

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95

Boring No.: BR1-1-01

Contract: 25-113-01

Boring Location: Sta. 741+50

Boring Surface Elev.: + 19.0

Reference:

Wt. of Casing Hammer:
Wt. of Sample Hammer: 140
Type of: D-Sampler: Split-Barrel
S-Sampler:
U-Sampler:
Core Bit:

Lbs.
Lbs.
O.D.
O.D.
O.D.
O.D.

Average Fall:
Average Fall: 30
O.D. of Sampler: 2
O.D. of Samp. Tube:
O.D. of Samp. Tube:
O.D. of Rock Core:

IN.
IN.
IN.
IN.
IN.
IN.

Casing Size: 3 1/4"
Hollow Stem Auger:

Inches

From Depth of:
From Depth of: 0.0

To:
To: 50.0

Water Level Readings

| Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
|-----------|------|---------------|-----------------|----------------|----------------|
| 1/21/2009 | | 20.0 | 18.0 | 16.4 | |

Pay Quantities:

| | | | | | |
|---------------------------------------|-------|------|------------------------|-----------------------|-----|
| 2 1/2 in. Dia. Dry Sample Boring: | 101.0 | Ft.; | | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of | U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | | Ft. |

Boring Contractor: Walton Corporation

Driller: Gary Truver

Helpers: T. Kane

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|---------------|
| | 1/20/09 | 1 | 0.5' | 22 10 11 | Moist medium dense orange coarse to fine sand w/some gravel and silt. 14" RECOVERY | A-1-b | Topsoil - 3". |
| 3 | | 2 | 2.0' | 11 14 13 12 | Moist medium dense orange fine to coarse sand w/some silt and gravel. 17" RECOVERY | A-2-4(0) | |
| | | 3 | 4.0' | 30 50/4" | Moist very dense gray gravel w/some coarse to fine sand, trace of silt. 2" RECOVERY | A-1-a | |
| 6 | | 4 | 6.0' | 15 14 15 21 | Moist medium dense orange coarse to fine sand w/some silt, trace of gravel. 23" RECOVERY | A-1-b | |
| 9 | | 5 | 8.0' | 19 25 31 39 | Moist very dense orange coarse to fine sand w/some silt, trace of gravel. 22" RECOVERY | A-1-b | |
| 12 | | 6 | 10.0' | 30 27 40 27 | Moist very dense orange coarse sand w/some fine sand, silt and gravel. 17" RECOVERY | A-1-b | |
| | | 7 | 12.0' | 9 6 5 3 | Wet medium dense brown silty coarse to fine sand w/some gravel. 19" RECOVERY | A-2-4(0) | |
| 15 | | 8 | 14.0' | 1 1 2 1 | Wet very loose brown coarse to fine sand w/some silt and gravel. 11" RECOVERY | A-1-b | |
| | | 9 | 16.0' | 2 2 2 2 | Saturated very loose orange fine sand w/some coarse sand and silt, trace of gravel. | A-2-4(0) | |

Remarks: Mud Rotary @ 50.0'.

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-1-01

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|----------------|----------------------|---|-------------|---------|
| 18 | | | 18.0' | | 14" RECOVERY | | |
| | | 10 | 18.0' | 2 3 3 2 | Saturated loose orange fine sand w/some coarse sand and silt, trace of gravel. | A-2-4(0) | |
| | | | 20.0' | | 17" RECOVERY | | |
| 21 | | | | | | | |
| | | | | | | | |
| 24 | | | | | | | |
| | 1/21/09 | 11 | 24.0' | 1 W/R W/R 1 | Saturated very loose brown fine sand w/some silt and coarse sand. | A-2-4(0) | |
| | | | 26.0' | | 20" RECOVERY | | |
| 27 | | | | | | | |
| | | | | | | | |
| | | 12 | 29.0' | 3 3 5 9 | Saturated loose brown silty fine sand w/some coarse sand, trace of gravel. | A-2-4(0) | |
| 30 | | | 31.0' | | 22" RECOVERY | | |
| | | | | | | | |
| 33 | | | | | | | |
| | | 13 | 34.0' | 2 3 3 4 | Saturated loose light brown silty fine sand w/ trace of coarse sand and gravel. | A-2-4(0) | |
| 36 | | | 36.0' | | 21" RECOVERY | | |
| | | | | | | | |
| 39 | | 14 | 39.0' | 3 3 3 | Saturated loose light brown silty fine sand w/ trace of coarse sand. | A-2-4(0) | |
| | | | 40.5' | | 17" RECOVERY | | |
| | | 14A | 40.5' 41.0' | 5 | Saturated loose gray silty fine sand w/trace of coarse sand, organic matter and gravel. | A-2-4(0) | |
| 42 | | | | | 6" RECOVERY | | |
| | | | | | | | |
| 45 | | 15 | 44.0' | 2 2 4 4 | Saturated loose gray silty fine sand w/trace of coarse sand, organic matter and gravel. | A-2-4(0) | |

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Contract: 25-113-01

Boring No.: BR1-1-01

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|---------------------|
| | | | 46.0' | | 18" RECOVERY | | |
| 48 | | | | | | | |
| | | 16 | 49.0' | 4 5 6 9 | Saturated stiff gray clayey fine sandy silt w/ trace of gravel, coarse sand and organic matter. | A-4(0) | Mud Rotary @ 50.0'. |
| 51 | | | 51.0' | | 21" RECOVERY | | |
| | | | | | | | |
| 54 | | | | | | | |
| | | 17 | 54.0' | 6 10 13 12 | Saturated very stiff gray clayey fine sandy silt w/trace of organic matter and coarse sand. | A-4(0) | |
| | | | 56.0' | | 24" RECOVERY | | |
| 57 | | | | | | | |
| | | | | | | | |
| 60 | | 18 | 59.0' | 6 10 17 27 | Saturated medium dense grayish green silty fine sand w/trace of organic matter, coarse sand and gravel. | A-2-4(0) | Glauconite |
| | | | 61.0' | | 20" RECOVERY | | |
| 63 | | | | | | | |
| | | | | | | | |
| 66 | | 19 | 64.0' | 10 13 21 17 | Saturated dense green silty fine sand w/trace of coarse sand, organic matter and gravel. | A-2-4(0) | Glauconite |
| | | | 66.0' | | 23" RECOVERY | | |
| 69 | | | | | | | |
| | | | | | | | |
| 72 | | 20 | 69.0' | 4 6 11 14 | Saturated very stiff gray clayey silt w/some organic matter, trace of fine sand. | A-7-6(24) | |
| | | | 71.0' | | 24" RECOVERY | | |

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Contract: 25-113-01

Boring No.: BR1-1-01

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|------------|
| 75 | | 21 | 74.0' | 17 21 31 32 | Saturated very dense green silty fine sand w/ some organic matter, trace of gravel. 22" RECOVERY | A-2-4(0) | Glaucanite |
| | | | 76.0' | | | | |
| 78 | | | | | | | |
| | | 22 | 79.0' | 13 19 32 43 | Saturated very dense green silty fine sand w/ some organic matter, trace of gravel. 22" RECOVERY | A-2-4(0) | Glaucanite |
| 81 | | | 81.0' | | | | |
| | | | | | | | |
| 84 | | | | | | | |
| | 1/22/09 | 23 | 84.0' | 6 12 19 25 | Saturated hard gray fine sandy silt w/trace of organic matter. 20" RECOVERY | A-4(0) | |
| 87 | | | 86.0' | | | | |
| | | | | | | | |
| | | 24 | 89.0' | 6 11 15 19 | Saturated very stiff gray fine sandy silt w/ some organic matter. 21" RECOVERY | A-4(0) | |
| 90 | | | 91.0' | | | | |
| | | | | | | | |
| 93 | | | | | | | |
| | | 25 | 94.0' | 6 8 13 17 | Saturated very stiff gray clay w/some organic matter and fine sand. 18" RECOVERY | A-7-6(13) | |
| 96 | | | 96.0' | | | | |
| | | | | | | | |
| 99 | | 26 | 99.0' | 8 13 18 22 | Saturated hard gray fine sandy clay w/some organic matter. 24" RECOVERY | A-7-6(14) | |
| | | | 101.0' | | | | |
| | | | | | | | |
| 102 | | | | | End of Boring | | |

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KEY TO SYMBOLS

Symbol Description

Strata symbols



Silty sand



Poorly graded gravel
with silt



Poorly graded clayey
silty sand



Clayey sand



Low plasticity
clay



Silt

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Notes:

1. Exploratory borings were drilled on 1/20/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a Track CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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
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F.A. Project: U.S. 301, Maryland State Line to I-95

Boring No.: BR1-1-02

Contract: 25-113-01

Boring Location: Sta. 743+00

Boring Surface Elev.: + 17.5

Reference:

Wt. of Casing Hammer:
Wt. of Sample Hammer: 140
Type of: D-Sampler: Split-Barrel
S-Sampler:
U-Sampler:
Core Bit:

Lbs.
Lbs.
O.D.
O.D.
O.D.
O.D.

Average Fall:
Average Fall: 30
O.D. of Sampler: 2
O.D. of Samp. Tube:
O.D. of Samp. Tube:
O.D. of Rock Core:

IN.
IN.
IN.
IN.
IN.
IN.

Casing Size: 3 1/4"
Hollow Stem Auger:

Inches

From Depth of:
From Depth of: 0.0

To:
To: 34.0

Water Level Readings

| Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
|-----------|------|---------------|-----------------|----------------|----------------|
| 1/26/2009 | | 18.0 | 16.0 | 14.0 | |

Pay Quantities:

| | | | | |
|---------------------------------------|-------|------|------------------------|-----|
| 2 1/2 in. Dia. Dry Sample Boring: | 101.0 | Ft.; | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | Ft. |

Boring Contractor: Walton Corporation

Driller: Gary Truver

Helpers: T. Kane

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------|---|-------------|---------------|
| | 1/23/09 | 1 | 1.0' | 6 | Moist medium dense orange coarse to fine sand w/some silt and gravel. | A-1-b | Topsoil - 8". |
| | | | 2.0' | 5 | | | |
| 3 | | 2 | 2.0' | 9 | Moist medium dense orange fine to coarse sand w/some silt, trace of gravel. | A-2-4(0) | |
| | | | | 13 | | | |
| | | | | 14 | | | |
| | | | | 13 | | | |
| | | | 4.0' | | 19" RECOVERY | | |
| | | 3 | 4.0' | 5 | Moist medium dense orange fine sand w/some coarse sand, trace of silt and gravel. | A-3 | |
| | | | | 10 | | | |
| | | | | 14 | | | |
| | | | | 14 | | | |
| 6 | | | 6.0' | | 17" RECOVERY | | |
| | | 4 | 6.0' | 15 | Wet dense orange fine sand w/some coarse sand and silt, trace of gravel. | A-2-4(0) | |
| | | | | 15 | | | |
| | | | | 16 | | | |
| | | | | 16 | | | |
| | | | 8.0' | | 21" RECOVERY | | |
| | | 5 | 8.0' | 5 | Wet medium dense orange fine to coarse sand w/some silt, trace of gravel. | A-2-4(0) | |
| 9 | | | | 10 | | | |
| | | | | 12 | | | |
| | | | | 14 | | | |
| | | | 10.0' | | 19" RECOVERY | | |
| | | 6 | 10.0' | 12 | Wet dense orange fine sand w/some coarse sand, trace of silt and gravel. | A-3 | |
| | | | | 16 | | | |
| | | | | 23 | | | |
| | | | | 22 | | | |
| 12 | | | 12.0' | | 21" RECOVERY | | |
| | | 7 | 12.0' | 13 | Wet dense orange fine to coarse sand w/some silt, trace of gravel. | A-2-4(0) | |
| | | | | 20 | | | |
| | | | | 18 | | | |
| | | | | 15 | | | |
| | | | 14.0' | | 21" RECOVERY | | |
| | | 8 | 14.0' | 4 | Wet medium dense brown fine to coarse sand w/some silt, trace of gravel. | A-2-4(0) | |
| 15 | | | 15.0' | 10 | | | |
| | | 8A | 15.0' | 12 | 7" RECOVERY | A-3 | |
| | | | 16.0' | 12 | Wet medium dense orange fine to coarse sand w/trace of silt and gravel. | A-3 | |
| | | 9 | 16.0' | 7 | | | |
| | | | | 6 | 12" RECOVERY | | |
| | | | | 8 | | | |
| | | | | 9 | Saturated medium dense orange fine to coarse sand w/trace of silt and gravel. | | |

Remarks: Mud Rotary @ 34.0'.

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-1-02

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|-----------------------|--|-------------|---------------------|
| | 1/26/09 | 10 | 18.0' | 2 3 4 2 | 21" RECOVERY | A-1-b | |
| | | | 18.0' | | Saturated loose brown coarse to fine sand w/ some silt and gravel. | | |
| 21 | | | 20.0' | | 17" RECOVERY | | |
| 24 | | | | | | | |
| | | 11 | 24.0' | W/R W/R 2 12 | Saturated very loose light brown coarse sand and gravel w/some fine sand, trace of silt. | A-1-b | |
| | | | 26.0' | | 10" RECOVERY | | |
| 27 | | | | | | | |
| | | 12 | 29.0' | 2 3 3 5 | Saturated loose gray clayey fine sand w/some coarse sand, trace of gravel and organic matter. | A-2-4(0) | |
| 30 | | | 31.0' | | 24" RECOVERY | | |
| 33 | | | | | | | |
| | | 13 | 34.0' | 3 4 4 5 | Saturated firm gray clayey fine sandy silt w/ trace of coarse sand and organic matter. | A-4(0) | Mud Rotary @ 34.0'. |
| 36 | | | 36.0' | | 24" RECOVERY | | |
| 39 | | | | | | | |
| | | 14 | 39.0' | 3 3 4 5 | Saturated loose gray silty fine sand w/trace of coarse sand and organic matter. | A-2-4(0) | |
| 42 | | | 41.0' | | 19" RECOVERY | | |
| 45 | | | | | | | |
| | | 15 | 44.0' | 4 5 7 9 | Saturated medium dense gray silty fine sand w/trace of clay, organic matter, coarse sand and gravel. | A-2-4(0) | |
| | | | 46.0' | | 19" RECOVERY | | |

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Contract: 25-113-01

Boring No.: BR1-1-02

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|-------------------------|----------------------|---|-------------|------------|
| 48 | | | | | | | |
| 51 | | 16 | 49.0' | 3 7 8 10 | Saturated stiff gray fine sandy silt w/some clay, trace of organic matter and coarse sand. 21" RECOVERY | A-4(0) | |
| 54 | | | 51.0' | | | | |
| 57 | | 17 | 54.0' | 6 10 13 22 | Saturated medium dense grayish green silty fine sand w/trace of organic matter, coarse sand and gravel. 20" RECOVERY | A-2-4(0) | Glauconite |
| 60 | | | 56.0' | | | | |
| 63 | | 18 | 59.0' | 10 20 24 37 | Saturated dense green silty fine sand w/trace of organic matter and coarse sand. 20" RECOVERY | A-2-4(0) | Glauconite |
| 66 | | | 61.0' | | | | |
| 69 | | 19 | 64.0' | 6 8 13 14 | Saturated medium dense green fine sand w/some clay, trace of organic matter and coarse sand. 21" RECOVERY | A-2-4(0) | Glauconite |
| 72 | | | 66.0' | | | | |
| | | 20 | 69.0' | 5 8 12 | Saturated very stiff gray clay w/some organic matter, trace of fine sand. 18" RECOVERY | A-7-6(27) | |
| | | 20A | 70.5' 70.5' 71.0' | 23 | Saturated medium dense gray silty fine sand w/some gravel, trace of organic matter and coarse sand. 6" RECOVERY | A-2-4(0) | |
| | | 21 | 74.0' | 7 | | | |

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Contract: 25-113-01

Boring No.: BR1-1-02

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|--|-------------|---------|
| 75 | | | 76.0' | 14 19 27 | Saturated dense grayish green silty fine sand w/trace of organic matter and coarse sand. 22" RECOVERY | A-2-4(0) | |
| 78 | | | | | | | |
| 81 | 1/27/09 | 22 | 79.0' | 7 12 13 21 | Saturated medium dense grayish green silty fine sand w/trace of organic matter. 21" RECOVERY | A-2-4(0) | |
| 84 | | | | | | | |
| 84 | | 23 | 84.0' | 7 10 16 19 | Saturated very stiff grayish green fine sandy silt w/trace of organic matter. 22" RECOVERY | A-4(0) | |
| 87 | | | 86.0' | | | | |
| 90 | | 24 | 89.0' | 5 8 15 16 | Saturated very stiff gray fine sandy silt w/ some organic matter. 22" RECOVERY | A-4(1) | |
| 93 | | | 91.0' | | | | |
| 96 | | 25 | 94.0' | 4 6 11 14 | Saturated very stiff gray fine sandy clay w/ some organic matter. 24" RECOVERY | A-7-6(12) | |
| 99 | | | 96.0' | | | | |
| 99 | | 26 | 99.0' | 5 8 11 13 | Saturated very stiff gray fine sandy clay w/ some organic matter. 24" RECOVERY | A-7-6(12) | |
| 102 | | | 101.0' | | | | |
| | | | | | End of Boring | | |

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KEY TO SYMBOLS

Symbol Description

Strata symbols



Silty sand



Poorly graded sand
with silt



Well graded sand
with silt



Poorly graded clayey
silty sand



High plasticity
clay



Silt



Low plasticity
clay

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Notes:

1. Exploratory borings were drilled on 1/23/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a Track CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to I-95

Boring No.: BR1-2-01

Contract: 25-113-01

Boring Location: Sta. 742+29.90, 45' Rt. C.L.

Boring Surface Elev.: 12.40

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: | 3 | IN. |
| | U-Sampler: Ball Sampler | O.D. | O.D. of Samp. Tube: | 3 | IN. |
| | Core Bit: | O.D. | O.D. of Rock Core: | | IN. |

| | | | | | | |
|---------------------------|-------|---------------|-----------------------|------|------------|-------|
| Casing Size: | 3 1/4 | Inches | From Depth of: | | To: | |
| Hollow Stem Auger: | | | From Depth of: | 0.0' | To: | 31.0' |

| | | | | | | |
|-----------------------------|-------------|-------------|----------------------|------------------------|-----------------------|-----------------------------|
| Water Level Readings | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| | 3/20/08 | | 14.0' | 12.0' | 11.0' | 1.4 12.4 12.4 12.4 |

Pay Quantities:

| | | | | | |
|---------------------------------------|-------|-------------|-------------------------------|------------------------------|------------|
| 2 1/2 in. Dia. Dry Sample Boring: | 101.0 | Ft.; | 3 | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of | U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | | Ft. |

Boring Contractor: Walton Corporation
Driller: Dave Burt
Helpers: T. Kane

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|----------------|----------------------|--|-------------|-----------------------------|
| | | 1 | 1.5' | 14 | | A-1-b | Asphalt - 12". Stone - 8" . |
| 2.49 | | 2 | 2.0' 2.0' | 11 10 9 11 | Moist medium dense brown coarse to fine sand and gravel, trace of silt. 4" RECOVERY | A-2-4(0) | Fill material. |
| | | | 4.0' | | 16" RECOVERY | | |
| 4.98 | | 3 | 4.0' 4.0' | 6 17 20 18 | Wet hard brown and black fine sandy silt w/ some coarse sand and gravel, trace of organic matter and clay. | A-4(0) | Fill material. |
| | | | 6.0' | | 14" RECOVERY | | |
| 7.47 | | 4 | 6.0' 6.0' | 8 10 12 18 | Wet very stiff brown and black fine sandy silt w/ some coarse sand and clay, trace of gravel. | A-4(0) | Fill material. |
| | | | 8.0' | | 18" RECOVERY | | |
| 9.96 | | 5 | 8.0' 8.0' | 5 12 10 10 | Wet very stiff brown fine to coarse sandy silt, trace of gravel. | A-4(0) | Fill material. |
| | | | 10.0' | | 20" RECOVERY | | |
| | | 6 | 10.0' 10.0' | 10 12 24 18 | Wet hard brown fine to coarse sandy silt w/ some gravel. | A-4(0) | Fill material, gas smell. |
| | | | 12.0' | | 19" RECOVERY | | |
| 12.45 | | 7 | 12.0' 12.0' | 4 8 8 | Saturated medium dense brown silty coarse to fine sand w/ some gravel. | A-2-4(0) | Fill material, gas smell. |
| | | | 14.0' | | 15" RECOVERY | | |
| 14.94 | | 8 | 14.0' 14.0' | 3 4 9 9 | Saturated medium dense light brown coarse to fine sand w/ some clay, trace of gravel. | A-2-4(0) | Fill material. |

Remarks: Mud Rotary at 31.0'

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-2-01

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|--|
| | | | 16.0' | | 14" RECOVERY | | |
| | | 9 | 16.0' | 6 4 5 7 | Saturated loose light brown silty coarse to fine sand, trace of gravel. | A-2-4(0) | Fill material. |
| 17.43 | | | 17.5' | | 18" RECOVERY | | |
| | | 9A | 17.5' | 7 | Visual Description: Saturated firm dark brown organic coarse sandy silt w/ some fine sand. | | |
| | | 10 | 18.0' | 7 10 12 17 | 6" RECOVERY Saturated very stiff dark brown organic (peat) coarse sandy silt w/ some fine sand, trace of gravel. | A-5(5) | |
| 19.92 | | | 20.0' | | 11" RECOVERY | | |
| | | U-1 | 20.0' | | Saturated dark brown coarse sand w/ some silt and organic matter, trace of fine sand and gravel. | A-1-b | Bottom half of sample in tube fell out; peat material on top half. |
| | | | 22.0' | | 12" RECOVERY | | |
| 22.41 | | 11 | 22.0' | 24 26 27 35 | Saturated very dense light brown gravel and coarse sand w/ some fine sand, trace of silt. | A-1-a | |
| | | | 24.0' | | 18" RECOVERY | | |
| 24.9 | | 12 | 24.0' | 3 2 4 4 | Saturated loose gray clayey fine sand, trace of coarse sand and gravel. | A-2-4(0) | |
| | | | 26.0' | | 20" RECOVERY | | |
| | | 13 | 26.0' | 2 1 2 2 | Visual Description: Saturated loose gray clayey fine sand, trace of coarse sand. | | Sample brought to GTA lab for pH testing. |
| 27.39 | | | 28.0' | | 20" RECOVERY | | |
| | | | 29.0' | | 23" RECOVERY | | |
| 29.88 | | 14 | 29.0' | 2 2 4 6 | Saturated firm gray clayey fine sandy silt, trace of coarse sand and gravel. | A-4(0) | |
| | | | 31.0' | | 23" RECOVERY | | |
| 32.37 | | | 34.0' | | 16" RECOVERY | | |
| | | 15 | 34.0' | 5 6 7 9 | Saturated medium dense gray silty fine sand, trace of coarse sand and gravel. | A-2-4(0) | |
| 34.86 | | | 36.0' | | 16" RECOVERY | | |
| | | | 37.35 | | | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-2-01

