#40	45.1	45.1	43.2	56.1
#200	90.0	44.9	43.0	13.0
PASS #200		13.6	13.0	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	87.0
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 10

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 18.0

Elevation: _____ Source: LH-SWM # 25

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			779.21	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			663.29	
WT. OF WATER LOST:			115.92	POST-IGNITION
WT. OF BOTTLE:			86.41	DISH & SOIL:
WT. OF DRY SOIL:			576.88	
PERCENT OF WATER:			20.10	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 564

WT. OF TOTAL SAMPLE: 576.9 WT. OF WASH SAMPLE: 107.6

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	1.7	1.7	0.3	99.7
#4	6.8	5.1	0.9	98.8
#10	12.7	5.9	1.0	97.8
#40	42.0	42.0	38.2	59.6
#200	91.3	49.3	44.8	14.8
PASS #200		16.3	14.8	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	85.2
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 11

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 20.0

Elevation: Source: LH-SWM # 25

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			842.14	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			725.42	
WT. OF WATER LOST:			116.72	POST-IGNITION
WT. OF BOTTLE:			87.50	DISH & SOIL:
WT. OF DRY SOIL:			637.92	
PERCENT OF WATER:			18.30	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 631

WT. OF TOTAL SAMPLE: 637.9 WT. OF WASH SAMPLE: 128.9

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
3/8"	0.0	0.0	0.0	100.0
#4	2.1	2.1	0.3	99.7
#10	7.4	5.3	0.8	98.8
#40	36.6	36.6	28.1	70.8
#200	110.3	73.7	56.5	14.3
PASS #200		18.6	14.3	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	85.7
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 12

REPORTED BY: _____

REVIEWED BY: _____

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: _____ Road: _____

Location: _____ Depth: 22.0

Elevation: _____ Source: LH-SWM # 25

Type and Use of Material: _____

Method Placed: _____ Type of Sample: _____

Remarks: _____

_____ Date Sampled: _____

Sampled By: _____

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: _____ Date Tested: _____ Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			744.89	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			608.56	
WT. OF WATER LOST:			136.33	POST-IGNITION
WT. OF BOTTLE:			79.08	DISH & SOIL:
WT. OF DRY SOIL:			529.48	
PERCENT OF WATER:			25.70	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %: _____

WT PASSING #10 SIEVE: 523

WT. OF TOTAL SAMPLE: 529.5 WT. OF WASH SAMPLE: 106.6

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	5.2	5.2	1.0	99.0
#4	6.0	0.8	0.2	98.9
#10	6.2	0.2	0.0	98.8
#40	20.8	20.8	19.3	79.5
#200	89.1	68.3	63.3	16.2
PASS #200		17.5	16.2	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	83.8
% SILT:	
% CLAY:	
CLASSIFICATION:	A-2-4(0)

This sample _____ conform with the requirements of the specifications. Material represented by this sample has been _____ for use.

REMARKS:

COMPARISON: _____

INDEPENDENT ASSURANCE SUPERVISOR: _____

QUALITY ASSURANCE SUPERVISOR: _____

(FOR INDEPENDENT ASSURANCE EVALUATION)

_____
SOILS SUPERVISOR

_____
GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 13

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 24.0

Elevation: Source: LH-SWM # 25

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			644.81	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			540.25	
WT. OF WATER LOST:			104.56	POST-IGNITION
WT. OF BOTTLE:			78.95	DISH & SOIL:
WT. OF DRY SOIL:			461.30	
PERCENT OF WATER:			22.70	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 446

WT. OF TOTAL SAMPLE: 461.3 WT. OF WASH SAMPLE: 110.9

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	1.2	1.2	0.3	99.7
#4	4.4	3.2	0.7	99.0
#10	15.6	11.2	2.4	96.6
#40	54.4	54.4	47.4	49.2
#200	96.6	42.2	36.8	12.5
PASS #200		14.3	12.5	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	87.5
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 14

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 26.0

Elevation: Source: LH-SWM # 25

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			771.73	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			656.38	
WT. OF WATER LOST:			115.35	POST-IGNITION
WT. OF BOTTLE:			77.90	DISH & SOIL:
WT. OF DRY SOIL:			578.48	
PERCENT OF WATER:			19.90	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 505