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|-------------|
| 39.84 | | 16 | 39.0' | 3 5 3 6 | Saturated firm gray fine sandy silt w/ some clay, trace of coarse sand and gravel. | A-4(0) | |
| | | | 41.0' | | 16" RECOVERY | | |
| 42.33 | | | | | | | |
| 44.82 | | 17 | 44.0' | 4 9 11 19 | Saturated very stiff gray clayey fine sandy silt, trace of organic matter and gravel. | A-4(0) | |
| | | | 46.0' | | 23" RECOVERY | | |
| 47.31 | | | | | | | |
| 49.8 | | 18 | 49.0' | 4 9 15 19 | Saturated medium dense dark gray silty fine sand w/ some clay, trace of organic matter, gravel, and coarse sand. | A-2-4(0) | |
| | | | 51.0' | | 20" RECOVERY | | |
| 52.29 | | | | | | | |
| 54.78 | | 19 | 54.0' | 16 25 29 44 | Saturated hard dark green fine sandy silt, trace of organic matter, coarse sand, and gravel. | A-4(0) | Glauconitic |
| | | | 56.0' | | 22" RECOVERY | | |
| 57.27 | | | | | | | |
| 59.76 | | 20 | 59.0' | 7 9 11 17 | Saturated medium dense dark green silty fine sand, trace of organic matter and coarse sand. | A-2-4(0) | Glauconitic |
| | | | 61.0' | | 24" RECOVERY | | |
| 62.25 | | | | | | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-2-01

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|--|-------------|-------------|
| 64.74 | | 21 | 64.0' | 4 8 8 11 | Saturated very stiff dark green silty clay w/ some organic matter, trace of fine to coarse sand. 22" RECOVERY | A-7-6(17) | |
| 67.23 | | | 66.0' | | | | |
| 69.72 | | 22 | 69.0' | 9 14 21 23 | Saturated hard dark green fine sandy silt, trace of organic matter and gravel. 22" RECOVERY | A-4(0) | Glaucanitic |
| 72.21 | | | 71.0' | | | | |
| 74.7 | | 23 | 74.0' | 7 18 22 24 | Saturated dense dark green silty fine sand, trace of organic matter. 15" RECOVERY | A-2-4(0) | Glaucanitic |
| 77.19 | | | 76.0' | | | | |
| 79.68 | | 24 | 79.0' | 5 8 12 16 | Saturated very stiff dark green fine sandy silt, trace of organic matter and mica. 18" RECOVERY | A-4(0) | |
| 82.17 | | | 81.0' | | | | |
| 84.66 | | 25 | 84.0' | 8 9 12 15 | Saturated very stiff dark gray clay w/ some fine sand and organic matter, trace of gravel and mica. | A-7-6(15) | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-2-01

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|---------|
| | | | 86.0' | | 24" RECOVERY | | |
| 87.15 | | | | | | | |
| | | 26 | 89.0' | 6 12 13 14 | Saturated very stiff dark gray fine sandy clay, trace of organic matter and mica. | A-7-6(8) | |
| 89.64 | | | 91.0' | | 24" RECOVERY | | |
| | | | | | | | |
| 92.13 | | | | | | | |
| | | 27 | 94.0' | 9 10 12 16 | Saturated very stiff gray silty fine sandy clay w/ some organic matter, trace of coarse sand. | A-7-6(17) | |
| 94.62 | | | 96.0' | | 21" RECOVERY | | |
| | | | | | | | |
| 97.11 | | | | | | | |
| | | 28 | 99.0' | 11 17 21 20 | Saturated hard gray clay w/ some fine sand and organic matter. | A-6(11) | |
| 99.6 | | | 101.0' | | 24" RECOVERY | | |
| | | | | | Boring terminated at 101.0 feet. | | |
| 102.09 | | | | | | | |
| | | | | | | | |
| 104.58 | | | | | | | |
| | | | | | | | |
| 107.07 | | | | | | | |

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KEY TO SYMBOLS

Symbol Description

Strata symbols



Poorly graded sand
with silt



Silty sand



Poorly graded clayey
silty sand



Elastic silt



Poorly graded sand



Low plasticity
clay



Silt

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Notes:

1. Exploratory boring was drilled on 3/20/2008 using a 3 1/4-inch diameter continuous flight power auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at time of drilling. Boring backfilled upon completion.
3. Surveyed boring location and elevation was provided by Century Engineering.
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 SPT blow counts are uncorrected.

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95

Boring No.: BR1-2-02

Contract: 25-113-01

Boring Location: Sta. 743+62.04, 44' Rt. C.L.

Boring Surface Elev.: 12.50

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: Ball Sampler | | O.D. | O.D. of Samp. Tube: 3 | | IN. |
| Core Bit: | | O.D. | O.D. of Rock Core: | | IN. |

| | | | | | |
|---------------------------|---------------|----------------------------|--|------------|-------|
| Casing Size: 3 1/4 | Inches | From Depth of: | | To: | |
| Hollow Stem Auger: | | From Depth of: 0.0' | | To: | 36.0' |

| | | | | | | |
|-----------------------------|--|-------------|----------------------|------------------------|-----------------------|-----------------------------|
| Water Level Readings | | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| Date 3/20/08 | | | 14.0' | 12.0' | 11.3' | 1.2 12.5 12.5 12.5 |

Pay Quantities:

| | | | | | | |
|---------------------------------------|-------|-------------|--|-------------------------------|------------------------------|------------|
| 2 1/2 in. Dia. Dry Sample Boring: | 101.0 | Ft.; | | 3 | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | | No. of | U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | | | Core Drilling in Rock: | | |

Boring Contractor: Walton Corporation
Driller: Gary Truver, Sr.
Helpers: D. Zmijewski

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|-------------------|--|-------------|--|
| | | 1 | 0.0' | | 0" RECOVERY | | From 0.0 to 1.0', 12" of hot mix asphalt; from 1.0' to 2.0', 12" of crushed stone. |
| 2.49 | | 2 | 2.0' | 4 6 12 6 | Moist medium dense brown coarse to fine sand and gravel w/ some clay. | A-1-b | Fill material. |
| | | | 4.0' | | 13" RECOVERY | | |
| 4.98 | | 3 | 4.0' | 4 6 5 5 | Wet stiff brown gravelly silt w/ some fine to coarse sand and clay. | A-4(0) | Fill material. |
| | | | 6.0' | | 17" RECOVERY | | |
| 7.47 | | 4 | 6.0' | 4 8 9 10 | Wet very stiff brown clayey silt w/ some fine to coarse sand, trace of gravel. | A-4(2) | Fill material. |
| | | | 8.0' | | 17" RECOVERY | | |
| 9.96 | | 5 | 8.0' | 1 3 4 3 | Wet firm brown clayey silt w/ some fine to coarse sand, trace of gravel. | A-4(2) | Fill material. |
| | | | 10.0' | | 18" RECOVERY | | |
| | | 6 | 10.0' | 3 3 3 3 | Saturated firm brown clayey silt, trace of fine to coarse sand and gravel. | A-4(3) | Fill material. |
| 12.45 | | U-1 | 12.0' | | 21" RECOVERY | | Press Sample - Shelby Tube. Fill material. |

Remarks: Mud Rotary at 36.0'

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-2-02

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|----------------|---------------------|--|-------------|--|
| 14.94 | | 7 | 14.0' 14.0' | 1 1 3 3 | 21" RECOVERY Saturated soft brown organic (peat) silt w/ some coarse sand, trace of fine sand and gravel. | A-5(9) | |
| 17.43 | | 8 | 16.0' 16.0' | 3 5 6 6 | 22" RECOVERY Saturated stiff brown organic (peat) silt w/ some coarse to fine sand, trace of gravel. | A-5(3) | |
| 19.92 | | 9 | 18.0' 18.0' | 1 3 12 6 | 24" RECOVERY Saturated very loose brown organic fine to coarse sand w/ some silt, trace of gravel. | A-2-4(0) | |
| 22.41 | | 9A | 19.0' 20.0' | 12 16 12 6 | 8" RECOVERY Saturated medium dense brown gravel and coarse sand w/ some fine sand, trace of silt. 8" RECOVERY | A-1-a | |
| 24.9 | | 10 | 24.0' | 1 3 3 4 | Saturated firm gray clayey fine sandy silt, trace of coarse sand and gravel. | A-4(0) | |
| 27.39 | | 11 | 26.0' 26.0' | 3 4 5 6 | 24" RECOVERY Visual Description: Saturated firm gray clayey fine sandy silt, trace of coarse sand and gravel. | | Sample brought to GTA lab for pH testing. |
| 29.88 | | 12 | 29.0' 31.0' | 2 2 3 4 | 24" RECOVERY Saturated firm gray fine sandy silt, trace of coarse sand and gravel. | A-4(0) | |
| 32.37 | | U-2 | 32.0' | | 24" RECOVERY Saturated medium dense gray fine sand w/ some silt, trace of coarse sand and gravel. | A-2-4(0) | Press Sample - Shelby Tube. |
| 34.86 | | 13 | 34.0' 34.0' | 3 5 8 9 | 24" RECOVERY Saturated stiff gray fine sandy silt, trace of coarse sand and gravel. | A-4(0) | |
| 37.35 | | | 36.0' | | 24" RECOVERY | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-2-02

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|-------------|
| 39.84 | | 14 | 39.0' | 4 7 10 9 | Saturated very stiff gray fine sandy silt, trace of coarse sand and gravel. | A-4(0) | |
| | | | 41.0' | | 24" RECOVERY | | |
| 42.33 | | | | | | | |
| 44.82 | | 15 | 44.0' | 5 9 13 16 | Saturated very stiff gray clayey fine sandy silt, trace of coarse sand and gravel. | A-4(1) | |
| | | | 46.0' | | 22" RECOVERY | | |
| 47.31 | | | | | | | |
| 49.8 | | 16 | 49.0' | 9 11 17 24 | Saturated very stiff dark gray fine sandy silt, trace of coarse sand, organic matter, and gravel. | A-4(0) | |
| | | | 51.0' | | 23" RECOVERY | | |
| 52.29 | | | | | | | |
| 54.78 | | 17 | 54.0' | 15 23 40 50 | Saturated hard dark green fine sandy silt, trace of coarse sand and organic matter. | A-4(0) | Glauconitic |
| | | | 56.0' | | 18" RECOVERY | | |
| 57.27 | | | | | | | |
| 59.76 | | 18 | 59.0' | 9 11 19 19 | Saturated hard dark green clayey fine sandy silt, trace of organic matter, coarse sand, and gravel. | A-4(2) | Glauconitic |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-2-02

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|-------------|
| | | | 61.0' | | 19" RECOVERY | | |
| 62.25 | | | | | | | |
| | | 19 | 64.0' | 6 11 21 30 | Saturated hard dark green clay w/ some fine sand and organic matter, trace of coarse sand and gravel. | A-7-6(15) | Glauconitic |
| 64.74 | | | 66.0' | | 14" RECOVERY | | |
| | | | | | | | |
| 67.23 | | | | | | | |
| | | 20 | 69.0' | 12 16 21 29 | Saturated hard dark green fine sandy silt, trace of organic matter and coarse sand. | A-4(0) | Glauconitic |
| 69.72 | | | 71.0' | | 24" RECOVERY | | |
| | | | | | | | |
| 72.21 | | | | | | | |
| | | 21 | 74.0' | 10 19 25 30 | Saturated hard dark green fine sandy silt, trace of organic matter and mica. | A-4(0) | Glauconitic |
| 74.7 | | | 76.0' | | 17" RECOVERY | | |
| | | | | | | | |
| 77.19 | | | | | | | |
| | | 22 | 79.0' | 8 10 20 35 | Saturated very stiff dark green fine sandy silt w/ some organic matter and mica. | A-4(0) | Glauconitic |
| 79.68 | | | 81.0' | | 22" RECOVERY | | |
| | | | | | | | |
| 82.17 | | | | | | | |
| | | 23 | 84.0' | 8 11 | Saturated very stiff dark green clayey fine | A-4(6) | Glauconitic |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-2-02









| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|--------------|
| 84.66 | | | | 15 19 | sandy silt w/ some organic matter, trace of gravel and mica. 23" RECOVERY | | |
| | | | 86.0' | | | | |
| 87.15 | | | | | | | |
| 89.64 | | 24 | 89.0' | 8 10 13 15 | Saturated very stiff dark green clay w/ some fine sand and organic matter, trace of gravel and mica. 22" RECOVERY | A-7-6(16) | Glaucconitic |
| | | | 91.0' | | | | |
| 92.13 | | | | | | | |
| 94.62 | | 25 | 94.0' | 11 13 15 18 | Saturated very stiff dark green silty clay w/ some fine sand and organic matter, trace of coarse sand and mica. 24" RECOVERY | A-7-5(15) | Glaucconitic |
| | | | 96.0' | | | | |
| 97.11 | | | | | | | |
| 99.6 | | 26 | 99.0' | 8 14 18 22 | Saturated hard dark green and gray mottled clay w/ some organic matter, trace of fine sand and mica. 24" RECOVERY | A-7-6(24) | Glaucconitic |
| | | | 101.0' | | | | |
| 102.09 | | | | | Boring terminated at 101.0 feet. | | |
| 104.58 | | | | | | | |
| 107.07 | | | | | | | |

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KEY TO SYMBOLS

Symbol Description

Strata symbols

| | |
|--|---------------------------------|
|  | Poorly graded clayey silty sand |
|  | Low plasticity clay |
|  | Silty low plasticity clay |
|  | Elastic silt |
|  | Silty sand |
|  | Poorly graded sand |
|  | Clayey sand |
|  | Silt |

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Notes:

1. Exploratory boring was drilled on 3/20/2008 using a 3 1/4-inch diameter continuous flight power auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at time of drilling. Boring backfilled upon completion.
3. Boring elevation was obtained from Figure A-2, Structure BR1-2 Exploration Plan.
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 SPT blow counts are uncorrected.

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95

Boring No.: BR1-3-01

Contract: 25-113-01

Boring Location: Sta. 713+36.63, 4' Lt. C.L.

Boring Surface Elev.: 47.10

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: Ball Sampler | | O.D. | O.D. of Samp. Tube: 3 | | IN. |
| Core Bit: | | O.D. | O.D. of Rock Core: | | IN. |

| | | | | | |
|---------------------------|---------------|----------------------------|--|------------------|--|
| Casing Size: 3 1/4 | Inches | From Depth of: | | To: | |
| Hollow Stem Auger: | | From Depth of: 0.0' | | To: 74.0' | |

| | | | | | | |
|-----------------------------|-------------|-------------|----------------------|------------------------|-----------------------|------------------------------|
| Water Level Readings | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| | 4/11/08 | | 32.0' | 30.0' | 28.0' | 19.1 47.1 47.1 47.1 |

Pay Quantities:

| | | | | | |
|---------------------------------------|-------|-------------|---|-------------------------------|------------|
| 2 1/2 in. Dia. Dry Sample Boring: | 101.0 | Ft.; | 3 | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | | No. of U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | | Core Drilling in Rock: | Ft. |

Boring Contractor: Walton Corporation
Driller: Jason Truver
Helpers: J. Hillebrand

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|------------------|--|-------------|-----------------------|
| | | 1 | 1.0' | 2 2 | Moist soft brown clayey fine sandy silt w/ some coarse sand, trace of gravel. 12" RECOVERY | A-4(3) | Cultivated Soil - 8". |
| 2.49 | | 2 | 2.0' | 6 8 7 8 | Moist medium dense orange coarse sand and gravel w/ some silt and fine sand. 18" RECOVERY | A-1-b | |
| 4.98 | | 3 | 4.0' | 4 4 4 4 | Moist loose orange coarse to fine sand w/ some silt, trace of gravel. 20" RECOVERY | A-1-b | |
| 7.47 | | 4 | 6.0' | 4 6 8 3 | Moist medium dense orange coarse sand w/ some fine sand and silt, trace of gravel. 19" RECOVERY | A-1-b | |
| 9.96 | | 5 | 8.0' | 3 3 4 4 | Moist loose orange silty fine to coarse sand, trace of gravel. 18" RECOVERY | A-2-4(0) | |
| 12.45 | | 6 | 10.0' | 4 4 5 4 | Moist loose orange fine to coarse sand w/ some silt, trace of gravel. 19" RECOVERY | A-2-4(0) | |
| | | 7 | 12.0' | 2 2 4 3 | Moist loose orange silty fine to coarse sand, trace of gravel. 22" RECOVERY | A-2-4(0) | |
| | | 8 | 14.0' | 3 4 4 4 | Moist loose orange coarse to fine sand w/ some silt, trace of gravel. | A-1-b | |

Remarks: Mud Rotary at 74.0'

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-01

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|--------------------|---|-------------|---------|
| | | | 16.0' | | 22" RECOVERY | | |
| | | 9 | 16.0' | 4 6 4 5 | Moist loose orange coarse to fine sand w/ some silt, trace of gravel. | A-1-b | |
| 17.43 | | | | | | | |
| | | | 18.0' | | 21" RECOVERY | | |
| | | 10 | 18.0' | 2 4 4 5 | Moist loose orange coarse sand w/ some fine sand, silt, and gravel. | A-1-b | |
| 19.92 | | | 20.0' | | 19" RECOVERY | | |
| | | | | | | | |
| 22.41 | | | | | | | |
| | | 11 | 24.0' | 5 3 3 4 | Wet loose orange coarse to fine sand w/ some silt, trace of gravel. | A-1-b | |
| 24.9 | | | 26.0' | | 19" RECOVERY | | |
| | | | | | | | |
| 27.39 | | | | | | | |
| | | 12 | 29.0' | 1 50 | Wet very dense orange coarse sand and gravel w/ some fine sand, trace of silt. | A-1-b | |
| 29.88 | | | 30.0' | | 7" RECOVERY | | |
| | | | | | | | |
| 32.37 | | | | | | | |
| | | 13 | 34.0' | 9 8 11 18 | Saturated medium dense brown fine to coarse sand w/ some silt, trace of gravel. | A-2-4(0) | |
| 34.86 | | | 36.0' | | 15" RECOVERY | | |
| | | | | | | | |
| 37.35 | | | | | | | |

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AUGUST 2015

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-01

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|---------|
| 39.84 | | 14 | 39.0' | 13 11 11 15 | Saturated medium dense brown fine sand w/ some silt and coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 41.0' | | 16" RECOVERY | | |
| 42.33 | | | | | | | |
| 44.82 | | 15 | 44.0' | 10 15 19 22 | Saturated dense brown fine sand w/ some silt and coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 46.0' | | 19" RECOVERY | | |
| 47.31 | | | | | | | |
| 49.8 | | 16 | 49.0' | 10 15 17 25 | Saturated dense brown fine sand w/ some coarse sand and silt, trace of gravel. | A-2-4(0) | |
| | | | 51.0' | | 22" RECOVERY | | |
| 52.29 | | | | | | | |
| 54.78 | | 17 | 54.0' | 12 16 18 20 | Saturated dense brown fine sand w/ some coarse sand, trace of silt. | A-3 | |
| | | | 56.0' | | 18" RECOVERY | | |
| 57.27 | | | | | | | |
| 59.76 | | 18 | 59.0' | 10 15 21 24 | Saturated dense light brown fine sand w/ some silt, trace of coarse sand. | A-2-4(0) | |
| | | | 61.0' | | 18" RECOVERY | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-01

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|-----------------------------|
| 62.25 | | | | | | | |
| 64.74 | | 19 | 64.0' | 14 23 31 48 | Saturated very dense gray silty fine sand w/ some coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 66.0' | | 19" RECOVERY | | |
| 67.23 | | | | | | | |
| 69.72 | | 20 | 69.0' | 11 14 24 25 | Saturated dense gray silty fine sand w/ some coarse sand. | A-2-4(0) | |
| | | | 71.0' | | 20" RECOVERY | | |
| 72.21 | | U-1 | 72.0' | | Saturated gray silty fine to coarse sand with a trace of gravel. | A-2-4(0) | Press Sample - Shelby Tube. |
| | | | 73.0' | | 11.5" RECOVERY | | |
| 74.7 | | 21 | 74.0' | 6 14 21 34 | Saturated hard gray clayey fine sandy silt, trace of coarse sand and gravel. | A-4(0) | |
| | | | 76.0' | | 24" RECOVERY | | |
| 77.19 | | | | | | | |
| 79.68 | | 22 | 79.0' | 8 14 21 48 | Saturated hard gray clayey fine sandy silt, trace of coarse sand and gravel. | A-4(0) | |
| | | | 81.0' | | 23" RECOVERY | | |
| 82.17 | | | | | | | |
| 84.66 | | 23 | 84.0' | 6 12 20 30 | Saturated hard dark gray clayey fine sandy silt w/ some coarse sand, trace of organic matter. | A-4(1) | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-01

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|---------|
| | | | 86.0' | | 23" RECOVERY | | |
| 87.15 | | | | | | | |
| | | 24 | 89.0' | 6 10 14 26 | Saturated very stiff dark gray clayey fine sandy silt w/ some coarse sand, trace of gravel and organic matter. | A-4(0) | |
| 89.64 | | | 91.0' | | 24" RECOVERY | | |
| | | | | | | | |
| 92.13 | | | | | | | |
| | | 25 | 94.0' | 10 17 24 39 | Saturated hard gray-green fine sandy silt, trace of coarse sand, gravel, and organic matter. | A-4(0) | |
| 94.62 | | | 96.0' | | 24" RECOVERY | | |
| | | | | | | | |
| 97.11 | | | | | | | |
| | | 26 | 99.0' | 9 12 16 22 | Saturated very stiff gray-green clayey fine sandy silt, trace of organic matter, gravel, and coarse sand. | A-4(0) | |
| 99.6 | | | 101.0' | | 24" RECOVERY | | |
| | | | | | Boring terminated at 101.0 feet. | | |
| 102.09 | | | | | | | |
| | | | | | | | |
| 104.58 | | | | | | | |
| | | | | | | | |
| 107.07 | | | | | | | |

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KEY TO SYMBOLS

Symbol Description

Strata symbols



Low plasticity
clay



Silty sand



Well graded sand
with silt



Poorly graded sand
with silt



Clayey sand



Poorly graded clayey
silty sand

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AUGUST 2015

Notes:

1. Exploratory boring was drilled on 4/11/2008 using a 3 1/4-inch diameter continuous flight power auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at time of drilling. Boring backfilled upon completion.
3. Surveyed boring locations and elevations were provided by Century Engineering.
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 SPT blow counts are uncorrected.

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95

Boring No.: BR1-3-02

Contract: 25-113-01

Boring Location: Sta. 726+60.00, 35' Rt. C.L.

Boring Surface Elev.: 19.96

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: Ball Sampler | | O.D. | | O.D. of Samp. Tube: 3 | | IN. |
| Core Bit: | | O.D. | | O.D. of Rock Core: | | IN. |

| | | | | | |
|---------------------------|---------------|----------------------------|--|------------------|--|
| Casing Size: 3 1/4 | Inches | From Depth of: | | To: | |
| Hollow Stem Auger: | | From Depth of: 0.0' | | To: 41.0' | |

| Water Level Readings | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
|----------------------|---------|------|---------------|-----------------|----------------|----------------|
| | 3/20/08 | | 10.0' | 8.0' | 6.2' | 13.8 |
| | | | | | | 20.0 |
| | | | | | | 20.0 |
| | | | | | | 20.0 |

Pay Quantities:

| | | | | | | | |
|---------------------------------------|-------|-------------|--|-------------------------------|------------------------------|--|------------|
| 2 1/2 in. Dia. Dry Sample Boring: | 101.0 | Ft.; | | No. of: 3 | Dia. U-Sample Boring: | | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | | Core Drilling in Rock: | U-Samples: | | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | | | | | | |

Boring Contractor: Walton Corporation
Driller: Jason Truver
Helpers: J. Hillebrand

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|---|-------------|--|
| | | 1 | 0.0' | 2 3 4 5 | Wet firm brown clayey fine to coarse sandy silt, trace of gravel. | A-4(1) | Boring started in drainage swale - no ground cover; fill material. |
| 2.49 | | 2 | 2.0' | 7 8 7 6 | 17" RECOVERY Wet medium dense brown fine to coarse sand w/ some silt and gravel. | A-2-4(0) | Fill material. |
| 4.98 | | 3 | 4.0' | 13 15 12 6 | 18" RECOVERY Wet medium dense brown gravel and fine to coarse sand w/ some silt. | A-1-b | Fill material. |
| 7.47 | | 4 | 6.0' | 3 6 9 11 | 13" RECOVERY Saturated medium dense brown fine to coarse sand w/ some silt, trace of gravel. | A-2-4(0) | |
| 9.96 | | 5 | 8.0' | 4 4 4 8 | 24" RECOVERY Saturated loose brown silty fine sand w/ some coarse sand, trace of gravel. | A-2-4(0) | |
| 12.45 | | 6 | 10.0' | 10 6 8 8 | 16" RECOVERY Saturated medium dense brown fine to coarse sand, trace of silt and gravel. | A-3 | |
| | | 7 | 12.0' | 5 4 6 8 | 24" RECOVERY Saturated loose orange-brown fine sand w/ some silt and coarse sand, trace of gravel. | A-2-4(0) | |

Remarks: Mud Rotary at 41.0'

Reviewed By: Marueen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-02

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|-------------------------|--------------------|--|-------------|-----------------------------|
| 14.94 | | 8 | 14.0' 14.0' | 1 3 6 8 | 20" RECOVERY Saturated loose orange-brown fine sand w/ some silt and coarse sand, trace of gravel. | A-2-4(0) | |
| 17.43 | | 9 | 16.0' 16.0' | 6 8 13 15 | 24" RECOVERY Saturated medium dense orange-brown silty fine sand w/ some coarse sand, trace of gravel. | A-2-4(0) | |
| 19.92 | | 10 | 18.0' 18.0' | 5 6 7 8 | 24" RECOVERY Saturated medium dense orange-brown fine sand w/ some coarse sand and silt, trace of gravel. | A-2-4(0) | |
| 22.41 | | | 20.0' | | 24" RECOVERY | | |
| 24.9 | | 11 | 24.0' | 4 7 4 6 | Saturated medium dense brown fine sand w/ some coarse sand and silt, trace of gravel. | A-2-4(0) | |
| 27.39 | | | 26.0' | | 22" RECOVERY | | |
| 29.88 | | 12 | 29.0' | 3 4 4 7 | Saturated loose brown-red fine sand w/ some silt and coarse sand, trace of gravel. | A-2-4(0) | |
| 32.37 | | | 31.0' | | 22" RECOVERY | | |
| 34.86 | | 13 | 34.0' | 3 4 3 3 | Saturated loose gray clayey fine sand, trace of coarse sand and gravel. | A-2-4(0) | |
| 37.35 | | U-1 | 36.0' 36.0' 36.9' | | 18" RECOVERY No Recovery - pushed tube 11" to refusal. 0" RECOVERY | | Press Sample - Shelby Tube. |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-02

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|---|-------------|-----------------------------|
| 39.84 | | 14 | 39.0' | 4 7 7 11 | Saturated medium dense gray clayey fine sand w/ some coarse sand. | A-2-4(0) | |
| | | | 41.0' | | 20" RECOVERY | | |
| | | U-2 | 41.0' | | No Recovery - pushed tube 18" to refusal. | | Press Sample - Shelby Tube. |
| 42.33 | | | 42.5' | | 0" RECOVERY | | |
| 44.82 | | 15 | 44.0' | 6 6 7 10 | Saturated stiff gray fine sandy silt w/ some clay, trace of coarse sand and gravel. | A-4(0) | |
| | | | 46.0' | | 24" RECOVERY | | |
| 47.31 | | | | | | | |
| 49.8 | | 16 | 49.0' | 6 7 8 14 | Saturated stiff gray fine sandy silt, trace of coarse sand, gravel, and seashells. | A-4(0) | |
| | | | 51.0' | | 24" RECOVERY | | |
| 52.29 | | | | | | | |
| 54.78 | | 17 | 54.0' | 4 6 11 11 | Saturated very stiff gray clayey fine sandy silt, trace of gravel and coarse sand. | A-4(2) | |
| | | | 56.0' | | 24" RECOVERY | | |
| 57.27 | | | | | | | |
| 59.76 | | 18 | 59.0' | 8 13 15 27 | Saturated very stiff dark gray fine sandy silt, trace of coarse sand, gravel, and organic matter. | A-4(0) | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-02

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|---|-------------|---------|
| | | | 61.0' | | 24" RECOVERY | | |
| 62.25 | | | | | | | |
| | | 19 | 64.0' | 23 34 50/5" | Saturated very dense green silty fine sand, trace of organic matter and coarse sand. | A-2-4(0) | |
| 64.74 | | | 65.5' | | 15" RECOVERY | | |
| | | | | | | | |
| 67.23 | | | | | | | |
| | | 20 | 69.0' | 6 8 14 17 | Saturated very stiff gray fine sandy silt w/ some organic matter, trace of coarse sand. | A-4(0) | |
| 69.72 | | | 71.0' | | 20" RECOVERY | | |
| | | | | | | | |
| 72.21 | | | | | | | |
| | | 21 | 74.0' | 7 7 8 7 | Saturated very stiff gray silty clay w/ some fine sand and organic matter, trace of seashells. | A-7-6(18) | |
| 74.7 | | | 76.0' | | 24" RECOVERY | | |
| | | | | | | | |
| 77.19 | | | | | | | |
| | | 22 | 79.0' | 9 15 20 27 | Saturated hard gray fine sandy clay w/ some organic matter, trace of coarse sand and seashells. | A-4(5) | |
| 79.68 | | | 81.0' | | 24" RECOVERY | | |
| | | | | | | | |
| 82.17 | | | | | | | |
| | | 23 | 84.0' | 18 26 | Saturated hard gray fine sandy silt w/ some | A-4(0) | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-02


| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|---------|
| 84.66 | | | | 30 36 | organic matter, trace of coarse sand and mica. | | |
| | | | 86.0' | | 16" RECOVERY | | |
| 87.15 | | | | | | | |
| | | 24 | 89.0' | 12 16 17 23 | Saturated hard gray clayey fine sandy silt w/ some organic matter, trace of coarse sand, gravel, and mica. | A-4(0) | |
| 89.64 | | | 91.0' | | 10" RECOVERY | | |
| 92.13 | | | | | | | |
| | | 25 | 94.0' | 12 13 14 17 | Saturated very stiff gray fine sandy silt, trace of organic matter and gravel. | A-4(0) | |
| 94.62 | | | 96.0' | | 9" RECOVERY | | |
| 97.11 | | | | | | | |
| | | 26 | 99.0' | 12 15 18 23 | Saturated hard gray fine sandy silt, trace of organic matter. | A-4(0) | |
| 99.6 | | | 101.0' | | 14" RECOVERY | | |
| | | | | | Boring terminated at 101.0 feet. | | |
| 102.09 | | | | | | | |
| 104.58 | | | | | | | |
| 107.07 | | | | | | | |


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KEY TO SYMBOLS


Symbol Description


Strata symbols


 Silty low plasticity clay

 Silty sand

 Poorly graded sand with silt

 Clayey sand

 Poorly graded clayey silty sand

 Low plasticity clay

 Silt

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Notes:

1. Exploratory boring was drilled on 3/20/2008 using a 3 1/4-inch diameter continuous flight power auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at time of drilling. Boring backfilled upon completion.
3. Surveyed boring locations and elevations were provided by Century Engineering.
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 SPT blow counts are uncorrected.

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95

Boring No.: BR1-3-03

Contract: 25-113-01

Boring Location: Sta. 725+39.99, 5' Lt. C.L.

Boring Surface Elev.: 28.40

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: | 3 | IN. |
| | U-Sampler: Ball Sampler | O.D. | O.D. of Samp. Tube: | 3 | IN. |
| | Core Bit: | O.D. | O.D. of Rock Core: | | IN. |

| | | | | | | |
|---------------------------|-------|---------------|-----------------------|------|------------|-------|
| Casing Size: | 3 1/4 | Inches | From Depth of: | | To: | |
| Hollow Stem Auger: | | | From Depth of: | 0.0' | To: | 59.0' |

| Water Level Readings | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
|----------------------|---------|------|---------------|-----------------|----------------|----------------|
| | 3/24/08 | | 12.0' | 10.0' | 9.5' | 18.9 |
| | | | | | | 28.4 |
| | | | | | | 28.4 |
| | | | | | | 28.4 |

Pay Quantities:

| | | | | | |
|---------------------------------------|-------|-------------|-------------------------------|------------------------------|------------|
| 2 1/2 in. Dia. Dry Sample Boring: | 100.0 | Ft.; | 3 | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of: | U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | | Ft. |

Boring Contractor: Walton Corporation
Driller: Dave Burt
Helpers: T. Kane

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|-------------------------------------|
| | | 1 | 0.5' | 7 8 10 | Wet very stiff brown clayey coarse to fine sandy silt, trace of gravel. | A-4(0) | Topsoil - 4"; fill material. |
| | | | 2.0' | | 8" RECOVERY | | |
| 2.49 | | 2 | 2.0' | 6 5 4 5 | Wet stiff brown clayey coarse to fine sandy silt, trace of gravel. | A-4(0) | Fill material. |
| | | | 4.0' | | 19" RECOVERY | | |
| 4.98 | | 3 | 4.0' | 3 4 6 4 | Wet loose brown clayey fine to coarse sand, trace of gravel. | A-2-4(0) | Fill material. |
| | | | 6.0' | | 11" RECOVERY | | |
| 7.47 | | 4 | 6.0' | 2 4 3 6 | Wet loose light brown coarse to fine sand and gravel w/ some clay. | A-2-4(0) | Fill material. |
| | | | 8.0' | | 13" RECOVERY | | |
| 9.96 | | 5 | 8.0' | 3 2 2 3 | Saturated very loose orange silty fine sand, trace of coarse sand and gravel. | A-2-4(0) | Fill material. |
| | | | 10.0' | | 9" RECOVERY | | |
| | | 6 | 10.0' | 15 16 20 18 | Saturated dense orange silty fine sand and gravel w/ some coarse sand. | A-2-4(0) | Fill material; geotextile in spoon. |
| | | | 12.0' | | 5" RECOVERY | | |
| 12.45 | | 7 | 12.0' | 3 7 9 | Saturated medium dense orange-brown fine sand w/ some silt and coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 14.0' | | 12" RECOVERY | | |
| | | 8 | 14.0' | 5 6 | Saturated medium dense orange-brown fine to | A-3 | |

Remarks: Mud Rotary at 59.0'

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-03

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|---------|
| 14.94 | | | | 10 15 | coarse sand, trace of silt and gravel. | | |
| | | | 16.0' | | 20" RECOVERY | | |
| | | 9 | 16.0' | 4 6 12 20 | Saturated medium dense orange-brown fine sand w/ some coarse sand and silt, trace of gravel. | A-2-4(0) | |
| 17.43 | | | 18.0' | | 24" RECOVERY | | |
| | | 10 | 18.0' | 20 19 26 27 | Saturated dense orange-brown fine to coarse sand w/ some silt, trace of gravel. | A-2-4(0) | |
| 19.92 | | | 20.0' | | 24" RECOVERY | | |
| 22.41 | | | | | | | |
| | | 11 | 24.0' | 17 14 11 10 | Saturated medium dense orange-brown fine to coarse sand w/ some silt, trace of gravel. | A-2-4(0) | |
| 24.9 | | | 26.0' | | 20" RECOVERY | | |
| 27.39 | | | | | | | |
| | | 12 | 29.0' | 10 7 9 10 | Saturated medium dense orange-brown silty fine sand, trace of coarse sand. | A-2-4(0) | |
| 29.88 | | | 31.0' | | 20" RECOVERY | | |
| 32.37 | | | | | | | |
| | | 13 | 34.0' | 6 4 5 4 | Saturated loose orange-brown silty fine sand w/ some coarse sand, trace of gravel. | A-2-4(0) | |
| 34.86 | | | 36.0' | | 24" RECOVERY | | |
| 37.35 | | | | | | | |

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AUGUST 2015

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-03

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|--|-------------|-----------------------------|
| 39.84 | | 14 | 39.0' | 5 12 15 17 | Saturated medium dense gray and brown fine sand w/ some silt and coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 41.0' | | 24" RECOVERY | | |
| 42.33 | | | | | | | |
| 44.82 | | 15 | 44.0' | 5 4 6 11 | Saturated stiff gray clayey fine sandy silt, trace of coarse sand. | A-4(0) | |
| | | | 46.0' | | 19" RECOVERY | | |
| 47.31 | | | | | | | |
| 49.8 | | 16 | 49.0' | 5 7 8 12 | Saturated medium dense gray clayey fine sand w/ some coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 51.0' | | 24" RECOVERY | | |
| 52.29 | | | | | | | |
| 54.78 | | 17 | 54.0' | 4 6 7 8 | Saturated medium dense gray clayey fine sand, trace of coarse sand. | A-2-4(0) | |
| | | | 56.0' | | 24" RECOVERY | | |
| 57.27 | | U-1 | 56.5' | | Saturated gray silty fine to coarse sand. | A-2-4(0) | Press Sample - Shelby Tube. |
| | | | 57.8' | | 16" RECOVERY | | |
| 59.76 | | 18 | 58.0' | 5 6 7 7 | Saturated medium dense gray clayey fine sand w/ some coarse sand. | A-2-4(0) | |
| | | | 60.0' | | 24" RECOVERY | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-03

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|--------------|
| 62.25 | | | | | | | |
| 64.74 | | 19 | 64.0' | 6 9 11 | Saturated medium dense gray silty fine sand, trace of coarse sand and gravel. | A-2-4(0) | |
| | | | 66.0' | | 19" RECOVERY | | |
| 67.23 | | | | | | | |
| 69.72 | | 20 | 69.0' | 8 11 14 17 | Saturated very stiff gray clayey fine sandy silt, trace of coarse sand and gravel. | A-4(0) | |
| | | | 71.0' | | 24" RECOVERY | | |
| 72.21 | | | | | | | |
| 74.7 | | 21 | 74.0' | 9 10 13 17 | Saturated very stiff gray clayey fine sandy silt, trace of organic matter, coarse sand, and gravel. | A-4(1) | |
| | | | 76.0' | | 20" RECOVERY | | |
| 77.19 | | | | | | | |
| 79.68 | | 22 | 79.0' | 10 20 23 25 | Saturated dense dark gray silty fine sand w/ some coarse sand, organic matter, and gravel. | A-2-4(0) | |
| | | | 81.0' | | 18" RECOVERY | | |
| 82.17 | | | | | | | |
| 84.66 | | 23 | 84.0' | 14 21 27 31 | Saturated dense green silty fine sand, trace of coarse sand, organic matter, gravel, and | A-2-4(0) | Glauconitic. |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-03


| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|--------------|
| | | | 86.0' | | seashells. 16" RECOVERY | | |
| 87.15 | | | | | | | |
| | | 24 | 89.0' | 8 10 14 16 | Saturated very stiff green-gray fine sandy silt w/ some clay, trace of coarse sand, organic matter, and gravel. 18" RECOVERY | A-4(0) | Glauconitic. |
| 89.64 | | | 91.0' | | | | |
| | | | | | | | |
| 92.13 | | | | | | | |
| | | 25 | 94.0' | 8 9 11 10 | Saturated very stiff gray clay w/ some organic matter, trace of fine to coarse sand. 24" RECOVERY | A-7-6(28) | |
| 94.62 | | | 96.0' | | | | |
| | | | | | | | |
| 97.11 | | | | | | | |
| | | 26 | 98.0' | 10 15 17 24 | Saturated hard gray silty clay w/ some organic matter, trace of fine sand. 24" RECOVERY | A-7-6(29) | |
| 99.6 | | | 100.0' | | | | |
| | | | | | Boring terminated at 100.0 feet. | | |
| 102.09 | | | | | | | |
| | | | | | | | |
| 104.58 | | | | | | | |
| | | | | | | | |
| 107.07 | | | | | | | |


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AUGUST 2015


KEY TO SYMBOLS


Symbol Description


Strata symbols


 Poorly graded clayey
silty sand

 Silty sand

 Poorly graded sand
with silt

 Clayey sand

 Low plasticity
clay

 High plasticity
clay

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NOT FOR BIDDING
AUGUST 2015

Notes:

1. Exploratory boring was drilled on 3/24/2008 using a 3 1/4-inch diameter continuous flight power auger. Rig is a ATV CME 55.
2. Groundwater levels recorded at time of drilling. Boring backfilled upon completion.
3. Surveyed boring locations and elevations were provided by Century Engineering.
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 SPT blow counts are uncorrected.

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95

Boring No.: BR1-3-04

Contract: 25-113-01

Boring Location: Sta. 724+29.41, 20' Rt. C.L.

Boring Surface Elev.: 23.31

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: | 3 | IN. |
| | U-Sampler: Ball Sampler | O.D. | O.D. of Samp. Tube: | 3 | IN. |
| | Core Bit: | O.D. | O.D. of Rock Core: | | IN. |

| | | | | | | |
|--------------|--------------------|--------|----------------|------|-----|-------|
| Casing Size: | 3 1/4 | Inches | From Depth of: | 0.0' | To: | |
| | Hollow Stem Auger: | | From Depth of: | 0.0' | To: | 49.0' |

| Water Level Readings | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
|----------------------|---------|------|---------------|-----------------|----------------|----------------|
| | 3/26/08 | | 12.0' | 10.0' | 8.7' | 14.6 |
| | | | | | | 23.3 |
| | | | | | | 23.3 |
| | | | | | | 23.3 |

Pay Quantities:

| | | | | | |
|---------------------------------------|-------|------|------------------------|-----------------------|-----|
| 2 1/2 in. Dia. Dry Sample Boring: | 100.0 | Ft.; | 3 | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of: | U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | | Ft. |

Boring Contractor: Walton Corporation
Driller: Dave Burt
Helpers: J. Hillebrand

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|--|-------------|------------------------------|
| | | 1 | 0.5' | 4 4 8 | Wet stiff brown silt w/ some clay, trace of fine to coarse sand, gravel, and organic matter. | A-4(2) | Topsoil - 3"; fill material. |
| | | | 2.0' | | 15" RECOVERY | | |
| 2.49 | | 2 | 2.0' | 6 7 11 12 | Wet very stiff brown clayey silt w/ some fine to coarse sand, trace of gravel. | A-4(3) | Fill material. |
| | | | 4.0' | | 9" RECOVERY | | |
| 4.98 | | 3 | 4.0' | 3 8 8 10 | Wet very stiff brown silt w/ some coarse to fine sand and clay, trace of gravel. | A-4(0) | Fill material. |
| | | | 6.0' | | 18" RECOVERY | | |
| 7.47 | | 4 | 6.0' | 6 5 5 7 | Wet stiff brown coarse to fine sandy silt w/ some clay, trace of gravel. | A-4(0) | Fill material. |
| | | | 8.0' | | 18" RECOVERY | | |
| 9.96 | | 5 | 8.0' | 1 4 8 7 | Saturated medium dense brown fine to coarse sand w/ some clay, trace of gravel. | A-2-4(0) | Fill material. |
| | | | 10.0' | | 18" RECOVERY | | |
| | | 6 | 10.0' | 6 10 20 10 | Saturated medium dense brown silty fine sand w/ some gravel and coarse sand. | A-2-4(0) | Fill material. |
| | | | 12.0' | | 24" RECOVERY | | |
| 12.45 | | 7 | 12.0' | 6 8 10 10 | Saturated medium dense orange-brown fine to coarse sand w/ some silt, trace of gravel. | A-2-4(0) | Fill material. |
| | | | 14.0' | | 20" RECOVERY | | |
| | | 8 | 14.0' | 6 16 | Saturated medium dense orange-brown fine to | A-2-4(0) | |

Remarks: Mud Rotary at 49.0'

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-04

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|---------|
| 14.94 | | | | 8 9 | coarse sand w/ some silt, trace of gravel. | | |
| | | | 16.0' | | 18" RECOVERY | | |
| | | 9 | 16.0' | 6 12 10 13 | Saturated medium dense orange-brown fine to coarse sand w/ some silt, trace of gravel. | A-2-4(0) | |
| 17.43 | | | 18.0' | | 24" RECOVERY | | |
| | | 10 | 18.0' | 10 14 17 20 | Saturated dense orange-brown fine sand w/ some coarse sand and silt. | A-2-4(0) | |
| 19.92 | | | 20.0' | | 24" RECOVERY | | |
| 22.41 | | | | | | | |
| | | 11 | 24.0' | 6 6 8 10 | Saturated medium dense orange-brown fine sand w/ some coarse sand, trace of silt and gravel. | A-3 | |
| 24.9 | | | 26.0' | | 16" RECOVERY | | |
| 27.39 | | | | | | | |
| | | 12 | 29.0' | 4 4 5 6 | Saturated loose orange-brown fine sand w/ some coarse sand, trace of silt. | A-3 | |
| 29.88 | | | 31.0' | | 18" RECOVERY | | |
| 32.37 | | | | | | | |
| | | 13 | 34.0' | 5 6 6 9 | Saturated medium dense orange-brown fine sand w/ some silt, trace of coarse sand, gravel, and seashells. | A-2-4(0) | |
| 34.86 | | | 36.0' | | 16" RECOVERY | | |
| 37.35 | | | | | | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-04

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|------------------|---|-------------|-----------------------------|
| 39.84 | | 14 | 39.0' | 3 6 6 7 | Saturated medium dense gray fine sand w/ some silt and coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 41.0' | | 13" RECOVERY | | |
| 42.33 | | | | | | | |
| 44.82 | | 15 | 44.0' | 6 7 7 8 | Saturated medium dense gray silty fine sand w/ some coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 46.0' | | 24" RECOVERY | | |
| 47.31 | | U-1 | 46.5' | | Saturated gray silty clayey fine to coarse sand with a trace of gravel. | A-2-4(0) | Press Sample - Shelby Tube. |
| | | | 48.5' | | 24" RECOVERY | | |
| 49.8 | | 16 | 48.5' | 4 5 5 7 | Saturated loose gray clayey fine sand w/ some coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 50.5' | | 21" RECOVERY | | |
| 52.29 | | | | | | | |
| 54.78 | | 17 | 53.5' | 3 5 6 6 | Saturated medium dense gray clayey fine sand, trace of coarse sand and gravel. | A-2-4(0) | |
| | | | 55.5' | | 18" RECOVERY | | |
| 57.27 | | | | | | | |
| 59.76 | | 18 | 59.0' | 3 4 5 6 | Saturated loose gray silty fine sand w/ some coarse sand. | A-2-4(0) | |
| | | | 61.0' | | 17" RECOVERY | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-04

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|-----------------------------|
| 62.25 | | | | | | | |
| 64.74 | | 19 | 64.0' | 3 4 4 6 | Saturated firm gray clayey fine sandy silt, trace of coarse sand and gravel. | A-4(0) | |
| | | | 66.0' | | 20" RECOVERY | | |
| 67.23 | | U-2 | 66.5' | | Saturated gray fine sand w/ some silt, trace of gravel. | A-2-4(0) | Press Sample - Shelby Tube. |
| | | | 68.5' | | 11" RECOVERY | | |
| 69.72 | | 20 | 68.5' | 4 8 14 26 | Saturated medium dense gray silty fine sand, trace of coarse sand and gravel. | A-2-4(0) | |
| | | | 70.5' | | 21" RECOVERY | | |
| 72.21 | | | | | | | |
| 74.7 | | 21 | 74.0' | 10 14 14 15 | Saturated very stiff gray clayey fine sandy silt, trace of coarse sand. | A-4(1) | |
| | | | 76.0' | | 20" RECOVERY | | |
| 77.19 | | | | | | | |
| 79.68 | | 22 | 79.0' | 10 13 23 31 | Saturated hard dark gray fine sandy silt, trace of coarse sand. | A-4(0) | |
| | | | 81.0' | | 24" RECOVERY | | |
| 82.17 | | | | | | | |
| 84.66 | | 23 | 84.0' | 10 20 33 42 | Saturated very dense green silty fine sand, trace of organic matter, gravel, and coarse | A-2-4(0) | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-04


| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|---------|
| | | | 86.0' | | sand. 20" RECOVERY | | |
| 87.15 | | | | | | | |
| | | 24 | 89.0' | 10 12 26 29 | Saturated hard green fine sandy silt, trace of organic matter, coarse sand, and gravel. 24" RECOVERY | A-4(0) | |
| 89.64 | | | 91.0' | | | | |
| | | | | | | | |
| 92.13 | | | | | | | |
| | | 25 | 94.0' | 8 9 12 17 | Saturated very stiff gray clay w/ some organic matter, trace of fine to coarse sand. 24" RECOVERY | A-7-6(19) | |
| 94.62 | | | 96.0' | | | | |
| | | | | | | | |
| 97.11 | | | | | | | |
| | | 26 | 98.0' | 8 9 15 17 | Saturated very stiff gray clay w/ some organic matter, trace of fine sand and gravel. 24" RECOVERY | A-7-6(26) | |
| 99.6 | | | 100.0' | | | | |
| | | | | | Boring terminated at 100.0 feet. | | |
| 102.09 | | | | | | | |
| | | | | | | | |
| 104.58 | | | | | | | |
| | | | | | | | |
| 107.07 | | | | | | | |


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AUGUST 2015


KEY TO SYMBOLS


Symbol Description


Strata symbols


 Silty low plasticity clay

 Poorly graded clayey silty sand

 Silty sand

 Poorly graded sand with silt

 Clayey sand

 Low plasticity clay

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AUGUST 2015

Notes:

1. Exploratory boring was drilled on 3/26/2008 using a 3 1/4-inch diameter continuous flight power auger. Rig is a Truck CME 75.
2. Groundwater levels recorded at time of drilling. Boring backfilled upon completion.
3. Surveyed boring locations and elevations were provided by Century Engineering.
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 SPT blow counts are uncorrected.