WT. OF TOTAL SAMPLE: 578.5 WT. OF WASH SAMPLE: 123.8

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	17.8	17.8	3.1	96.9
#4	38.0	20.2	3.5	93.4
#10	73.5	35.5	6.1	87.3
#40	54.1	54.1	38.1	49.1
#200	102.2	48.1	33.9	15.2
PASS #200		21.6	15.2	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	84.8
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

GEOTECHNICAL ENGINEER

LB-44 (Rev 5/2003)
Doc # 55-08/04/07/20

MATERIALS AND RESEARCH LABORATORY

SOIL ANALYSIS REPORT

TEST NO.: 15

REPORTED BY:

REVIEWED BY:

DELAWARE DEPARTMENT OF TRANSPORTATION

DOVER, DELAWARE (302) 760-2400

Contract: 24-122-02 F.A. Project: S.R. 1, Little Heaven Grade

Contractor: Road:

Location: Depth: 28.0

Elevation: Source: LH-SWM # 25

Type and Use of Material:

Method Placed: Type of Sample:

Remarks:

Date Sampled:

Sampled By:

FOR LABORATORY USE ONLY

Location of Lab: DOVER

Date Received: Date Tested: Date Reported: 5/21/2009

PHYSICAL TEST CONSTANTS	LIQUID LIMIT T-89	PLASTIC LIMIT T-90	MOISTURE T-265	ORGANIC T-267
BOTTLE NO.:				PRE-IGNITION
WT. WET SOIL & BOTTLE:			777.89	DISH & SOIL:
WT. DRY SOIL & BOTTLE:			661.53	
WT. OF WATER LOST:			116.36	POST-IGNITION
WT. OF BOTTLE:			87.20	DISH & SOIL:
WT. OF DRY SOIL:			574.33	
PERCENT OF WATER:			20.30	DISH:
BLOWS REQUIRED FOR CLOSURE:				
CORRECTED LIQUID LIMIT %:	NV			LOSS %:

WT PASSING #10 SIEVE: 504

WT. OF TOTAL SAMPLE: 574.3 WT. OF WASH SAMPLE: 102.7

SIEVE	CUM. RT. WT.	RT. WT.	% RET.	% PASSING
1"	0.0	0.0	0.0	100.0
3/8"	21.0	21.0	3.7	96.3
#4	40.0	19.0	3.3	93.0
#10	70.1	30.1	5.2	87.8
#40	44.3	44.3	37.9	49.9
#200	87.8	43.5	37.2	12.7
PASS #200		14.9	12.7	

SUMMARY

LIQUID LIMIT:	NV
PLASTIC LIMIT:	NP
PLASTICITY INDEX:	NP
% SAND AND GRAVEL:	87.3
% SILT:	
% CLAY:	
CLASSIFICATION:	A-1-b

This sample conform with the requirements of the specifications. Material represented by this sample has been for use.

REMARKS:

COMPARISON:

INDEPENDENT ASSURANCE SUPERVISOR:

QUALITY ASSURANCE SUPERVISOR:

(FOR INDEPENDENT ASSURANCE EVALUATION)

SOILS SUPERVISOR

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STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

F.A. Project: S.R. 1, Little Heaven Grade Separated Intersection **Boring No.:** LH-SWM # 25

Contract: 24-122-02

Boring Location: Sta. 134+70.38, 976.2794

Boring Surface Elev.: **Reference:**

Wt. of Casing Hammer:		**Lbs.**	**Average Fall:**		**IN.**
Wt. of Sample Hammer:	140	**Lbs.**	**Average Fall:**	30	**IN.**
Type of: D-Sampler:	Split-Barrel	**O.D.**	**O.D. of Sampler:**	2	**IN.**
S-Sampler:		**O.D.**	**O.D. of Samp. Tube:**		**IN.**
U-Sampler:		**O.D.**	**O.D. of Samp. Tube:**		**IN.**
Core Bit:		**O.D.**	**O.D. of Rock Core:**		**IN.**

Casing Size: 3 1/4" **Inches** **From Depth of:** 0.0' **To:** 28.0'
Hollow Stem Auger: **From Depth of:** **To:**

Water Level Readings

Date	Time	Depth of Hole	Depth of Casing	Depth of Water	Elev. of Water
3/18/2009	3:00 p.m.	6.0'	4.0'	5.9'	-5.9