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95

Boring No.: BR1-3-05

Contract: 25-113-01

Boring Location: Sta. 722+94.26, 5' Lt. C.L.

Boring Surface Elev.: 31.00

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: Ball Sampler | | O.D. | O.D. of Samp. Tube: 3 | | IN. |
| Core Bit: | | O.D. | O.D. of Rock Core: | | IN. |

| | | | | | |
|---------------------------|---------------|----------------------------|--|------------|-------|
| Casing Size: 3 1/4 | Inches | From Depth of: | | To: | |
| Hollow Stem Auger: | | From Depth of: 0.0' | | To: | 51.0' |

| Water Level Readings | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
|----------------------|---------|------|---------------|-----------------|----------------|----------------|
| | 3/24/08 | | 16.0' | 14.0' | 13.4' | 17.6 |
| | | | | | | 31.0 |
| | | | | | | 31.0 |
| | | | | | | 31.0 |

Pay Quantities:

| | | | | | | |
|---------------------------------------|-------|-------------|--|-------------------------------|------------------------------|------------|
| 2 1/2 in. Dia. Dry Sample Boring: | 101.0 | Ft.; | | 3 | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | | No. of | U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | | Core Drilling in Rock: | | Ft. |

Boring Contractor: Walton Corporation
Driller: Jason Truver
Helpers: D. Zmijewski

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|--------------------|--|-------------|------------------------------|
| | | 1 | 0.5' | 3 8 4 | Wet stiff brown clayey silt w/ some fine to coarse sand, trace of gravel. | A-4(2) | Topsoil - 5"; fill material. |
| | | | 2.0' | | 10" RECOVERY | | |
| 2.49 | | 2 | 2.0' | 5 6 4 6 | Wet stiff brown clayey fine sandy silt w/ some coarse sand, trace of gravel. | A-4(1) | Fill material. |
| | | | 4.0' | | 9" RECOVERY | | |
| | | 3 | 4.0' | 2 3 2 4 | Wet firm brown clayey silt w/ some fine sand, trace of coarse sand and gravel. | A-4(5) | Fill material. |
| 4.98 | | | 6.0' | | 10" RECOVERY | | |
| | | 4 | 6.0' | 7 5 4 5 | Wet stiff brown silt w/ some coarse to fine sand, trace of gravel. | A-4(0) | Fill material. |
| 7.47 | | | 8.0' | | 16" RECOVERY | | |
| | | 5 | 8.0' | 1 1 5 7 | Wet loose brown-orange clayey fine to coarse sand w/ some gravel. | A-2-4(0) | Fill material. |
| | | | 10.0' | | 17" RECOVERY | | |
| 9.96 | | 6 | 10.0' | 7 10 7 10 | Wet medium dense brown-orange silty fine to coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 12.0' | | 21" RECOVERY | | |
| 12.45 | | 7 | 12.0' | 4 3 5 7 | Saturated loose brown fine sand w/ some silt, trace of coarse sand and gravel. | A-2-4(0) | |
| | | | 14.0' | | 21" RECOVERY | | |
| | | 8 | 14.0' | W/R 1 | Saturated loose brown fine sand w/ some silt | A-2-4(0) | |

Remarks: Mud Rotary at 51.0'

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-05

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|-------------------|--|-------------|---------|
| 14.94 | | | | 5 5 | and coarse sand, trace of gravel. | | |
| | | | 16.0' | | 20" RECOVERY | | |
| | | 9 | 16.0' | 4 6 8 12 | Saturated medium dense brown fine to coarse sand w/ some silt. | A-2-4(0) | |
| 17.43 | | | 18.0' | | 21" RECOVERY | | |
| | | 10 | 18.0' | 4 4 8 9 | Saturated medium dense brown fine sand w/ some silt and coarse sand. | A-2-4(0) | |
| 19.92 | | | 20.0' | | 17" RECOVERY | | |
| 22.41 | | | | | | | |
| | | 11 | 24.0' | 3 5 5 6 | Saturated loose brown silty fine sand w/ some coarse sand, trace of gravel. | A-2-4(0) | |
| 24.9 | | | 26.0' | | 17" RECOVERY | | |
| 27.39 | | | | | | | |
| | | 12 | 29.0' | 5 4 4 5 | Saturated loose brown fine sand w/ some coarse sand, trace of silt and gravel. | A-3 | |
| 29.88 | | | 31.0' | | 12" RECOVERY | | |
| 32.37 | | | | | | | |
| | | 13 | 34.0' | 5 6 2 1 | Saturated loose brown fine sand w/ some coarse sand, trace of silt. | A-3 | |
| 34.86 | | | 36.0' | | 13" RECOVERY | | |
| 37.35 | | | | | | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95

Boring No.: BR1-3-05

Contract: 25-113-01

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|--|-------------|-----------------------------|
| 39.84 | | 14 | 39.0' | 9 12 15 20 | Saturated medium dense brown fine sand w/ some silt and coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 41.0' | | 22" RECOVERY | | |
| 42.33 | | | | | | | |
| 44.82 | | 15 | 44.0' | 5 6 6 14 | Saturated medium dense gray fine sand w/ some silt and coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 46.0' | | 18" RECOVERY | | |
| 47.31 | | U-1 | 47.0' | | Saturated gray silty sand with a trace of coarse sand. | A-4(0) | Press sample - Shelby Tube. |
| | | | 48.5' | | 18" RECOVERY | | |
| 49.8 | | 16 | 49.0' | 2 2 7 10 | Saturated loose gray clayey fine sand w/ some coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 51.0' | | 21" RECOVERY | | |
| 52.29 | | | | | | | |
| 54.78 | | 17 | 54.0' | 9 10 11 11 | Saturated medium dense gray clayey fine sand w/ some coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 56.0' | | 24" RECOVERY | | |
| 57.27 | | | | | | | |
| 59.76 | | 18 | 59.0' | 5 4 7 7 | Saturated medium dense gray clayey fine sand w/ some coarse sand. | A-2-6(0) | |
| | | | 61.0' | | 24" RECOVERY | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-05

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|--------------|
| 62.25 | | | | | | | |
| 64.74 | | 19 | 64.0' | 4 6 6 8 | Saturated stiff gray clayey fine sandy silt, trace of coarse sand and gravel. | A-4(0) | |
| | | | 66.0' | | 23" RECOVERY | | |
| 67.23 | | | | | | | |
| 69.72 | | 20 | 69.0' | 6 6 10 12 | Saturated medium dense gray silty fine sand, trace of coarse sand and gravel. | A-2-4(0) | |
| | | | 71.0' | | 22" RECOVERY | | |
| 72.21 | | | | | | | |
| 74.7 | | 21 | 74.0' | 11 8 8 12 | Saturated very stiff gray clayey fine sandy silt, trace of coarse sand. | A-4(1) | |
| | | | 76.0' | | 24" RECOVERY | | |
| 77.19 | | | | | | | |
| 79.68 | | 22 | 79.0' | 10 10 10 22 | Saturated medium dense dark gray clayey fine sand, trace of organic matter, coarse sand, gravel, and seashells. | A-2-4(0) | |
| | | | 81.0' | | 23" RECOVERY | | |
| 82.17 | | | | | | | |
| 84.66 | | 23 | 84.0' | 11 17 27 36 | Saturated dense dark green silty fine sand, trace of organic matter and coarse sand. | A-2-4(0) | Glauconitic. |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-05


| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|--------------------|---|-------------|---------------------------------|
| | | | 86.0' | | 18" RECOVERY | | |
| 87.15 | | | | | | | |
| | | 24 | 89.0' | 6 9 12 17 | Saturated medium dense dark green clayey fine sand, trace of organic matter and coarse sand. | A-2-4(0) | Glauconitic. |
| 89.64 | | | 91.0' | | 24" RECOVERY | | |
| | | | | | | | |
| 92.13 | | | | | | | |
| | | 25 | 94.0' | 6 8 8 8 | Saturated very stiff dark green silty clay w/ some organic matter, trace of fine to coarse sand and gravel. | A-7-6(34) | Pocket penetrometer = 2.75 tsf. |
| 94.62 | | | 96.0' | | 24" RECOVERY | | |
| | | | | | | | |
| 97.11 | | | | | | | |
| | | 26 | 99.0' | 6 9 9 11 | Saturated very stiff dark green silty clay w/ some fine sand and organic matter, trace of coarse sand. | A-7-6(18) | Pocket penetrometer = 3.25 tsf. |
| 99.6 | | | 101.0' | | 24" RECOVERY | | |
| | | | | | Boring terminated at 101.0 feet. | | |
| 102.09 | | | | | | | |
| | | | | | | | |
| 104.58 | | | | | | | |
| | | | | | | | |
| 107.07 | | | | | | | |


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KEY TO SYMBOLS


Symbol Description


Strata symbols


 Silty low plasticity clay


 Low plasticity clay


 Silt

 Poorly graded clayey silty sand

 Silty sand

 Poorly graded sand with silt

 Clayey sand

 High plasticity clay

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Notes:

1. Exploratory boring was drilled on 3/24/2008 using a 3 1/4-inch diameter continuous flight power auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at time of drilling. Boring backfilled upon completion.
3. Boring elevation was obtained from Figure A-2, Structure BR1-3 Exploration Plan.
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 SPT blow counts are uncorrected.

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95

Boring No.: BR1-3-06

Contract: 25-113-01

Boring Location: Sta. 721+66.66, 35' Rt. C.L.

Boring Surface Elev.: 31.00

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: | 3 | IN. |
| | U-Sampler: Ball Sampler | O.D. | O.D. of Samp. Tube: | 3 | IN. |
| | Core Bit: | O.D. | O.D. of Rock Core: | | IN. |

| | | | | | | |
|--------------|--------------------|--------|----------------|------|-----|-------|
| Casing Size: | 3 1/4 | Inches | From Depth of: | 0.0' | To: | |
| | Hollow Stem Auger: | | From Depth of: | 0.0' | To: | 49.0' |

| | | | | | | | |
|----------------------|--|---------|------|---------------|-----------------|----------------|------------------------------|
| Water Level Readings | | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| | | 3/28/08 | | 10.0' | 8.0' | 6.0' | 25.0 31.0 31.0 31.0 |

Pay Quantities:

| | | | | | |
|---------------------------------------|-------|------|------------------------|-----------------------|-----|
| 2 1/2 in. Dia. Dry Sample Boring: | 100.0 | Ft.; | 3 | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of | U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | | Ft. |

Boring Contractor: Walton Corporation
Driller: Jason Truver
Helpers: T. Kane

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|--|-------------|-------------------------------|
| | | 1 | 0.5' | 5 6 6 | Wet stiff brown clayey silt w/ some fine to coarse sand, trace of gravel. | A-4(3) | Topsoil - 4"; fill material. |
| | | | 2.0' | | 12" RECOVERY | | |
| 2.49 | | 2 | 2.0' | 6 5 4 | Wet loose orange silty fine to coarse sand, trace of gravel. | A-2-4(0) | Fill material. |
| | | | 3.5' | | 12" RECOVERY | | |
| | | 2A | 3.5' | 4 | Wet soft gray clayey fine to coarse sandy silt, trace of gravel. | A-4(2) | Fill material. |
| | | | 4.0' | | 6" RECOVERY | | |
| 4.98 | | 3 | 4.0' | 2 2 2 3 | Wet soft brown clay, trace of coarse to fine sand. | A-6(8) | Fill material. |
| | | | 6.0' | | 19" RECOVERY | | |
| | | 4 | 6.0' | 2 17 17 20 | Saturated hard brown clay w/ some coarse to fine sand, trace of gravel. | A-6(6) | Fill material; rock in spoon. |
| 7.47 | | | 8.0' | | 8" RECOVERY | | |
| | | 5 | 8.0' | 5 6 7 7 | Saturated medium dense orange fine to coarse sand w/ some silt, trace of gravel. | A-2-4(0) | |
| | | | 10.0' | | 19" RECOVERY | | |
| 9.96 | | 6 | 10.0' | 4 8 11 8 | Saturated medium dense orange fine to coarse sand w/ some silt, trace of gravel. | A-2-4(0) | |
| | | | 12.0' | | 18" RECOVERY | | |
| 12.45 | | 7 | 12.0' | W/R 1 2 3 | Saturated very loose orange fine to coarse sand w/ some silt, trace of gravel. | A-2-4(0) | |
| | | | 14.0' | | 13" RECOVERY | | |
| | | 8 | 14.0' | 1 1 | Saturated loose orange fine to coarse sand w/ | A-2-4(0) | |

Remarks: Mud Rotary at 49.0'

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-06

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|--------------------|---|-------------|---------|
| 14.94 | | | | 5 6 | some silt, trace of gravel. | | |
| | | | 16.0' | | 16" RECOVERY | | |
| | | 9 | 16.0' | 5 6 6 | Saturated medium dense orange fine sand w/ some coarse sand and silt, trace of gravel. | A-2-4(0) | |
| 17.43 | | | 18.0' | | 16" RECOVERY | | |
| | | 10 | 18.0' | 1 5 6 7 | Saturated medium dense orange fine sand w/ some coarse sand and silt, trace of gravel. | A-2-4(0) | |
| 19.92 | | | 20.0' | | 13" RECOVERY | | |
| 22.41 | | | | | | | |
| | | 11 | 24.0' | 3 6 10 11 | Saturated medium dense orange fine sand w/ some coarse sand and silt, trace of gravel. | A-2-4(0) | |
| 24.9 | | | 26.0' | | 10" RECOVERY | | |
| 27.39 | | | | | | | |
| | | 12 | 29.0' | 5 6 10 14 | Saturated medium dense orange fine sand w/ some coarse sand and silt, trace of gravel. | A-2-4(0) | |
| 29.88 | | | 31.0' | | 17" RECOVERY | | |
| 32.37 | | | | | | | |
| | | 13 | 34.0' | 7 6 7 6 | Saturated medium dense brown fine to coarse sand w/ some silt. | A-2-4(0) | |
| 34.86 | | | 36.0' | | 15" RECOVERY | | |
| 37.35 | | | | | | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-06

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|--------------------|--|-------------|-----------------------------|
| 39.84 | | 14 | 39.0' | 8 5 8 9 | Saturated medium dense brown fine sand w/ some silt, trace of coarse sand and gravel. | A-2-4(0) | |
| 42.33 | | | 41.0' | | 18" RECOVERY | | |
| 44.82 | | 15 | 44.0' | 5 8 | Saturated medium dense brown fine sand w/ some silt and coarse sand. | A-2-4(0) | |
| | | | 45.0' | | 7" RECOVERY | | |
| 47.31 | | 15A | 45.0' | 7 10 | Saturated medium dense gray silty fine sand w/ some coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 46.0' | | 12" RECOVERY | | |
| 49.8 | | U-1 | 49.0' | | No Recovery. | | Press Sample - Shelby Tube. |
| 52.29 | | | 51.0' | | 0" RECOVERY | | |
| 54.78 | | 16 | 54.0' | 5 7 13 15 | Saturated medium dense gray fine sand w/ some clay and coarse sand, trace of gravel. | A-2-4(0) | |
| 57.27 | | | 56.0' | | 22" RECOVERY | | |
| 59.76 | | 17 | 59.0' | 5 4 6 8 | Saturated stiff gray clayey fine sandy silt w/ some coarse sand. | A-4(0) | |
| | | | 61.0' | | 24" RECOVERY | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-06

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|-------------------------|---|-------------|--------------|
| 62.25 | | | | | | | |
| 64.74 | | 18 | 64.0' | 6 7 10 13 | Saturated medium dense gray silty fine sand, trace of coarse sand and gravel. | A-2-4(0) | |
| | | | 66.0' | | 24" RECOVERY | | |
| 67.23 | | | | | | | |
| 69.72 | | 19 | 69.0' | 9 12 16 24 | Saturated medium dense gray silty fine sand, trace of coarse sand and gravel. | A-2-4(0) | |
| | | | 71.0' | | 23" RECOVERY | | |
| 72.21 | | | | | | | |
| 74.7 | | 20 | 74.0' | 8 9 11 14 | Saturated very stiff gray and green fine sandy clay, trace of coarse sand. | A-6(2) | Glauconitic. |
| | | | 76.0' | | 24" RECOVERY | | |
| 77.19 | | | | | | | |
| 79.68 | | 21 | 79.0' | 8 13 14 16 | Saturated very stiff dark green clayey fine sandy silt, trace of gravel, organic matter, and coarse sand. | A-4(0) | Glauconitic. |
| | | | 81.0' | | 24" RECOVERY | | |
| 82.17 | | | | | | | |
| 84.66 | | 22 | 84.0' | 16 24 34 50/5* | Saturated very dense dark green silty fine sand, trace of coarse sand and organic matter. | A-2-4(0) | Glauconitic. |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-06

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|----------------|----------------------|--|-------------|---------------|
| | | | 86.0' | | 22" RECOVERY | | |
| 87.15 | | | | | | | |
| | | 23 | 89.0' | 11 12 16 21 | Saturated very stiff dark green fine sandy silt w/ some clay, trace of organic matter and coarse sand. | A-4(0) | Glaucconitic. |
| 89.64 | | | 91.0' | | 23" RECOVERY | | |
| | | | | | | | |
| 92.13 | | | | | | | |
| | | 24 | 94.0' | 9 | Saturated loose dark green silty fine sand, trace of coarse sand, organic matter, and gravel. | A-2-4(0) | Glaucconitic. |
| 94.62 | | 24A | 94.5' 94.5' | 12 16 19 | 6" RECOVERY | A-7-6(20) | |
| | | | 96.0' | | Saturated hard gray clay w/ some organic matter and fine sand. 18" RECOVERY | | |
| 97.11 | | | | | | | |
| | | 25 | 98.0' | 10 9 14 15 | Saturated very stiff gray silty clay w/ some organic matter, trace of fine sand. | A-7-6(30) | |
| 99.6 | | | 100.0' | | 24" RECOVERY | | |
| | | | | | Boring terminated at 100.0 feet. | | |
| 102.09 | | | | | | | |
| | | | | | | | |
| 104.58 | | | | | | | |
| | | | | | | | |
| 107.07 | | | | | | | |

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KEY TO SYMBOLS

Symbol Description

Strata symbols



Low plasticity
clay



Silty sand



Silty low plasticity
clay



Poorly graded sand
with silt



Poorly graded clayey
silty sand



Clayey sand

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Notes:

1. Exploratory boring was drilled on 3/28/2008 using a 3 1/4-inch diameter continuous flight power auger. Rig is a ATV CME 55.
2. Groundwater levels recorded at time of drilling. Boring backfilled upon completion.
3. Boring elevation was obtained from Figure A-2, Structure BR1-3 Exploration Plan.
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 SPT blow counts are uncorrected.

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95

Boring No.: BR1-3-07

Contract: 25-113-01

Boring Location: Sta. 720+42.99, 5' Lt. C.L.

Boring Surface Elev.: 30.00

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: Ball Sampler | | O.D. | O.D. of Samp. Tube: 3 | | IN. |
| Core Bit: | | O.D. | O.D. of Rock Core: | | IN. |

| | | | | | |
|---------------------------|---------------|----------------------------|--|------------------|--|
| Casing Size: 3 1/4 | Inches | From Depth of: | | To: | |
| Hollow Stem Auger: | | From Depth of: 0.0' | | To: 54.0' | |

| | | | | | | |
|-----------------------------|-------------|-------------|----------------------|------------------------|-----------------------|------------------------------|
| Water Level Readings | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| | 4/2/08 | | 14.0' | 12.0' | 11.2' | 18.8 30.0 30.0 30.0 |

Pay Quantities:

| | | | | | |
|---------------------------------------|-------|-------------|---|-------------------------------|------------|
| 2 1/2 in. Dia. Dry Sample Boring: | 100.0 | Ft.; | 3 | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | | No. of U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | | Core Drilling in Rock: | Ft. |

Boring Contractor: Walton Corporation
Driller: Dave Burt
Helpers: J. Hillebrand

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|--------------------|--|-------------|---|
| | | 1 | 0.5' | 4 4 8 | Visual Description: Wet firm brown clayey silt w/ sand. | | No sieve analysis; ; Topsoil - 6"; fill material. |
| 2.49 | | 2 | 2.0' | 4 5 5 7 | 2" RECOVERY No Sample Recovery | | |
| 4.98 | | 3 | 4.0' | 3 6 14 12 | 0" RECOVERY Wet very stiff brown coarse to fine sandy silt, trace of gravel. | A-4(0) | Fill material. |
| 7.47 | | 4 | 6.0' | 4 5 5 8 | 12" RECOVERY Wet loose brown silty coarse to fine sand, trace of gravel. | A-2-4(0) | Fill material. |
| 9.96 | | 5 | 8.0' | 3 4 4 4 | 18" RECOVERY Wet loose brown coarse to fine sand w/ some silt, trace of gravel. | A-1-b | |
| 12.45 | | 6 | 10.0' | 2 4 4 4 | 15" RECOVERY Saturated loose orange-brown coarse to fine sand w/ some silt, trace of gravel. | A-2-4(0) | |
| | | 7 | 12.0' | 5 5 6 7 | 24" RECOVERY Saturated medium dense orange-brown coarse to fine sand w/ some silt, trace of gravel. | A-2-4(0) | |
| | | 8 | 14.0' | 12 5 | 24" RECOVERY Saturated medium dense orange-brown fine to | A-2-4(0) | |

Remarks: Mud Rotary at 54.0'

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-07

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|---------|
| 14.94 | | | | 6 12 | coarse sand w/ some silt, trace of gravel. | | |
| | | | 16.0' | | 13" RECOVERY | | |
| | | 9 | 16.0' | 8 7 8 9 | Saturated medium dense orange-brown coarse to fine sand and gravel. | A-1-b | |
| 17.43 | | | 18.0' | | 24" RECOVERY | | |
| | | 10 | 18.0' | 14 9 14 16 | Saturated medium dense orange-brown coarse to fine sand w/ some silt, trace of gravel. | A-1-b | |
| 19.92 | | | 20.0' | | 24" RECOVERY | | |
| 22.41 | | | | | | | |
| | | 11 | 24.0' | 26 20 16 12 | Saturated dense brown coarse to fine sand w/ some silt and gravel. | A-1-b | |
| 24.9 | | | 26.0' | | 20" RECOVERY | | |
| 27.39 | | | | | | | |
| | | 12 | 29.0' | 15 5 14 17 | Saturated medium dense brown fine sand w/ some coarse sand and silt, trace of gravel. | A-2-4(0) | |
| 29.88 | | | 31.0' | | 12" RECOVERY | | |
| 32.37 | | | | | | | |
| | | 13 | 34.0' | 14 8 11 9 | Saturated medium dense brown fine sand w/ some coarse sand and silt, trace of gravel. | A-2-4(0) | |
| 34.86 | | | 36.0' | | 16" RECOVERY | | |
| 37.35 | | | | | | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-07

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|-----------------------------|
| 39.84 | | 14 | 39.0' | 12 7 3 10 | Saturated loose brown fine sand w/ some coarse sand, trace of silt. | A-3 | |
| | | | 41.0' | | 14" RECOVERY | | |
| 42.33 | | | | | | | |
| 44.82 | | 15 | 44.0' | 11 13 13 16 | Saturated medium dense gray-brown silty fine sand, trace of coarse sand and gravel. | A-2-4(0) | |
| | | | 46.0' | | 24" RECOVERY | | |
| 47.31 | | | | | | | |
| 49.8 | | 16 | 49.0' | 5 9 11 13 | Saturated medium dense gray silty fine sand w/ some coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 51.0' | | 21" RECOVERY | | |
| 52.29 | | U-1 | 51.0' | | Saturated gray silty clayey fine to coarse sand with a trace of gravel. | A-2-4(0) | Press Sample - Shelby Tube. |
| | | | 52.8' | | 22" RECOVERY | | |
| 54.78 | | 17 | 54.0' | 4 4 5 8 | Saturated stiff gray clayey fine sandy silt, trace of coarse sand and gravel. | A-4(0) | |
| | | | 56.0' | | 24" RECOVERY | | |
| 57.27 | | | | | | | |
| 59.76 | | 18 | 59.0' | 5 10 15 18 | Saturated very stiff gray clayey fine sandy silt w/ some coarse sand, trace of gravel. | A-4(0) | |
| | | | 61.0' | | 20" RECOVERY | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-07

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|--------------|
| 62.25 | | | | | | | |
| 64.74 | | 19 | 64.0' | 5 7 8 10 | Saturated medium dense gray clayey fine sand w/ some coarse sand. | A-2-4(0) | |
| | | | 66.0' | | 19" RECOVERY | | |
| 67.23 | | | | | | | |
| 69.72 | | 20 | 69.0' | 4 9 11 13 | Saturated very stiff gray fine sandy silt w/ some clay, trace of coarse sand and gravel. | A-4(0) | |
| | | | 71.0' | | 20" RECOVERY | | |
| 72.21 | | | | | | | |
| 74.7 | | 21 | 74.0' | 12 12 15 16 | Saturated medium dense gray silty fine sand, trace of coarse sand. | A-2-4(0) | |
| | | | 76.0' | | 18" RECOVERY | | |
| 77.19 | | | | | | | |
| 79.68 | | 22 | 79.0' | 10 11 15 17 | Saturated very stiff gray fine sandy silt w/ some clay, trace of organic matter, gravel, and coarse sand. | A-4(0) | |
| | | | 81.0' | | 24" RECOVERY | | |
| 82.17 | | | | | | | |
| 84.66 | | 23 | 84.0' | 8 11 15 19 | Saturated very stiff dark green fine sandy silt, trace of organic matter, coarse sand, and | A-4(0) | Glauconitic. |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-07

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|---------------|
| | | | 86.0' | | gravel. 19" RECOVERY | | |
| 87.15 | | | | | | | |
| | | 24 | 89.0' | 8 12 21 24 | Saturated hard dark green fine sandy silt, trace of organic matter and coarse sand. | A-4(0) | Glaucconitic. |
| 89.64 | | | 91.0' | | 15" RECOVERY | | |
| | | | | | | | |
| 92.13 | | | | | | | |
| | | 25 | 94.0' | 7 10 15 19 | Saturated very stiff dark green fine sandy silt w/ some organic matter, trace of coarse sand. | A-4(0) | Glaucconitic. |
| 94.62 | | | 96.0' | | 20" RECOVERY | | |
| | | | | | | | |
| 97.11 | | | | | | | |
| | | 26 | 98.0' | 10 13 16 19 | Saturated medium dense dark green silty fine sand, trace of organic matter and coarse sand. | A-2-4(0) | Glaucconitic. |
| 99.6 | | | 100.0' | | 19" RECOVERY | | |
| | | | | | Boring terminated at 100.0 feet. | | |
| 102.09 | | | | | | | |
| | | | | | | | |
| 104.58 | | | | | | | |
| | | | | | | | |
| 107.07 | | | | | | | |

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KEY TO SYMBOLS

Symbol Description

Strata symbols



Silt



Silty sand



Poorly graded sand
with silt



Poorly graded clayey
silty sand



Clayey sand

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Notes:

1. Exploratory boring was drilled on 4/2/2008 using a 3 1/4-inch diameter continuous flight power auger. Rig is a Truck CME 75.
2. Groundwater levels recorded at time of drilling. Boring backfilled upon completion.
3. Boring elevation was obtained from Figure A-2, Structure BR1-3 Exploration Plan.
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 SPT blow counts are uncorrected.

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95

Boring No.: BR1-3-08

Contract: 25-113-01

Boring Location: Sta. 718+66.33, 89' Rt. C.L.

Boring Surface Elev.: 30.00

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: Ball Sampler | | O.D. | O.D. of Samp. Tube: 3 | | IN. |
| Core Bit: | | O.D. | O.D. of Rock Core: | | IN. |

| | | | | | |
|---------------------------|---------------|----------------------------|--|------------------|--|
| Casing Size: 3 1/4 | Inches | From Depth of: | | To: | |
| Hollow Stem Auger: | | From Depth of: 0.0' | | To: 74.0' | |

| | | | | | | |
|-----------------------------|-------------|-------------|----------------------|------------------------|-----------------------|------------------------------|
| Water Level Readings | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| | 3/31/08 | | 14.0' | 12.0' | 10.0' | 20.0 30.0 30.0 30.0 |

Pay Quantities:

| | | | | | |
|---------------------------------------|-------|-------------|-------------------------------|------------------------------|------------|
| 2 1/2 in. Dia. Dry Sample Boring: | 100.0 | Ft.; | 3 | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of | U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | | Ft. |

Boring Contractor: Walton Corporation
Driller: Dave Burt
Helpers: J. Hillebrand

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|------------------------------|
| | | 1 | 0.5' | 2 7 8 | Wet stiff brown clayey coarse sandy silt w/ some fine sand, trace of gravel. | A-4(1) | Topsoil - 3"; fill material. |
| | | | 2.0' | | 18" RECOVERY | | |
| 2.49 | | 2 | 2.0' | 14 19 22 24 | Wet hard brown and dark brown clayey coarse to fine sandy silt, trace of gravel. | A-4(0) | Fill material. |
| | | | 4.0' | | 20" RECOVERY | | |
| 4.98 | | 3 | 4.0' | 8 12 20 17 | Wet hard brown clayey coarse to fine sandy silt, trace of gravel. | A-4(1) | Fill material. |
| | | | 6.0' | | 18" RECOVERY | | |
| 7.47 | | 4 | 6.0' | 9 7 4 4 | Wet medium dense brown silty fine to coarse sand, trace of gravel. | A-2-4(0) | Fill material. |
| | | | 8.0' | | 16" RECOVERY | | |
| 9.96 | | 5 | 8.0' | 1 2 3 4 | Wet loose light brown coarse to fine sand, trace of gravel and silt. | A-1-b | |
| | | | 10.0' | | 12" RECOVERY | | |
| | | 6 | 10.0' | 2 4 6 8 | Saturated loose light brown fine to coarse sand w/ some silt, trace of gravel. | A-2-4(0) | |
| | | | 12.0' | | 24" RECOVERY | | |
| 12.45 | | 7 | 12.0' | 2 2 4 5 | Saturated loose orange-brown fine to coarse sand w/ some silt, trace of gravel. | A-2-4(0) | |
| | | | 14.0' | | 18" RECOVERY | | |
| | | 8 | 14.0' | 7 4 | Saturated loose orange-brown fine to coarse | A-2-4(0) | |

Remarks: Mud Rotary at 74.0'

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-08

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|---------|
| 14.94 | | | | 6 6 | sand w/ some silt, trace of gravel. | | |
| | | | 16.0' | | 12" RECOVERY | | |
| | | 9 | 16.0' | 8 10 10 17 | Saturated medium dense orange-brown fine to coarse sand w/ some gravel and silt. | A-2-4(0) | |
| 17.43 | | | 18.0' | | 24" RECOVERY | | |
| | | 10 | 18.0' | 12 10 12 17 | Saturated medium dense orange-brown fine to coarse sand w/ some silt, trace of gravel. | A-2-4(0) | |
| 19.92 | | | 20.0' | | 24" RECOVERY | | |
| 22.41 | | | | | | | |
| | | 11 | 24.0' | 10 20 22 25 | Saturated dense orange-brown silty fine sand w/ some gravel and coarse sand. | A-2-4(0) | |
| 24.9 | | | 26.0' | | 17" RECOVERY | | |
| 27.39 | | | | | | | |
| | | 12 | 29.0' | 5 10 13 15 | Saturated medium dense fine sand w/ some silt and coarse sand, trace of gravel. | A-2-4(0) | |
| 29.88 | | | 31.0' | | 24" RECOVERY | | |
| 32.37 | | | | | | | |
| | | 13 | 34.0' | 9 11 13 14 | Saturated medium dense brown fine sand w/ some coarse sand, trace of silt and gravel. | A-3 | |
| 34.86 | | | 36.0' | | 15" RECOVERY | | |
| 37.35 | | | | | | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-08

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|---------|
| 39.84 | | 14 | 39.0' | 8 16 13 15 | Saturated medium dense brown fine sand w/ some silt and coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 41.0' | | 24" RECOVERY | | |
| 42.33 | | | | | | | |
| 44.82 | | 15 | 44.0' | 12 22 20 20 | Saturated dense gray silty fine sand, trace of coarse sand. | A-2-4(0) | |
| | | | 46.0' | | 14" RECOVERY | | |
| 47.31 | | | | | | | |
| 49.8 | | 16 | 49.0' | 8 15 22 26 | Saturated dense gray silty fine sand, trace of coarse sand. | A-2-4(0) | |
| | | | 51.0' | | 24" RECOVERY | | |
| 52.29 | | | | | | | |
| 54.78 | | 17 | 54.0' | 9 10 11 17 | Saturated medium dense gray silty fine sand, trace of coarse sand and gravel. | A-2-4(0) | |
| | | | 56.0' | | 24" RECOVERY | | |
| 57.27 | | | | | | | |
| 59.76 | | 18 | 59.0' | 9 4 11 21 | Saturated medium dense gray silty fine sand w/ some coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 61.0' | | 24" RECOVERY | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-08

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|---|-------------|-----------------------------|
| 62.25 | | | | | | | |
| 64.74 | | 19 | 64.0' | 9 10 13 22 | Saturated medium dense gray clayey fine sand w/ some coarse sand. | A-2-4(0) | |
| | | | 66.0' | | 24" RECOVERY | | |
| 67.23 | | | | | | | |
| 69.72 | | 20 | 69.0' | 4 6 9 9 | Saturated medium dense gray clayey fine sand w/ some coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 71.0' | | 24" RECOVERY | | |
| 72.21 | | U-1 | 72.0' | | Saturated gray fine sand w/ some silt, trace of gravel. | A-4(0) | Press Sample - Shelby Tube. |
| | | | 73.3' | | 15" RECOVERY | | |
| 74.7 | | 21 | 74.0' | 7 9 13 17 | Saturated medium dense gray clayey fine sand, trace of coarse sand. | A-2-6(0) | |
| | | | 76.0' | | 24" RECOVERY | | |
| 77.19 | | | | | | | |
| 79.68 | | 22 | 79.0' | 6 7 14 16 | Saturated very stiff gray clayey fine sandy organic silt, trace of coarse sand and gravel. | A-4(0) | |
| | | | 81.0' | | 20" RECOVERY | | |
| 82.17 | | | | | | | |
| 84.66 | | 23 | 84.0' | 6 12 16 17 | Saturated very stiff gray clayey fine sandy silt, trace of organic matter, coarse sand, and | A-4(1) | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-08

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|---------|
| | | | 86.0' | | gravel. 24" RECOVERY | | |
| 87.15 | | | | | | | |
| | | 24 | 89.0' | 10 24 34 47 | Saturated very dense dark gray silty fine sand, trace of coarse sand and organic matter. 17" RECOVERY | A-2-4(0) | |
| 89.64 | | | 91.0' | | | | |
| | | | | | | | |
| 92.13 | | | | | | | |
| | | 25 | 94.0' | 14 16 15 15 | Saturated hard dark gray fine sandy silt, trace of organic matter, coarse sand, and gravel. 16" RECOVERY | A-4(0) | |
| 94.62 | | | 96.0' | | | | |
| | | | | | | | |
| 97.11 | | | | | | | |
| | | 26 | 98.0' | 17 15 23 20 | Saturated hard dark gray fine sandy silt, trace of organic matter, coarse sand, and gravel. 18" RECOVERY | A-4(0) | |
| 99.6 | | | 100.0' | | | | |
| | | | | | Boring terminated at 100.0 feet. | | |
| 102.09 | | | | | | | |
| | | | | | | | |
| 104.58 | | | | | | | |
| | | | | | | | |
| 107.07 | | | | | | | |

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KEY TO SYMBOLS

Symbol Description

Strata symbols



Low plasticity
clay



Clayey sand



Silty sand



Well graded sand
with silt



Poorly graded sand
with silt



Poorly graded clayey
silty sand

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Notes:

1. Exploratory boring was drilled on 3/31/2008 using a 3 1/4-inch diameter continuous flight power auger. Rig is a Truck CME 75.
2. Groundwater levels recorded at time of drilling. Boring backfilled upon completion.
3. Boring elevation was obtained from Figure A-2, Structure BR1-3 Exploration Plan.
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 SPT blow counts are uncorrected.

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95

Boring No.: BR1-3-09

Contract: 25-113-01

Boring Location: Sta. 716+88.76, 78' Lt. C.L.

Boring Surface Elev.: 30.00

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: Ball Sampler | O.D. | O.D. of Samp. Tube: 3 | IN. |
| Core Bit: | O.D. | O.D. of Rock Core: | IN. |

| | | | |
|---------------------------|---------------|----------------------------|------------------|
| Casing Size: 3 1/4 | Inches | From Depth of: | To: |
| Hollow Stem Auger: | | From Depth of: 0.0' | To: 54.0' |

| | | | | | | |
|-----------------------------|-------------|-------------|----------------------|------------------------|-----------------------|------------------------------|
| Water Level Readings | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| | 4/7/08 | | 14.0' | 12.0' | 10.0' | 20.0 30.0 30.0 30.0 |

Pay Quantities:

| | | | | | |
|---------------------------------------|------|-------------|-------------------------------|------------------------------|------------|
| 2 1/2 in. Dia. Dry Sample Boring: | 98.5 | Ft.; | 3 | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of: | U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | | Core Drilling in Rock: | | |

Boring Contractor: Walton Corporation
Driller: Dave Burt
Helpers: T. Kane

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|-------------------|--|-------------|---------------|
| | | 1 | 0.5' | 6 12 13 | Moist medium dense orange silty coarse sand w/ some fine sand and gravel. | A-1-b | Topsoil - 6". |
| | | | 2.0' | | 16" RECOVERY | | |
| 2.49 | | 2 | 2.0' | 9 7 5 | Moist medium dense orange coarse to fine sand w/ some silt, trace of gravel. | A-1-b | |
| | | | 4.0' | | 20" RECOVERY | | |
| 4.98 | | 3 | 4.0' | 2 3 5 5 | Moist loose orange fine to coarse sand w/ some silt, trace of gravel. | A-2-4(0) | |
| | | | 6.0' | | 14" RECOVERY | | |
| 7.47 | | 4 | 6.0' | 4 5 4 5 | Moist loose orange fine to coarse sand w/ some silt, trace of gravel. | A-2-4(0) | |
| | | | 8.0' | | 21" RECOVERY | | |
| 9.96 | | 5 | 8.0' | 2 3 4 6 | Wet loose orange coarse to fine sand w some silt, trace of gravel. | A-2-4(0) | |
| | | | 10.0' | | 16" RECOVERY | | |
| | | 6 | 10.0' | 7 5 4 3 | Wet loose orange coarse to fine sand w/ some silt, trace of gravel. | A-1-b | |
| | | | 12.0' | | 10" RECOVERY | | |
| 12.45 | | 7 | 12.0' | 2 2 5 11 | Saturated loose orange coarse to fine sand w/ some silt, trace of gravel. | A-1-b | |
| | | | 14.0' | | 12" RECOVERY | | |
| | | 8 | 14.0' | 4 13 | Saturated dense brown coarse sand and gravel | A-1-b | |

Remarks: Mud Rotary at 54.0'

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-09

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|---------|
| 14.94 | | | | 18 10 | w/ some fine sand and silt. | | |
| | | | 16.0' | | 10" RECOVERY | | |
| | | 9 | 16.0' | 3 4 7 9 | Saturated medium dense brown coarse to fine sand w/ some silt, trace of gravel. | A-2-4(0) | |
| 17.43 | | | 18.0' | | 15" RECOVERY | | |
| | | 10 | 18.0' | 4 6 10 14 | Saturated medium dense brown fine to coarse sand w/ some silt, trace of gravel. | A-2-4(0) | |
| 19.92 | | | 20.0' | | 14" RECOVERY | | |
| 22.41 | | | | | | | |
| | | 11 | 24.0' | 13 14 14 18 | Saturated medium dense brown fine sand w/ some coarse sand and silt, trace of gravel. | A-2-4(0) | |
| 24.9 | | | 26.0' | | 16" RECOVERY | | |
| 27.39 | | | | | | | |
| | | 12 | 29.0' | 2 2 6 8 | Saturated loose brown fine sand w/ some coarse sand and silt, trace of gravel. | A-2-4(0) | |
| 29.88 | | | 31.0' | | 12" RECOVERY | | |
| 32.37 | | | | | | | |
| | | 13 | 34.0' | 8 6 8 11 | Saturated medium dense brown fine sand w/ some coarse sand, trace of silt and gravel. | A-3 | |
| 34.86 | | | 36.0' | | 21" RECOVERY | | |
| 37.35 | | | | | | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-09

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|--|-------------|-----------------------------|
| 39.84 | | 14 | 39.0' | 9 6 14 11 | Saturated medium dense brown fine sand w/ some silt and coarse sand. | A-2-4(0) | |
| 42.33 | | | 41.0' | | 17" RECOVERY | | |
| 44.82 | | 15 | 44.0' | 5 20 | Saturated medium dense brown fine sand w/ some coarse sand, trace of silt. | A-3 | |
| | | | 45.0' | | 12" RECOVERY | | |
| | | 15A | 45.0' | 30 32 | Saturated very dense gray fine sand w/ some silt, trace of coarse sand and gravel. | A-2-4(0) | Fossils present. |
| | | | 46.0' | | 12" RECOVERY | | |
| 47.31 | | | | | | | |
| 49.8 | | 16 | 49.0' | 5 16 22 30 | Saturated dense gray fine sand w/ some silt and coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 51.0' | | 20" RECOVERY | | |
| 52.29 | | U-1 | 52.0' | | Saturated gray fine to coarse sand with a trace of silt and gravel. | A-2-4(0) | Press Sample - Shelby Tube. |
| | | | 53.0' | | 11" RECOVERY | | |
| 54.78 | | 17 | 54.0' | 4 11 27 50 | Saturated dense gray silty fine sand w/ some coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 56.0' | | 19" RECOVERY | | |
| 57.27 | | | | | | | |
| 59.76 | | 18 | 59.0' | 8 12 22 30 | Saturated dense gray silty fine sand w/ some coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 61.0' | | 22" RECOVERY | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-09

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|--------------|
| 62.25 | | | | | | | |
| 64.74 | | 19 | 64.0' | 7 8 14 12 | Saturated medium dense gray silty fine sand w/ some coarse sand. | A-2-4(0) | |
| | | | 66.0' | | 19" RECOVERY | | |
| 67.23 | | | | | | | |
| 69.72 | | 20 | 69.0' | 6 7 14 25 | Saturated medium dense gray silty fine sand w/ some coarse sand. | A-2-4(0) | |
| | | | 71.0' | | 21" RECOVERY | | |
| 72.21 | | | | | | | |
| 74.7 | | 21 | 74.0' | 8 9 17 27 | Saturated medium dense gray silty fine sand, trace of coarse sand and gravel. | A-2-4(0) | |
| | | | 76.0' | | 23" RECOVERY | | |
| 77.19 | | | | | | | |
| 79.68 | | 22 | 79.0' | 8 11 12 13 | Saturated medium dense gray and green clayey fine sand, trace of coarse sand and gravel. | A-2-4(0) | Glauconitic. |
| | | | 81.0' | | 19" RECOVERY | | |
| 82.17 | | | | | | | |
| 84.66 | | 23 | 84.0' | 11 15 17 30 | Saturated dense gray and green clayey fine sand, trace of organic matter, coarse sand, and | A-2-4(0) | Glauconitic. |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-09

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|----------------|---------------------|--|-------------|--|
| | | | 86.0' | | gravel. 22" RECOVERY | | |
| 87.15 | | | | | | | |
| | | 24 | 89.0' | 8 12 19 24 | Saturated dense dark gray silty fine sand, trace of organic matter, coarse sand, and seashells. 17" RECOVERY | A-2-4(0) | |
| 89.64 | | | 91.0' | | | | |
| | | | | | | | |
| 92.13 | | | | | | | |
| | | 25 | 94.0' | 24 50 | Saturated very dense dark green silty fine sand, trace of organic matter, coarse sand, and seashells. 11" RECOVERY | A-2-4(0) | Glaucconitic. |
| 94.62 | | | 95.0' | | | | |
| | | | | | | | |
| 97.11 | | | | | | | |
| | | 26 | 98.0' 98.5' | 52 | Saturated very dense dark green silty fine sand, trace of organic matter, coarse sand, and gravel. 5" RECOVERY Boring terminated at 98.5 feet. | A-2-4(0) | Glaucconitic; driller/logger noted that hole at the top of the boring caved and opened up to a large hole when augers were pulled. |
| 99.6 | | | | | | | |
| | | | | | | | |
| 102.09 | | | | | | | |
| | | | | | | | |
| 104.58 | | | | | | | |
| | | | | | | | |
| 107.07 | | | | | | | |

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KEY TO SYMBOLS

Symbol Description

Strata symbols



Silty sand



Poorly graded sand
with silt



Poorly graded sand



Poorly graded clayey
silty sand



Clayey sand

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Notes:

1. Exploratory boring was drilled on 4/7/2008 using a 3 1/4-inch diameter continuous flight power auger. Rig is a ATV CME 55.
2. Groundwater levels recorded at time of drilling. Boring backfilled upon completion.
3. Boring elevation was obtained from Figure A-2, Structure BR1-3 Exploration Plan.
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 SPT blow counts are uncorrected.