Pay Quantities:
2 1/2 in. Dia. Dry Sample Boring: 30.0 **Ft.;** **Dia. U-Sample Boring:** **Ft.**
No. of 2 in. Dia. Shelby Tubes: **;** **No. of:** **U-Samples:**
2 1/2 in. Dia. Contin. Sample Boring: **Ft.;** **Core Drilling in Rock:** **Ft.**

Boring Contractor: Walton Corporation
Driller: David
Helpers: Herberto

Depth (ft.)	Daily Progress	No.	Sample Depth	Blows/6"	Sample Description	Class./G.I.	Remarks
	3/18/09	1	0.0'	2 3 4 4	Moist loose brown silty fine to coarse sand.	A-2-4(0)	
			2.0'		24" RECOVERY		
2.53		2	2.0'	3 3 3 3	Moist loose brown silty fine to coarse sand w/ trace of gravel.	A-2-4(0)	
			4.0'		22" RECOVERY		
		3	4.0'	2 3 4 4	Wet loose brown silty fine to coarse sand w/ trace of gravel.	A-2-4(0)	Water @ 5.9'.
5.06			6.0'		21" RECOVERY		
		4	6.0'	8 4 4 3	Saturated loose brown fine sand w/some silt and coarse sand.	A-2-4(0)	
7.59			8.0'		23" RECOVERY		
		5	8.0'	2 2 4 3	Saturated loose brown fine to coarse sand w/ some silt, trace of gravel.	A-2-4(0)	
10.12			10.0'		20" RECOVERY		
		6	10.0'	6 5 4 5	Saturated loose brown fine sand w/some silt and coarse sand, trace of gravel.	A-2-4(0)	
			12.0'		24" RECOVERY		
12.65		7	12.0'	1 2 2 4	Saturated very loose orangish brown silty fine to coarse sand.	A-2-4(0)	
			14.0'		19" RECOVERY		

Remarks:

Reviewed By: Maureen Kelley **Soils Supervisor:** Randy Ferguson

STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

F.A. Project: S.R. 1, Little Heaven Grade Separated Intersection **Boring No.:** LH-SWM # 25
Contract: 24-122-02

Depth (ft.)	Daily Progress	No.	Sample Depth	Blows/6"	Sample Description	Class./G.I.	Remarks
		8	14.0'	2 3 2 3	Saturated loose orangish brown fine to coarse sand w/trace of silt and gravel.	A-3	
15.18			16.0'		23" RECOVERY		
		9	16.0'	3 3 4 5	Saturated loose orangish brown fine to coarse sand w/some silt, trace of gravel.	A-2-4(0)	
17.71			18.0'		23" RECOVERY		
		10	18.0'	6 5 5 4	Saturated loose brown fine to coarse sand w/ some silt, trace of gravel.	A-2-4(0)	
20.24			20.0'		22" RECOVERY		
		11	20.0'	6 6 9 12	Saturated medium dense brown fine to coarse sand w/some silt, trace of gravel.	A-2-4(0)	
			22.0'		24" RECOVERY		
		12	22.0'	5 5 11 12	Saturated medium dene brown fine sand w/ some coarse sand and silt, trace of gravel.	A-2-4(0)	
22.77			24.0'		23" RECOVERY		
		13	24.0'	2 5 16 18	Saturated medium dense brown coarse to fine sand w/some silt, trace of gravel.	A-1-b	
25.3			26.0'		23" RECOVERY		
		14	26.0'	22 25 17 12	Saturated dense brown coarse to fine sand w/ some silt and gravel.	A-1-b	
27.83			28.0'		24" RECOVERY		
		15	28.0'	21 23 25 17	Saturated dense brown coarse to fine sand w/ some silt and gravel.	A-1-b	
			30.0'		24" RECOVERY		
30.36					End of Boring		
32.89							
35.42							
37.95							

KEY TO SYMBOLS

Symbol	Description
Strata symbols	
	Silty sand
	Poorly graded sand with silt

Notes:

1. Exploratory borings were drilled on 3-18-2009 using a 3 1/4 - inch diameter hollow stem auger. Rig is a ATV CME 55.

2. No free water was encountered at the time of drilling or when re-checked the following day, unless recorded on 1st page.

3. Boring locations were taped from existing features and elevations extrapolated from survey unless otherwise reported.

4. These logs are subject to the limitations, conclusions, and recommendations in this report.

5. Results of tests conducted on samples recovered are reported on the logs.

6. All blow counts are uncorrected.