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95

Boring No.: BR1-3-10

Contract: 25-113-01

Boring Location: Sta. 715+13.00, 35' Rt. C.L.

Boring Surface Elev.: 36.44

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: Ball Sampler | | O.D. | O.D. of Samp. Tube: 3 | | IN. |
| Core Bit: | | O.D. | O.D. of Rock Core: | | IN. |

| | | | | | |
|---------------------------|---------------|----------------------------|--|------------|-------|
| Casing Size: 3 1/4 | Inches | From Depth of: | | To: | |
| Hollow Stem Auger: | | From Depth of: 0.0' | | To: | 69.0' |

| | | | | | | |
|-----------------------------|--|-------------|----------------------|------------------------|-----------------------|------------------------------|
| Water Level Readings | | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| Date 4/7/08 | | | 18.0' | 16.0' | 14.0' | 22.4 36.4 36.4 36.4 |

Pay Quantities:

| | | | | | | |
|---------------------------------------|------|-------------|--|-------------------------------|------------------------------|------------|
| 2 1/2 in. Dia. Dry Sample Boring: | 99.5 | Ft.; | | 3 | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | | No. of | U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | | | Core Drilling in Rock: | | |

Boring Contractor: Walton Corporation
Driller: Jason Truver/Dave Burt
Helpers: A. Joseph

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|------------------|---|-------------|--|
| | | 1 | 1.5' | 2 | | A-2-4(0) | 7" of hot mix asphalt; 12" of |
| 2.49 | | 2 | 2.0' | 5 4 3 3 | Moist very loose light brown silty fine sand w/ some gravel, trace of coarse sand. 3" RECOVERY | A-2-4(0) | stone base; fill material. Fill material. |
| | | | 4.0' | | 13" RECOVERY | | |
| 4.98 | | 3 | 4.0' | 2 3 3 4 | Moist loose light brown coarse to fine sand w/ some silt, trace of gravel. | A-1-b | Fill material. |
| | | | 6.0' | | 17" RECOVERY | | |
| 7.47 | | 4 | 6.0' | 4 3 3 2 | Moist loose light brown coarse to fine sand, trace of silt and gravel. | A-1-b | |
| | | | 8.0' | | 18" RECOVERY | | |
| 9.96 | | 5 | 8.0' | 2 2 3 3 | Moist loose light brown silty coarse to fine sand, trace of gravel. | A-2-4(0) | Fill material. |
| | | | 10.0' | | 16" RECOVERY | | |
| | | 6 | 10.0' | 3 3 4 3 | Moist loose light brown coarse to fine sand and gravel w/ some silt. | A-1-b | Fill material. |
| | | | 12.0' | | 14" RECOVERY | | |
| 12.45 | | 7 | 12.0' | 2 3 5 5 | Wet loose orange-brown coarse sand w/ some fine sand and gravel, trace of silt. | A-1-b | |
| | | | 14.0' | | 17" RECOVERY | | |
| 14.94 | | 8 | 14.0' | 3 4 3 3 | Saturated loose light brown fine to coarse sand w/ some silt, trace of gravel. | A-2-4(0) | |

Remarks: Mud Rotary at 69.0'

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-10

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|---------|
| | | | 16.0' | | 16" RECOVERY | | |
| | | 9 | 16.0' | 6 7 8 5 | Saturated medium dense orange-brown coarse to fine sand w/ some silt, trace of gravel. | A-2-4(0) | |
| 17.43 | | | | | | | |
| | | | 18.0' | | 19" RECOVERY | | |
| | | 10 | 18.0' | 3 2 11 19 | Saturated medium dense orange-brown coarse to fine sand and gravel, trace of silt. | A-1-b | |
| 19.92 | | | | | | | |
| | | | 20.0' | | 18" RECOVERY | | |
| | | | | | | | |
| 22.41 | | | | | | | |
| | | | | | | | |
| | | 11 | 24.0' | 13 40 38 40 | Saturated very dense orange-brown coarse sand w/ some fine sand, trace of silt and gravel. | A-1-b | |
| 24.9 | | | | | | | |
| | | | 26.0' | | 18" RECOVERY | | |
| | | | | | | | |
| 27.39 | | | | | | | |
| | | | | | | | |
| | | 12 | 29.0' | 8 8 12 10 | Saturated medium dense orange-brown silty fine sand w/ some coarse sand, trace of gravel. | A-2-4(0) | |
| 29.88 | | | | | | | |
| | | | 31.0' | | 16" RECOVERY | | |
| | | | | | | | |
| 32.37 | | | | | | | |
| | | | | | | | |
| | | 13 | 34.0' | 12 15 22 19 | Saturated dense red-brown fine sand w/ some silt and coarse sand. | A-2-4(0) | |
| 34.86 | | | | | | | |
| | | | 36.0' | | 17" RECOVERY | | |
| | | | | | | | |
| 37.35 | | | | | | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-10

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|---------|
| 39.84 | | 14 | 39.0' | 7 9 14 18 | Saturated medium dense red-brown fine sand w/ some coarse sand and silt, trace of gravel. | A-2-4(0) | |
| | | | 41.0' | | 18" RECOVERY | | |
| 42.33 | | | | | | | |
| 44.82 | | 15 | 44.0' | 11 11 13 24 | Saturated medium dense brown fine sand w/ some silt and coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 46.0' | | 18" RECOVERY | | |
| 47.31 | | | | | | | |
| 49.8 | | 16 | 49.0' | 18 19 28 40 | Saturated dense brown fine to coarse sand w/ some silt, trace of gravel. | A-2-4(0) | |
| | | | 51.0' | | 19" RECOVERY | | |
| 52.29 | | | | | | | |
| 54.78 | | 17 | 54.0' | 11 18 26 36 | Saturated dense gray silty fine sand, trace of coarse sand and gravel. | A-2-4(0) | |
| | | | 56.0' | | 18" RECOVERY | | |
| 57.27 | | | | | | | |
| 59.76 | | 18 | 59.0' | 11 14 18 35 | Saturated dense gray silty fine sand w/ some coarse sand, trace of gravel and seashells. | A-2-4(0) | |
| | | | 61.0' | | 22" RECOVERY | | |
| 62.25 | | | | | | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-10

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|--|-------------|-----------------------------|
| 64.74 | | 19 | 64.0' | 7 20 50 | Saturated very dense gray clayey fine sand w/ some coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 65.5' | | 18" RECOVERY | | |
| 67.23 | | U-1 | 67.0' | | No Recovery. | | Press Sample - Shelby Tube. |
| | | | 68.1' | | 0" RECOVERY | | |
| 69.72 | | 20 | 69.0' | 9 12 19 24 | Saturated dense gray silty fine sand w/ some coarse sand. | A-2-4(0) | |
| | | | 71.0' | | 22" RECOVERY | | |
| 72.21 | | | | | | | |
| 74.7 | | 21 | 74.0' | 2 7 14 23 | Saturated medium dense gray fine sand w/ some clay and coarse sand, trace of seashells. | A-2-4(0) | |
| | | | 76.0' | | 21" RECOVERY | | |
| 77.19 | | | | | | | |
| 79.68 | | 22 | 79.0' | 8 13 17 14 | Saturated very stiff gray fine sandy silt w/ some clay, trace of gravel, coarse sand, and seashells. | A-4(0) | |
| | | | 81.0' | | 18" RECOVERY | | |
| 82.17 | | | | | | | |
| 84.66 | | 23 | 84.0' | 4 8 14 21 | Saturated very stiff gray fine sandy silt, trace of coarse sand. | A-4(0) | |

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**STATE OF DELAWARE
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DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: BR1-3-10

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|--------------------|--|-------------|--------------|
| | | | 86.0' | | 22" RECOVERY | | |
| 87.15 | | | | | | | |
| | | 24 | 89.0' | 6 9 14 20 | Saturated very stiff gray clayey fine sandy silt, trace of organic matter, coarse sand, and seashells. | A-4(1) | |
| 89.64 | | | 91.0' | | 23" RECOVERY | | |
| | | | | | | | |
| 92.13 | | | | | | | |
| | | 25 | 94.0' | 5 9 21 31 | Saturated very stiff dark green fine sandy silt, trace of organic matter, coarse sand, and seashells. | A-4(0) | Glauconitic. |
| 94.62 | | | 96.0' | | 23" RECOVERY | | |
| | | | | | | | |
| 97.11 | | | | | | | |
| | | 26 | 98.0' | 14 34 50 | Saturated hard dark green fine sandy silt, trace of organic matter and coarse sand. | A-4(0) | Glauconitic. |
| | | | 99.5' | | 11" RECOVERY | | |
| 99.6 | | | | | Boring terminated at 99.5 feet. | | |
| | | | | | | | |
| 102.09 | | | | | | | |
| | | | | | | | |
| 104.58 | | | | | | | |
| | | | | | | | |
| 107.07 | | | | | | | |

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KEY TO SYMBOLS

Symbol Description

Strata symbols



Silty sand



Well graded sand
with silt



Poorly graded sand
with silt



Poorly graded clayey
silty sand



Silty low plasticity
clay



Silt

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Notes:

1. Exploratory boring was drilled on 4/7/2008 using a 3 1/4-inch diameter continuous flight power auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at time of drilling. Boring backfilled upon completion.
3. Surveyed boring locations and elevations were provided by Century Engineering.
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 SPT blow counts are uncorrected.

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1

Boring No.: BR1-3-11

Contract: 25-113-01

Boring Location: Sta. 857+12, 20' Lt. C.L.

Boring Surface Elev.: + 32.1

Reference:

Wt. of Casing Hammer:
Wt. of Sample Hammer: 140
Type of: D-Sampler: Split Barrel
S-Sampler:
U-Sampler:
Core Bit:

Lbs.
Lbs.
O.D.
O.D.
O.D.
O.D.

Average Fall:
Average Fall: 30
O.D. of Sampler: 2
O.D. of Samp. Tube:
O.D. of Samp. Tube:
O.D. of Rock Core:

IN.
IN.
IN.
IN.
IN.
IN.

Casing Size: 3 1/4
Hollow Stem Auger:

Inches

From Depth of:
From Depth of: 0.0

To:
To: 20.0

Water Level Readings

Date
7/7/2009

Time

Depth of Hole
10.0

Depth of Casing
8.0

Depth of Water
6.4

Elev. of Water

Pay Quantities:

2 1/2 in. Dia. Dry Sample Boring: 100
No. of 2 in. Dia. Shelby Tubes:
2 1/2 in. Dia. Contin. Sample Boring:

Ft.;
Ft.;

No. of:
Core Drilling in Rock:

Dia. U-Sample Boring:
U-Samples:

Ft.
Ft.

Boring Contractor: Walton Corporation

Driller: Jason Truver

Helpers: J. Lafferty

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|---|-------------|----------------|
| | 7/7/09 | 1 | 0.5' | 8 9 8 | Moist medium dense brown fine to coarse sand w/trace of silt and gravel. 17" RECOVERY | A-3 | 5" of Topsoil. |
| 3 | | 2 | 2.0' | 11 8 9 7 | Moist medium dense orange fine to coarse sand w/some silt, trace of gravel. 21" RECOVERY | A-2-4(0) | |
| | | 3 | 4.0' | 5 7 8 10 | Moist medium dense brown coarse to fine sand and gravel w/some silt. 20" RECOVERY | A-1-b | |
| 6 | | 4 | 6.0' | 8 8 7 8 | Moist medium dense brown fine to coarse sand w/some silt, trace of gravel. 22" RECOVERY | A-2-4(0) | |
| | | 5 | 8.0' | 3 5 6 6 | Moist medium dense brown fine to coarse sand w/some silt, trace of gravel. 21" RECOVERY | A-2-4(0) | |
| | | 6 | 10.0' | 5 4 4 5 | Wet loose brown coarse to fine sand w/some gravel and silt. 18" RECOVERY | A-1-b | |
| 12 | | 7 | 12.0' | 2 2 2 2 | Wet very loose brown fine to coarse sand w/some silt, trace of gravel. 18" RECOVERY | A-2-4(0) | |
| | | 8 | 14.0' | 3 3 3 5 | Wet loose brown coarse to fine sand w/some silt, trace of gravel. 17" RECOVERY | A-1-b | |
| 15 | | 9 | 16.0' | 11 11 10 5 | Wet medium dense brown coarse to fine sand w/some silt and gravel. | A-1-b | |

Remarks: Mud Rotart @ 20.0 ft.

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 25-113-01

Boring No.: BR1-3-11

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|----------------------------------|
| 18 | | | 18.0' | | 20" RECOVERY | | |
| | | 10 | 18.0' | 1 3 5 8 | Wet loose brown coarse to fine sand w/trace of silt and gravel. | A-1-b | Switched to Mud Rotary at 20.0'. |
| | | | 20.0' | | 21" RECOVERY | | |
| 21 | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| 24 | | 11 | 23.0' | 7 9 9 10 | Wet medium dense orange fine sand w/some coarse sand, trace of silt and gravel. | A-3 | |
| | | | 25.0' | | 19" RECOVERY | | |
| 27 | | | | | | | |
| | | | | | | | |
| | | 12 | 28.0' | 8 10 12 17 | Wet medium dense orange fine sand w/some coarse sand. | A-2-4(0) | |
| 30 | | | 30.0' | | 20" RECOVERY | | |
| | | | | | | | |
| | | | | | | | |
| 33 | | | | | | | |
| | | 13 | 33.0' | 8 10 13 15 | Wet medium dense orange fine sand w/some coarse sand, trace of gravel. | A-3 | |
| | | | 35.0' | | 21" RECOVERY | | |
| 36 | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| 39 | | 14 | 38.0' | 6 10 15 15 | Wet medium dense brown fine sand w/some coarse sand and silt. | A-2-4(0) | |
| | | | 40.0' | | 17" RECOVERY | | |
| 42 | | | | | | | |
| | | | | | | | |
| | | 15 | 43.0' | 15 15 20 23 | Wet dense brown fine sand w/some silt, trace of coarse sand. | A-2-4(0) | |
| 45 | | | 45.0' | | 20" RECOVERY | | |

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**STATE OF DELAWARE
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DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 25-113-01

Boring No.: BR1-3-11

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|---------|
| 48 | | | | | | | |
| | | 16 | 48.0' | 11 17 19 27 | Wet dense grayish green silty fine sand w/ trace of coarse sand and gravel. | A-2-4(0) | |
| | | | 50.0' | | 20" RECOVERY | | |
| 51 | | | | | | | |
| | | 17 | 53.0' | 11 17 16 20 | Wet dense grayish green silty fine sand w/ some coarse sand. | A-2-4(0) | |
| 54 | | | 55.0' | | 23" RECOVERY | | |
| | | | | | | | |
| 57 | | | | | | | |
| | | 18 | 58.0' | 7 8 10 11 | Wet medium dense gray fine sand w/some clay, trace of coarse sand and gravel. | A-2-4(0) | |
| 60 | | | 60.0' | | 24" RECOVERY | | |
| | | | | | | | |
| 63 | | | | | | | |
| | | 19 | 63.0' | 7 11 11 13 | Wet very stiff gray fine sandy silt w/some clay, trace of coarse sand and sea shell fragments. | A-4(0) | |
| | | | 65.0' | | 23" RECOVERY | | |
| 66 | | | | | | | |
| | | 20 | 68.0' | 5 9 15 21 | Wet very stiff gray clayey fine sandy silt w/ trace of coarse sand, organic matter and sea shell fragments. | A-4(0) | |
| 69 | | | 70.0' | | 24" RECOVERY | | |
| | | | | | | | |
| 72 | | | | | | | |
| | | 21 | 73.0' | 5 7 9 | Wet very stiff gray clayey fine sandy silt w/ trace of coarse sand, gravel and organic | A-4(0) | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 25-113-01

Boring No.: BR1-3-11

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|-------------------------|---|-------------|--------------|
| 75 | | | 75.0' | 15 | matter. 23" RECOVERY | | |
| 78 | | 22 | 78.0' | 8 11 15 17 | Wet very stiff gray fine sandy silt w/trace of coarse sand, organic matter and gravel. 23" RECOVERY | A-4(0) | |
| 81 | | | 80.0' | | | | |
| 84 | | 23 | 83.0' | 8 9 11 17 | Wet very stiff grayish green clayey fine sandy silt w/trace of organic matter, coarse sand and sea shell fragments. 23" RECOVERY | A-4(0) | |
| 87 | | | 85.0' | | | | |
| 90 | | 24 | 88.0' | 7 17 31 41 | Wet dense green silty fine sand w/trace of organic matter and coarse sand. 23" RECOVERY | A-2-4(0) | Glauconitic |
| 93 | | | 90.0' | | | | |
| 96 | | 25 | 93.0' | 17 28 40 50/3" | No Sample Recovery 0" RECOVERY | | |
| 99 | | | 95.0' | | | | |
| 99 | | 26 | 98.0' | 7 12 22 23 | Wet dense green silty fine sand w/trace of organic matter and coarse sand. 23" RECOVERY | A-2-4(0) | Glauconitic. |
| 102 | | | 100.0' | | End of Boring | | |

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AUGUST 2015

KEY TO SYMBOLS

Symbol Description

Strata symbols



Poorly graded sand
with silt



Silty sand



Well graded sand
with silt



Poorly graded sand



Poorly graded clayey
silty sand



Clayey sand

DRAFT
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AUGUST 2015

Notes:

1. Exploratory borings were drilled on 7/7/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to S.R. 1

Boring No.: BR1-3-12

Contract: 25-113-01

Boring Location: Sta. 857+12, 80' Rt. C.L.

Boring Surface Elev.: + 33.7

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: | | To: |
| | Hollow Stem Auger: | | From Depth of: | 0.0 | To: |
| | | | | | 18.0 |

| | | | | | | |
|----------------------|-----------|------|---------------|-----------------|----------------|----------------|
| Water Level Readings | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| | 7/10/2009 | | 16.0 | 14.0 | 13.0 | |

Pay Quantities:

| | | | | | |
|---------------------------------------|-----|------|------------------------|-----------------------|-----|
| 2 1/2 in. Dia. Dry Sample Boring: | 100 | Ft.; | | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of: | U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | | Ft. |

Boring Contractor: Walton Corporation
Driller: Jason Truver
Helpers: J. Lafferty

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|---------------|
| | 7/10/09 | 1 | 0.5' | 13 17 15 | Moist dense brown coarse sand w/some silt and fine sand, trace of gravel. 11" RECOVERY | A-1-b | Topsoil - 5". |
| 3 | | 2 | 2.0' | 11 16 16 11 | Moist dense brown coarse to fine sand w/ some silt, trace of gravel. 20" RECOVERY | A-1-b | |
| | | 3 | 4.0' | 3 4 3 3 | Moist loose brown coarse sand w/some fine sand, trace of silt and gravel. 20" RECOVERY | A-1-b | |
| 6 | | 4 | 6.0' | 4 4 4 4 | Moist loose brown coarse sand w/some fine sand and silt, trace of gravel. 16" RECOVERY | A-1-b | |
| 9 | | 5 | 8.0' | 4 4 6 6 | Moist loose orange coarse to fine sand w/ some silt and gravel. 15" RECOVERY | A-1-b | |
| | | 6 | 10.0' | 4 5 5 5 | Moist loose orange coarse to fine sand w/ some silt and gravel. 16" RECOVERY | A-1-b | |
| 12 | | 7 | 12.0' | 2 2 3 3 | Wet loose brown coarse to fine sand w/some silt, trace of gravel. 14" RECOVERY | A-2-4(0) | |
| 15 | | 8 | 14.0' | 3 3 4 5 | Wet loose brown fine to coarse sand w/some silt, trace of gravel. 16" RECOVERY | A-3 | |
| | | 9 | 16.0' | 3 3 5 5 | Wet loose brown fine to coarse sand w/trace of silt and gravel. | | |

Remarks: Mud Rotary @ 18.0 Ft.

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 25-113-01

Boring No.: BR1-3-12

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|---|-------------|---------------------|
| 18 | | | 18.0' | | 22" RECOVERY | | |
| | | 10 | 18.0' | 5 9 11 13 | Wet medium dense brown coarse to fine sand and gravel w/trace of silt. | A-1-b | Mud Rotary @ 18.0'. |
| | | | 20.0' | | 15" RECOVERY | | |
| 21 | | | | | | | |
| | | 11 | 23.0' | 6 9 9 11 | Wet medium dense orange fine sand w/some coarse sand and silt, trace of gravel. | A-2-4(0) | |
| 24 | | | 25.0' | | 19" RECOVERY | | |
| | | | | | | | |
| 27 | | | | | | | |
| | | 12 | 28.0' | 9 14 15 14 | Wet medium dense orange fine sand w/some coarse sand and silt, trace of gravel. | A-2-4(0) | |
| 30 | | | 30.0' | | 14" RECOVERY | | |
| | | | | | | | |
| 33 | | | | | | | |
| | | 13 | 33.0' | 6 6 7 11 | Wet medium dense brown fine sand w/some silt and coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 35.0' | | 19" RECOVERY | | |
| 36 | | | | | | | |
| | | 14 | 38.0' | 7 8 8 9 | Wet medium dense brown fine sand w/some coarse sand, trace of silt. | A-3 | |
| 39 | | | 40.0' | | 19" RECOVERY | | |
| | | | | | | | |
| 42 | | | | | | | |
| | | 15 | 43.0' | 5 5 5 6 | Wet loose brown fine sand w/some coarse sand, trace of silt. | A-3 | |
| 45 | | | 45.0' | | 21" RECOVERY | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 25-113-01

Boring No.: BR1-3-12

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|-------------|
| 48 | | 16 | 48.0' | 6 10 21 17 | Wet dense brown fine sand w/some silt, trace of coarse sand and gravel. | A-2-4(0) | |
| | | | 50.0' | | 20" RECOVERY | | |
| 51 | | | | | | | |
| 54 | | 17 | 53.0' | 12 15 17 23 | Wet dense gray silty fine sand w/trace of coarse sand, gravel and organic matter. | A-2-4(0) | |
| | | | 55.0' | | 23" RECOVERY | | |
| 57 | | | | | | | |
| 60 | | 18 | 58.0' | 9 12 12 12 | Wet medium dense gray silty fine sand w/ trace of coarse sand, gravel and organic matter. | A-2-4(0) | |
| | | | 60.0' | | 23" RECOVERY | | |
| 63 | | | | | | | |
| 66 | | 19 | 63.0' | 4 7 10 18 | Wet medium dense gray silty fine sand w/ some coarse sand, trace or organic matter and gravel. | A-2-4(0) | Glauconitic |
| | | | 65.0' | | 23" RECOVERY | | |
| 69 | | 20 | 68.0' | 3 5 7 9 | Wet medium dense gray clayey fine sand w/ some coarse sand, trace of organic matter. | A-2-4(0) | Glauconitic |
| | | | 70.0' | | 23" RECOVERY | | |
| 72 | | | | | | | |
| | | 21 | 73.0' | 5 8 9 | Wet medium dense gray silty fine sand w/ trace of coarse sand and organic matter. | A-2-4(0) | Glauconitic |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 25-113-01

Boring No.: BR1-3-12

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|-------------------------|---|-------------|-------------|
| 75 | | | 75.0' | 14 | 23" RECOVERY | | |
| 78 | | 22 | 78.0' | 7 11 14 16 | Wet medium dense gray silty fine sand w/ trace of coarse sand and organic matter. | A-2-4(0) | Glauconitic |
| 81 | | | 80.0' | | 22" RECOVERY | | |
| 84 | | 23 | 83.0' | 7 10 13 13 | Wet very stiff grayish green fine sandy silt w/ trace of organic matter and coarse sand. | A-4(0) | Glauconitic |
| 87 | | | 85.0' | | 21" RECOVERY | | |
| 90 | | 24 | 88.0' | 13 17 19 26 | Wet hard greenish gray clayey silt w/some organic matter, trace of coarse sand and sea shell fragments. | A-4(0) | Glauconitic |
| 93 | | | 90.0' | | 24" RECOVERY | | |
| 96 | | 25 | 93.0' | 13 17 37 50/4" | Wet very dense green silty fine sand w/trace of organic matter and sea shell fragments. | A-2-4(0) | Glauconitic |
| 99 | | | 95.0' | | 22" RECOVERY | | |
| 102 | | 26 | 98.0' | 12 13 21 29 | Wet hard green fine sandy silt w/some organic matter, trace of coarse sand and sea shell fragments. | A-4(0) | Glauconitic |
| | | | 100.0' | | 24" RECOVERY | | |
| | | | | | End of Boring | | |

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AUGUST 2015

KEY TO SYMBOLS

Symbol Description

Strata symbols



Silty sand



Poorly graded sand
with silt



Poorly graded sand



Poorly graded clayey
silty sand

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AUGUST 2015

Notes:

1. Exploratory borings were drilled on 7/10/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to S.R. 1

Boring No.: BR1-3-14

Contract: 25-113-01

Boring Location: Sta. 860+71, 50' Lt. C.L.

Boring Surface Elev.: + 33.3

Reference:

Wt. of Casing Hammer:
Wt. of Sample Hammer: 140
Type of: D-Sampler: Split Barrel
S-Sampler:
U-Sampler:
Core Bit:

Lbs.
Lbs.
O.D.
O.D.
O.D.
O.D.

Average Fall:
Average Fall: 30
O.D. of Sampler: 2
O.D. of Samp. Tube:
O.D. of Samp. Tube:
O.D. of Rock Core:

IN.
IN.
IN.
IN.
IN.
IN.

Casing Size: 3 1/4
Hollow Stem Auger: Inches

From Depth of:
From Depth of: 0.0
To:
To: 18.0

| Water Level Readings | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
|----------------------|-----------|------|---------------|-----------------|----------------|----------------|
| | 7/15/2009 | | 18.0 | 16.0 | 12.0 | |

Pay Quantities:
2 1/2 in. Dia. Dry Sample Boring: 100 Ft.;
No. of 2 in. Dia. Shelby Tubes: ;
2 1/2 in. Dia. Contin. Sample Boring: Ft.;
Dia. U-Sample Boring: Ft.
U-Samples: ;
Core Drilling in Rock: Ft.

Boring Contractor: Walton Corporation
Driller: Jason Truver
Helpers: J. Williams

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|--|
| | 7/15/09 | 1 | 0.0' | | 0" RECOVERY | | Asphalt - 18". Stone - 3" . Fill - 3". |
| 3 | | 2 | 2.0' | 9 9 11 9 | Moist medium dense brown and tan clayey coarse to fine sand w/trace of gravel. | A-2-4(0) | |
| 6 | | 3 | 4.0' | 12 21 17 18 | Moist dense brown and tan silty coarse to fine sand w/trace of gravel. | A-2-4(0) | |
| 9 | | 4 | 6.0' | 14 21 22 26 | Moist hard brownish tan clayey coarse to fine sandy silt w/trace of gravel. | A-4(0) | |
| 12 | | 5 | 8.0' | 9 21 17 13 | Moist dense brownish tan coarse to fine sand w/some silt and gravel. | A-1-b | |
| 15 | | 6 | 10.0' | 6 7 8 9 | Wet stiff brown clay w/some fine to coarse sand, trace of gravel. | A-6(6) | |
| | | 7 | 12.0' | 5 5 11 12 | Wet medium dense brown fine to coarse sand w/some clay and gravel. | A-2-4(0) | |
| | | 8 | 14.0' | 5 6 7 8 | Wet medium dense brown fine to coarse sand w/some silt, trace of gravel. | A-2-4(0) | |
| | | 9 | 16.0' | 10 9 11 | Wet medium dense tan fine to coarse sand w/ | A-2-4(0) | |

Remarks: Mud Rotary at 18.0 Ft.

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 25-113-01

Boring No.: BR1-3-14

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|---------------------|
| 18 | | | 18.0' | 16 | some silt, trace of gravel. 22" RECOVERY | | |
| | | 10 | 18.0' | 10 11 17 10 | Wet medium dense brown gravel and coarse to fine sand w/some silt. 11" RECOVERY | A-1-b | Mud Rotary @ 18.0'. |
| 21 | | | 20.0' | | | | |
| 24 | | 11 | 23.0' | 6 7 8 9 | Wet medium dense brown fine sand w/some coarse sand, trace of silt and gravel. 16" RECOVERY | A-3 | |
| | | | 25.0' | | | | |
| 27 | | | | | | | |
| 30 | | 12 | 28.0' | 12 16 19 14 | Wet dense brown fine sand w/some gravel, coarse sand and silt. 8" RECOVERY | A-2-4(0) | |
| | | | 30.0' | | | | |
| 33 | | | | | | | |
| | | 13 | 33.0' | 7 9 13 15 | Wet medium dense brown fine sand w/some coarse sand, trace of silt. 20" RECOVERY | A-3 | |
| | | | 35.0' | | | | |
| 36 | | | | | | | |
| 39 | | 14 | 38.0' | 7 6 8 11 | Wet medium dense brown fine sand w/some coarse sand, trace of silt. 18" RECOVERY | A-3 | |
| | | | 40.0' | | | | |
| 42 | | | | | | | |
| | | 15 | 43.0' | 7 11 15 15 | Wet medium dense brown fine sand w/some silt, trace of coarse sand and gravel. 18" RECOVERY | A-2-4(0) | |
| 45 | | | 45.0' | | | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 25-113-01

Boring No.: BR1-3-14

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|--|-------------|---------|
| 48 | | | | | | | |
| | | 16 | 48.0' | 9 8 14 19 | Wet medium dense brown fine sand w/some silt and coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 50.0' | | 22" RECOVERY | | |
| 51 | | | | | | | |
| | | 17 | 53.0' | 4 8 10 13 | Wet very stiff gray clayey fine sandy silt w/ trace of coarse sand and organic matter. | A-4(0) | |
| 54 | | | 55.0' | | 24" RECOVERY | | |
| 57 | | | | | | | |
| | | 18 | 58.0' | 6 6 9 11 | Wet stiff gray fine sandy silt w/some clay, trace of coarse sand, organic matter and gravel. | A-4(0) | |
| 60 | | | 60.0' | | 24" RECOVERY | | |
| 63 | | | | | | | |
| | | 19 | 63.0' | 6 11 17 19 | Wet medium dense green clayey fine sand w/ trace of coarse sand and organic matter. | A-2-4(0) | |
| | | | 65.0' | | 24" RECOVERY | | |
| 66 | | | | | | | |
| | | 20 | 68.0' | 6 9 10 18 | Wet medium dense gray fine sand w/some clay, trace of coarse sand and organic matter. | A-2-4(0) | |
| 69 | | | 70.0' | | 24" RECOVERY | | |
| 72 | | | | | | | |
| | | 21 | 73.0' | 11 | | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 25-113-01

Boring No.: BR1-3-14

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|-----------------|----------------------|--|-------------|-------------|
| 75 | | | 75.0' | 13 16 21 | Wet very stiff gray fine sandy silt w/trace of coarse sand, organic matter and gravel. 24" RECOVERY | A-4(0) | |
| 78 | | 22 | 78.0' 80.0' | 15 13 17 28 | Wet medium dense green clayey fine sand w/ trace of organic matter, coarse sand and gravel. 24" RECOVERY | A-2-4(0) | Glauconitic |
| 81 | | | | | | | |
| 84 | | 23 | 83.0' 85.0' | 10 13 14 21 | Wet very stiff green clayey fine sandy silt w/ some organic matter, trace of gravel, coarse sand and crushed sea shells. 24" RECOVERY | A-4(0) | Glauconitic |
| 87 | | | | | | | |
| 90 | 7/16/09 | 24 | 88.0' 90.0' | 16 18 32 | Wet dense green silty fine sand w/trace of organic matter, coarse sand and crushed sea shells. 19" RECOVERY | A-2-4(0) | Glauconitic |
| 93 | | | | | | | |
| 96 | | 25 | 93.0' 95.0' | 16 25 35 30 | Wet very dense green silty fine sand w/some organic matter, trace of coarse sand and crushed sea shells. 17" RECOVERY | A-2-4(0) | Glauconitic |
| 99 | | 26 | 98.0' 100.0' | 10 12 18 22 | Wet very stiff green fine sandy silt w/some organic matter, trace of coarse sand, gravel and crushed sea shells. 21" RECOVERY | A-4(0) | Glauconitic |
| | | | | | End of Boring | | |

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NOT FOR BIDDING
AUGUST 2015

KEY TO SYMBOLS

Symbol Description

Strata symbols



Poorly graded clayey
silty sand



Silty sand



Low plasticity
clay



Poorly graded sand
with silt



Silt



Clayey sand

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AUGUST 2015

Notes:

1. Exploratory borings were drilled on 7/15/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to S.R. 1

Boring No.: BR1-3-15

Contract: 25-113-01

Boring Location: Sta. 860+71, 50' Lt. C.L.

Boring Surface Elev.: + 31.0

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: | | To: | |
| Hollow Stem Auger: | | From Depth of: 0.0 | | To: 18.0 | |

| | | | | | | |
|-----------------------------|-------------|-------------|----------------------|------------------------|-----------------------|-----------------------|
| Water Level Readings | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| | 7/8/2009 | | 14.0 | 12.0 | 10.9 | |

Pay Quantities:

| | | | | |
|---------------------------------------|-----|-------------|-------------------------------|------------|
| 2 1/2 in. Dia. Dry Sample Boring: | 100 | Ft.; | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | Ft. |

Boring Contractor: Walton Corporation
Driller: Jason Truver
Helpers: J. Lafferty

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|---------------|
| | 7/8/09 | 1 | 0.5' | 13 18 21 | Moist dense gray gravel w/some fine to coarse sand, trace of silt. 11" RECOVERY | A-1-a | Topsoil - 5". |
| 3 | | 2 | 2.0' | 14 9 7 9 | Moist medium dense brown silty coarse sand w/some fine sand and gravel. 22" RECOVERY | A-1-b | |
| | | 3 | 4.0' | 9 11 20 18 | Moist dense brown silty fine to coarse sand w/some gravel. 16" RECOVERY | A-2-4(0) | |
| 6 | | 4 | 6.0' | 14 13 17 17 | Moist very stiff brown clayey silt w/some fine to coarse sand, trace of gravel. 17" RECOVERY | A-4(3) | |
| | | 5 | 8.0' | 4 8 12 14 | Moist very stiff brown clayey gravelly coarse sandy silt w/some fine sand. 18" RECOVERY | A-4(0) | |
| | | 6 | 10.0' | 13 13 10 7 | Moist medium dense brown coarse to fine sand w/some silt, trace of gravel. 20" RECOVERY | A-2-4(0) | |
| 12 | | 7 | 12.0' | 2 3 5 5 | Wet loose brown coarse to fine sand w/some silt, trace of gravel. 15" RECOVERY | A-2-4(0) | |
| | | 8 | 14.0' | 2 8 8 7 | Wet medium dense brown fine to coarse sand and gravel w/some silt. 21" RECOVERY | A-2-4(0) | |
| 15 | | 9 | 16.0' | 5 7 9 11 | Wet medium dense brown fine to coarse sand w/some silt, trace of gravel. | A-2-4(0) | |

Remarks: Mud Rotary @ 18.0 Ft.

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 25-113-01

Boring No.: BR1-3-15

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|--------------------|---|-------------|---------------------|
| 18 | | | 18.0' | | 24" RECOVERY | | |
| | | 10 | 18.0' | 6 6 8 21 | Wet medium dense orange fine to coarse sand w/trace of gravel and silt. | A-3 | Mud Rotary @ 18.0'. |
| | | | 20.0' | | 15" RECOVERY | | |
| 21 | | | | | | | |
| | | | | | | | |
| 24 | | 11 | 23.0' | 5 6 7 7 | Wet medium dense orange fine sand w/some coarse sand, trace of silt and gravel. | A-3 | |
| | | | 25.0' | | 16" RECOVERY | | |
| 27 | | | | | | | |
| | | | | | | | |
| | | 12 | 28.0' | 6 6 13 21 | Wet very stiff orange fine sandy silt w/some coarse sand. | A-4(0) | |
| 30 | | | 30.0' | | 19" RECOVERY | | |
| | | | | | | | |
| 33 | | | | | | | |
| | | 13 | 33.0' | 7 7 9 10 | Wet medium dense brown fine sand w/some coarse sand, trace of silt. | A-3 | |
| | | | 35.0' | | 17" RECOVERY | | |
| 36 | | | | | | | |
| | | | | | | | |
| 39 | | 14 | 38.0' | 6 7 8 7 | Wet medium dense brown fine sand w/some coarse sand, trace of silt. | A-3 | |
| | | | 40.0' | | 20" RECOVERY | | |
| 42 | | | | | | | |
| | | | | | | | |
| | | 15 | 43.0' | 5 8 7 7 | Wet medium dense brown fine sand w/some silt and coarse sand, trace of gravel. | A-2-4(0) | |
| 45 | | | 45.0' | | 20" RECOVERY | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 25-113-01

Boring No.: BR1-3-15

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|--|-------------|-------------|
| 48 | | | | | | | |
| | | 16 | 48.0' | 7 11 10 17 | Wet medium dense greenish gray silty fine sand w/some coarse sand, trace of gravel and sea shell fragments. 20" RECOVERY | A-2-4(0) | Glauconitic |
| | | | 50.0' | | | | |
| 51 | | | | | | | |
| | | 17 | 53.0' | 4 6 5 7 | Wet medium dense gray fine sand w/some clay, trace of coarse sand, organic matter and sea shell fragments. 21" RECOVERY | A-2-4(0) | Glauconitic |
| 54 | | | 55.0' | | | | |
| | | | | | | | |
| 57 | | | | | | | |
| | | 18 | 58.0' | 7 9 16 19 | Wet very stiff gray fine sandy silt w/some clay, trace of coarse sand, organic matter and sea shell fragments. 23" RECOVERY | A-4(0) | Glauconitic |
| 60 | | | 60.0' | | | | |
| | | | | | | | |
| 63 | | | | | | | |
| | 7/9/09 | 19 | 63.0' | 5 8 12 13 | Wet medium dense gray silty fine sand w/some coarse sand, trace of organic matter. 23" RECOVERY | A-2-4(0) | Glauconitic |
| | | | 65.0' | | | | |
| 66 | | | | | | | |
| | | 20 | 68.0' | 5 9 13 16 | Wet medium dense gray silty fine sand w/some clay, trace of gravel, coarse sand and organic matter. 22" RECOVERY | A-2-4(0) | Glauconitic |
| 69 | | | 70.0' | | | | |
| | | | | | | | |
| 72 | | | | | | | |
| | | 21 | 73.0' | 6 13 17 | wet very stiff gray fine sandy silt w/trace of coarse sand. | A-4(0) | Glauconitic |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 25-113-01

Boring No.: BR1-3-15







| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|-------------------------|---|-------------|-------------|
| 75 | | | 75.0' | 18 | 22" RECOVERY | | |
| 78 | | 22 | 78.0' | 8 10 11 17 | Wet medium dense gray clayey fine sand w/ trace of coarse sand. | A-2-6(0) | |
| 81 | | | 80.0' | | 23" RECOVERY | | |
| 84 | | 23 | 83.0' | 10 10 14 20 | Wet medium dense green fine sand w/some clay, trace of coarse sand. | A-2-4(0) | Glauconitic |
| 87 | | | 85.0' | | 23" RECOVERY | | |
| 90 | | 24 | 88.0' | 19 26 43 50/4" | Wet very dense green silty fine sand w/trace of coarse sand. | A-2-4(0) | Glauconitic |
| 93 | | | 90.0' | | 20" RECOVERY | | |
| 96 | | 25 | 93.0' | 7 11 16 19 | Wet medium dense green silty fine sand w/ trace of coarse sand. | A-2-4(0) | Glauconitic |
| 99 | | | 95.0' | | 20" RECOVERY | | |
| 102 | | 26 | 98.0' | 5 7 10 15 | Wet very stiff black clay w/some fine sand. | A-6(17) | |
| | | | 100.0' | | 24" RECOVERY | | |
| | | | | | End of Boring | | |

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KEY TO SYMBOLS

Symbol Description

Strata symbols

| | |
|--|---------------------------------|
|  | Poorly graded sand with silt |
|  | Silty sand |
|  | Low plasticity clay |
|  | Poorly graded clayey silty sand |
|  | Poorly graded sand |
|  | Clayey sand |

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AUGUST 2015

Notes:

1. Exploratory borings were drilled on 7/8/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to S.R. 1

Boring No.: BR1-3-16

Contract: 25-113-01

Boring Location: Sta. 862+51, 9' Rt. C.L.

Boring Surface Elev.: + 31.0

Reference:

Wt. of Casing Hammer:
Wt. of Sample Hammer: 140
Type of: D-Sampler: Split Barrel
S-Sampler:
U-Sampler:
Core Bit:

Lbs.
Lbs.
O.D.
O.D.
O.D.
O.D.

Average Fall:
Average Fall: 30
O.D. of Sampler: 2
O.D. of Samp. Tube:
O.D. of Samp. Tube:
O.D. of Rock Core:

IN.
IN.
IN.
IN.
IN.
IN.

Casing Size: 3 1/4
Hollow Stem Auger: Inches

From Depth of:
From Depth of: 0.0
To:
To: 29.0

Water Level Readings

| Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
|----------|------|---------------|-----------------|----------------|----------------|
| 7/9/2009 | | 18.0 | 16.0 | 15.6 | |

Pay Quantities:

| | | | | |
|---------------------------------------|-----|------|------------------------|-----|
| 2 1/2 in. Dia. Dry Sample Boring: | 101 | Ft.; | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | Ft. |

Boring Contractor: Walton Corporation

Driller: Gary Truver

Helpers: J. Williams

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|---------------|
| | 7/9/09 | 1 | 0.0' | 5 6 | Wet stiff gray silt w/some fine to coarse sand, clay and gravel. | A-4(0) | Topsoil - 2". |
| | | 1A | 1.0' | 5 4 | 8" RECOVERY No Sieve Analysis - Indication of wet medium dense brown sand. | | |
| 3 | | 2 | 2.0' | 6 7 10 9 | 5" RECOVERY Wet medium dense brown clayey coarse sand w/some fine sand, trace of gravel. | A-2-4(0) | |
| | | 3 | 4.0' | 3 9 15 20 | 15" RECOVERY Wet medium dense brown coarse to fine sand w/some clay and gravel. | A-2-4(0) | |
| 6 | | 4 | 6.0' | 22 25 17 32 | 18" RECOVERY Wet dense brown silty fine to coarse sand w/ trace of gravel. | A-2-4(0) | |
| | | 5 | 8.0' | 15 28 32 14 | 15" RECOVERY Wet very dense brown coarse to fine sand w/ some silt, trace of gravel. | A-1-b | |
| 9 | | 6 | 10.0' | 28 18 16 11 | 20" RECOVERY Wet dense brown coarse to fine sand w/some silt, trace of gravel. | A-1-b | |
| | | 7 | 12.0' | 5 5 | 23" RECOVERY Wet loose brown coarse to fine sand w/some gravel and silt. | A-1-b | |
| 12 | | 7A | 13.0' | 4 3 | 8" RECOVERY Wet stiff brown silt w/some fine sand, trace of coarse sand and gravel. | A-4(0) | |
| | | 8 | 14.0' | 1 1 2 6 | 10" RECOVERY Wet soft green w/orange and tan mottles clayey silt w/some fine to coarse sand, trace of gravel. | A-4(3) | |
| 15 | | 9 | 16.0' | 16 16 16 | 18" RECOVERY | A-1-b | |

Remarks: Mud Rotary @ 29.0 Ft.

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 25-113-01

Boring No.: BR1-3-16

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|--|-------------|---------------------|
| 18 | | | 18.0' | 17 | Wet dense brown gravel and fine to coarse sand w/some silt. 14" RECOVERY | | |
| | | 10 | 18.0' | 7 8 8 9 | Wet medium dense brown silty fine to coarse sand w/trace of gravel. 18" RECOVERY | A-2-4(0) | |
| 21 | | | 20.0' | | | | |
| 24 | | | | | | | |
| | | 11 | 24.0' | 6 13 13 13 | Wet medium dense orange fine to coarse sand w/trace of silt and gravel. 17" RECOVERY | A-3 | |
| 27 | | | 26.0' | | | | |
| | | 12 | 29.0' | 9 11 12 15 | Wet medium dense orange fine sand w/some coarse sand and silt, trace of organic matter and gravel. 16" RECOVERY | A-2-4(0) | Mud Rotary @ 29.0'. |
| 30 | | | 31.0' | | | | |
| 33 | | | | | | | |
| | | 13 | 34.0' | 8 8 10 14 | Wet medium dense orange fine sand w/some coarse sand and silt, trace of organic matter. 16" RECOVERY | A-2-4(0) | |
| 36 | | | 36.0' | | | | |
| 39 | | | | | | | |
| | | 14 | 39.0' | 7 12 17 17 | Wet medium dense brown fine sand w/some coarse sand and organic matter, trace of silt. 17" RECOVERY | A-3 | |
| 42 | | | 41.0' | | | | |
| | | 15 | 44.0' | 10 | Wet dense brown fine sand w/some silt, trace | A-2-4(0) | |
| 45 | | 15A | 44.5' | 13 | of coarse sand, organic matter and gravel. | A-2-4(0) | |
| | | | 44.5' | 20 | | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 25-113-01

Boring No.: BR1-3-16

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|---------|
| 48 | | | 46.0' | 25 | 6" RECOVERY Wet dense brownish gray silty fine sand w/ trace of coarse sand, organic matter and gravel. | | |
| | | | | | 14" RECOVERY | | |
| 51 | | 16 | 49.0' | 9 18 21 25 | Wet dense gray silty fine sand w/some organic matter and coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 51.0' | | 22" RECOVERY | | |
| 54 | | 17 | 54.0' | 9 13 30 38 | Wet dense gray silty fine sand w/some coarse sand, trace of gravel and organic matter. | A-2-4(0) | |
| | | | 56.0' | | 23" RECOVERY | | |
| 60 | | 18 | 59.0' | 14 24 28 29 | Wet very dense gray silty fine sand w/trace of coarse sand, gravel and organic matter. | A-2-4(0) | |
| | | | 61.0' | | 23" RECOVERY | | |
| 66 | | 19 | 64.0' | 6 12 23 29 | Wet dense gray clayey fine sand w/some coarse sand, trace of organic matter and sea shell fragments. | A-2-4(0) | |
| | | | 66.0' | | 24" RECOVERY | | |
| 72 | | 20 | 69.0' | 16 17 18 34 | Wet hard gray clayey fine sandy silt w/trace of coarse sand, gravel, organic matter and sea shell fragments. | A-4(0) | |
| | | | 71.0' | | 23" RECOVERY | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 25-113-01

Boring No.: BR1-3-16


| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|-------------|
| 75 | | 21 | 74.0' | 7 13 18 26 | Wet hard gray fine sandy silt w/trace of gravel, coarse sand and organic matter. | A-4(0) | |
| | | | 76.0' | | 24" RECOVERY | | |
| 78 | | | | | | | |
| | | 22 | 79.0' | 12 16 28 28 | Wet dense gray clayey fine sand w/trace of organic matter, coarse sand, gravel and sea shell fragments. | A-2-4(0) | Glauconitic |
| 81 | | | 81.0' | | 23" RECOVERY | | |
| | | | | | | | |
| 84 | | 23 | 84.0' | 32 32 27 37 | Wet very dense gray fine sand w/some clay, trace of organic matter, gravel, coarse sand and sea shell fragments. | A-2-4(0) | Glauconitic |
| | | | 86.0' | | 24" RECOVERY | | |
| 87 | | | | | | | |
| | | | | | | | |
| 90 | 7/10/09 | 24 | 89.0' | 22 47 50/3" | Wet very dense gray silty fine sand w/trace of organic matter, gravel and coarse sand. | A-2-4(0) | Glauconitic |
| | | | 90.5' | | 15" RECOVERY | | |
| | | | | | | | |
| 93 | | | | | | | |
| | | 25 | 94.0' | 11 20 24 31 | Wet dense gray silty fine sand w/trace of organic matter and coarse sand. | A-2-4(0) | Glauconitic |
| 96 | | | 96.0' | | 24" RECOVERY | | |
| | | | | | | | |
| 99 | | 26 | 99.0' | 8 10 15 16 | Wet very stiff dark gray clay w/some fine sand and organic matter. | A-6(15) | |
| | | | 101.0' | | 24" RECOVERY | | |
| | | | | | End of Boring | | |


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
KEY TO SYMBOLS

Symbol Description


Strata symbols


 Silty low plasticity clay


 Poorly graded clayey silty sand


 Silty sand

 Silt

 Low plasticity clay

 Poorly graded sand with silt

 Poorly graded sand

 Clayey sand

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Notes:

1. Exploratory borings were drilled on 7/9/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301 Maryland State Line to S.R. 1

Boring No.: IT1-53

Contract: 28-113-01

Boring Location: Sta. 708+00, 171.00' Lt. C.L.

Boring Surface Elev.: + 50.71

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: | | To: |
| Hollow Stem Auger: | | | From Depth of: | 0.0 | To: 14.0 |

| | | | | | | |
|----------------------|----------|------|---------------|-----------------|----------------|----------------|
| Water Level Readings | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| | 7/6/2009 | | 16.0 | 14.0 | Dry | |

Pay Quantities:

| | | | | | |
|---------------------------------------|------|------|------------------------|--|-----|
| 2 1/2 in. Dia. Dry Sample Boring: | 16.0 | Ft.; | Dia. U-Sample Boring: | | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of U-Samples: | | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | | Ft. |

Boring Contractor: Walton Corporation
Driller: Bill Holden
Helpers: T. Kane

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|-------------------|---|-------------|------------------------|
| | 7/6/09 | 1 | 0.5' | 4 6 8 | Moist medium dense brown clayey coarse sand w/some gravel and fine sand. 14" RECOVERY | A-1-b | Topsoil - 5". |
| 3 | | 2 | 2.0' | 5 5 6 | Moist loose brown coarse sand w/some gravel, trace of silt and fine sand. 18" RECOVERY | A-1-b | |
| | | 3 | 4.0' | 9 5 6 | Moist loose brown coarse to fine sand w/some clay, trace of gravel. 19" RECOVERY | A-2-4(0) | |
| 6 | | 4 | 6.0' | 5 5 6 10 | Moist medium dense brown silty fine sand w/some gravel, trace of coarse sand. 18" RECOVERY | A-2-4(0) | |
| | | 5 | 8.0' | 6 8 7 9 | Moist medium dense brown coarse sand and gravel w/some silt, trace of fine sand and clay. 19" RECOVERY | A-1-b | USDA Classifica - Sand |
| | | 6 | 10.0' | 7 7 6 7 | Moist medium dense tan coarse sand and gravel w/some fine sand, trace of silt. 17" RECOVERY | A-1-b | |
| 12 | | 7 | 12.0' | 5 6 6 6 | Moist medium dense tan coarse to fine sand w/some silt, trace of gravel. 17" RECOVERY | A-1-b | |
| | | 8 | 14.0' | 5 7 6 7 | Moist medium dense tan coarse to fine sand w/trace of silt and gravel. 16" RECOVERY | A-1-b | |
| 15 | | | 16.0' | | End of Boring | | |

Remarks:

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

KEY TO SYMBOLS

Symbol Description

Strata symbols



Poorly graded clayey
silty sand



Poorly graded sand
with silt



Silty sand



Well graded sand
with silt

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Notes:

1. Exploratory borings were drilled on 7/6/2009 using a 3 1/4- inch diameter hollow stem auger. Rig is a Track CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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 Blows are un corrected.

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301 Maryland State Line to S.R. 1

Boring No.: IT1-54

Contract: 28-113-01

Boring Location: Sta. 712+90, 67.00' Rt. C.L.

Boring Surface Elev.: +48.1

Reference:

Wt. of Casing Hammer:
Wt. of Sample Hammer: 140
Type of: D-Sampler: Split Barrel
S-Sampler:
U-Sampler:
Core Bit:

Lbs.
Lbs.
O.D.
O.D.
O.D.
O.D.

Average Fall:
Average Fall: 30
O.D. of Sampler: 2
O.D. of Samp. Tube:
O.D. of Samp. Tube:
O.D. of Rock Core:

IN.
IN.
IN.
IN.
IN.

Casing Size: 3 1/4
Hollow Stem Auger:

Inches

From Depth of:
From Depth of: 0.0

To:
To: 14.0

Water Level Readings

Date
7/6/2009

Time

Depth of Hole
16.0

Depth of Casing
14.0

Depth of Water
Dry

Elev. of Water

Pay Quantities:

2 1/2 in. Dia. Dry Sample Boring: 16.0
No. of 2 in. Dia. Shelby Tubes:
2 1/2 in. Dia. Contin. Sample Boring:

Ft.;
Ft.;

No. of:
Core Drilling in Rock:

Dia. U-Sample Boring:
U-Samples:

Ft.
Ft.

Boring Contractor: Walton Corporation

Driller: Bill Holden

Helpers: T. Kane

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|--------------------|--|-------------|------------------------------|
| | 7/6/09 | 1 | 0.5' | 4 3 5 | Moist firm brown clayey silt w/some coarse sand, trace of fine sand and gravel. 13" RECOVERY | A-4(4) | Cultivated Soil - 6" |
| 3 | | 2 | 2.0' | 4 5 6 6 | Moist medium dense orange coarse to fine sand w/some gravel and silt. 21" RECOVERY | A-1-b | |
| | | 3 | 4.0' | 6 6 15 11 | Moist medium dense orange coarse to fine sand w/some silt and gravel, trace of clay. 17" RECOVERY | A-2-4(0) | USDA Classifica - Sandy Loam |
| 6 | | 4 | 6.0' | 6 5 4 5 | Moist loose orange coarse to fine sand w/some silt, trace of gravel. 20" RECOVERY | A-1-b | |
| | | 5 | 8.0' | 5 4 3 4 | MOist loose brown coarse to fine sand w/some silt, trace of gravel. 21" RECOVERY | A-2-4(0) | |
| 9 | | 6 | 10.0' | 4 4 3 4 | Moist loose brown fine to coarse sand w/some silt, trace of gravel. 19" RECOVERY | A-2-4(0) | |
| 12 | | 7 | 12.0' | 5 5 4 4 | Moist loose brown fine to coarse sand w/some silt, trace of gravel. 22" RECOVERY | A-2-4(0) | |
| | | 8 | 14.0' | 4 4 4 4 | Moist loose brown coarse to fine sand w/some silt, trace of gravel. 20" RECOVERY | A-1-b | |
| 15 | | | 16.0' | | End of Boring | | |

Remarks:

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

KEY TO SYMBOLS

Symbol Description

Strata symbols



Low plasticity
clay



Poorly graded sand
with silt



Silty sand

DRAFT
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AUGUST 2015

Notes:

1. Exploratory borings were drilled on 7/6/2009 using a 3 1/4- inch diameter hollow stem auger. Rig is a Track CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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 Blows are un corrected.

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301 Maryland State Line to S.R. 1

Boring No.: IT1-55

Contract: 28-113-01

Boring Location: Sta. 718+00, 274.00' Lt. C.L.

Boring Surface Elev.: + 38.07

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: | | To: | |
| Hollow Stem Auger: | | From Depth of: 0.0 | | To: 14.0 | |

| | | | | | | |
|-----------------------------|-------------|-------------|----------------------|------------------------|-----------------------|-----------------------|
| Water Level Readings | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| | 7/2/2009 | | 16.0 | 14.0 | Dry | |

Pay Quantities:

| | | | | |
|---------------------------------------|------|-------------|-------------------------------|------------|
| 2 1/2 in. Dia. Dry Sample Boring: | 16.0 | Ft.; | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | | Core Drilling in Rock: | Ft. |

Boring Contractor: Walton Corporation
Driller: Bill Holden
Helpers: T. Kane

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|------------------|---|-------------|------------------------|
| | 7/2/09 | 1 | 0.5' | 4 5 6 | Moist stiff brown clayey fine sandy silt w/trace of coarse sand. | A-4(0) | Cultivated Soil - 7". |
| | | | 2.0' | | 15" RECOVERY | | |
| 3 | | 2 | 2.0' | 4 5 6 | Moist medium dense brown silty fine sand w/some gravel, trace of coarse sand. | A-2-4(0) | |
| | | | 4.0' | | 17" RECOVERY | | |
| | | 3 | 4.0' | 2 3 4 5 | Moist loose brown fine to coarse sand w/some silt. | A-2-4(0) | |
| | | | 6.0' | | 15" RECOVERY | | |
| 6 | | 4 | 6.0' | 2 3 2 | Moist loose tan fine to coarse sand w/some silt, trace of clay. | A-2-4(0) | USDA Classifica - Sand |
| | | | 8.0' | | 19" RECOVERY | | |
| 9 | | 5 | 8.0' | 2 2 3 | Moist loose tan fine to coarse sand w/some silt. | A-2-4(0) | |
| | | | 10.0' | | 18" RECOVERY | | |
| | | 6 | 10.0' | 3 3 3 | Moist loose tan coarse to fine sand w/some silt, trace of gravel. | A-2-4(0) | |
| | | | 12.0' | | 20" RECOVERY | | |
| 12 | | 7 | 12.0' | 4 5 4 4 | Moist loose tan fine to coarse sand w/trace of silt and gravel. | A-3 | |
| | | | 14.0' | | 18" RECOVERY | | |
| 15 | | 8 | 14.0' | 3 4 4 5 | Moist loose tan fine to coarse sand w/some silt, trace of gravel. | A-2-4(0) | |
| | | | 16.0' | | 19" RECOVERY | | |
| | | | | | End of Boring | | |

Remarks:

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

KEY TO SYMBOLS

Symbol Description

Strata symbols



Poorly graded clayey
silty sand



Silty sand



Poorly graded sand
with silt



Poorly graded sand

DRAFT
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AUGUST 2015

Notes:

1. Exploratory borings were drilled on 7/2/2009 using a 3 1/4- inch diameter hollow stem auger. Rig is a Track CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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 Blows are un corrected.

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301 Maryland State Line to S.R. 1

Boring No.: IT1-56

Contract: 28-113-01

Boring Location: Sta. 723+00, 177.00' Lt. C.L.

Boring Surface Elev.: + 30.0

Reference:

Wt. of Casing Hammer:
Wt. of Sample Hammer: 140
Type of: D-Sampler: Split Barrel
S-Sampler:
U-Sampler:
Core Bit:

Lbs.
Lbs.
O.D.
O.D.
O.D.
O.D.

Average Fall:
Average Fall: 30
O.D. of Sampler: 2
O.D. of Samp. Tube:
O.D. of Samp. Tube:
O.D. of Rock Core:

IN.
IN.
IN.
IN.
IN.
IN.

Casing Size: 3 1/4
Hollow Stem Auger: Inches

From Depth of:
From Depth of: 0.0
To:
To: 14.0

Water Level Readings
Date 7/2/2009
Time

Depth of Hole 16.0
Depth of Casing 14.0
Depth of Water 11.0
Elev. of Water

Pay Quantities:

2 1/2 in. Dia. Dry Sample Boring: 16.0 Ft.;
No. of 2 in. Dia. Shelby Tubes: ;
2 1/2 in. Dia. Contin. Sample Boring: Ft.;
Dia. U-Sample Boring: Ft.
U-Samples:
Core Drilling in Rock: Ft.

Boring Contractor: Walton Corporation
Driller: Bill Holden
Helpers: T. Kane

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|------------------|---|-------------|------------------------|
| | 7/2/09 | 1 | 0.5' | 5 7 8 | Moist medium dense orange silty fine to coarse sand w/trace of gravel. | A-2-4(0) | Topsoil - 4". |
| | | | 2.0' | | 12" RECOVERY | | |
| 3 | | 2 | 2.0' | 9 6 5 4 | Moist medium dense orange fine to coarse sandw/some silt. | A-2-4(0) | |
| | | | 4.0' | | 16" RECOVERY | | |
| | | 3 | 4.0' | 3 3 3 4 | Moist loose tan fine to coarse sand w/some silt, trace of clay. | A-2-4(0) | USDA Classifica - Sand |
| 6 | | | 6.0' | | 16" RECOVERY | | |
| | | 4 | 6.0' | 4 3 2 3 | Moist loose tan fine sand w/some coarse sand and silt. | A-2-4(0) | |
| | | | 8.0' | | 17" RECOVERY | | |
| 9 | | 5 | 8.0' | 6 6 6 6 | Moist medium dense tan coarse sand and gravel w/some fine sand and silt. | A-1-b | |
| | | | 10.0' | | 15" RECOVERY | | |
| | | 6 | 10.0' | 4 4 5 4 | Wet loose tan coarse to fine sand w/some silt, trace of gravel. | A-1-b | |
| 12 | | | 12.0' | | 20" RECOVERY | | |
| | | 7 | 12.0' | 6 6 5 4 | Wet medium dense orange coarse to fine sand w/some gravel, trace of silt. | A-1-b | |
| | | | 14.0' | | 16" RECOVERY | | |
| 15 | | 8 | 14.0' | 8 12 50/2" | Wet very dense orange coarse to fine sand and gravel w/trace of silt. | A-1-b | |
| | | | 15.5' | | 8" RECOVERY | | |
| | | | | | End of Boring | | |

Remarks:

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

KEY TO SYMBOLS

Symbol Description

Strata symbols



Silty sand



Poorly graded sand
with silt



Well graded sand
with silt

DRAFT
NOT FOR BIDDING
AUGUST 2015

Notes:

1. Exploratory borings were drilled on 7/2/2009 using a 3 1/4- inch diameter hollow stem auger. Rig is a Track CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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 Blows are un corrected.

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301 Maryland State Line to S.R. 1

Boring No.: IT1-57

Contract: 28-113-01

Boring Location: Sta. 728+00, 251.00' Lt. C.L.

Boring Surface Elev.: + 35.00

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: | | To: | |
| Hollow Stem Auger: | | From Depth of: 0.0 | | To: 14.0 | |

| | | | | | | |
|-----------------------------|-------------|-------------|----------------------|------------------------|-----------------------|-----------------------|
| Water Level Readings | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| | 7/2/2009 | | 14.0 | 12.0 | 8.7 | |

Pay Quantities:

| | | | | |
|---------------------------------------|------|-------------|-------------------------------|------------|
| 2 1/2 in. Dia. Dry Sample Boring: | 16.0 | Ft.; | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | Ft. |

Boring Contractor: Walton Corporation
Driller: Bill Holden
Helpers: T. Kane

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------|---|--------------|------------------------|
| | 7/2/09 | 1 | 0.5' | 5 | Moist firm brown silt w/some clay and fine sand, trace of coarse sand and gravel. | A-4(0) | Topsoil - 3" |
| | | 1A | 1.5' | 9 | | 10" RECOVERY | |
| 3 | | 2 | 2.0' | 8 | Moist loose orange silty fine to coarse sand w/trace of gravel. | A-1-b | |
| | | | 2.0' | 7 | | | |
| 6 | | 3 | 4.0' | 12 | Moist medium dense tan coarse to fine sand w/some silt, trace of gravel. | A-1-b | USDA Classifica - Sand |
| | | | 4.0' | 3 | 17" RECOVERY | | |
| | | | 4.0' | 4 | Moist loose tan coarse to fine sand w/some silt, trace of clay and gravel. | | |
| 9 | | 4 | 6.0' | 5 | Moist loose orange coarse to fine sand w/trace of silt and gravel. | A-1-b | |
| | | | 6.0' | 4 | 14" RECOVERY | | |
| | | | 6.0' | 3 | 18" RECOVERY | | |
| 12 | | 5 | 8.0' | 2 | Wet very loose orange fine to coarse sand w/trace of silt and gravel. | A-3 | |
| | | | 8.0' | 2 | 10" RECOVERY | | |
| | | | 8.0' | 6 | Wet medium dense orange fine to coarse sand and gravel w/some silt. | | |
| 15 | | 6 | 10.0' | 8 | Wet medium dense brown fine sand w/some coarse sand, trace of gravel and silt. | A-3 | |
| | | | 10.0' | 9 | 16" RECOVERY | | |
| | | | 10.0' | 16 | 17" RECOVERY | | |
| | | 7 | 12.0' | 5 | Wet loose brown fine sand w/some coarse sand, trace of silt and gravel. | A-3 | |
| | | | 12.0' | 4 | 17" RECOVERY | | |
| | | | 12.0' | 6 | 17" RECOVERY | | |
| | | 8 | 14.0' | 4 | End of Boring | | |
| | | | 16.0' | 5 | | | |
| | | | | 4 | | | |

Remarks:

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

KEY TO SYMBOLS

Symbol Description

Strata symbols



Silt



Silty sand



Well graded sand
with silt



Poorly graded sand
with silt

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AUGUST 2015

Notes:

1. Exploratory borings were drilled on 7/2/2009 using a 3 1/4- inch diameter hollow stem auger. Rig is a Track CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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 Blows are un corrected.

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301 Maryland State Line to S.R. 1

Boring No.: R1-110

Contract: 25-113-01

Boring Location: STA. 1010+00 90' Rt. C.L.

Boring Surface Elev.: + 46.74

Reference:

Wt. of Casing Hammer:
Wt. of Sample Hammer: 140
Type of: D-Sampler: Split Barrel
S-Sampler:
U-Sampler:
Core Bit:

Lbs.
Lbs.
O.D.
O.D.
O.D.
O.D.

Average Fall:
Average Fall: 30
O.D. of Sampler: 2
O.D. of Samp. Tube:
O.D. of Samp. Tube:
O.D. of Rock Core:

IN.
IN.
IN.
IN.
IN.
IN.

Casing Size: 3 1/4
Hollow Stem Auger: Inches

From Depth of:
From Depth of: 0.0
To:
To: 19.0

Water Level Readings

| Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
|--------|------|---------------|-----------------|----------------|----------------|
| 2/9/10 | | 19.0 | 19.0 | Dry | |

Pay Quantities:

| | | | | |
|---------------------------------------|------|------|------------------------|-----|
| 2 1/2 in. Dia. Dry Sample Boring: | 50.0 | Ft.; | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | Ft. |

Boring Contractor: Walton Corporation

Driller: Jason Truver

Helpers: J. Lafferty

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|--|
| 3.5 | 2/8/11 | 1 | 0.5' | 16 21 31 | Moist dense brown coarse sandy fine gravel w/some fine sand, silt and clay. 16" RECOVERY | A-1-b | Topsoil - 4". Fill |
| | | | 2.0' | 50/4" | No Sieve Analysis - Indication of moist dense brown clayey sand w/some fine gravel, trace of clay. 2" RECOVERY | | Fill |
| | | 3 | 4.0' | 21 18 50/2" | Moist very dense red fine gravel w/trace of coarse to fine sand and silt. 6" RECOVERY | A-1-a | Fill Large boulders/concrete in fill. |
| 7 | 2/9/11 | 4 | 6.0' | 7 7 13 16 | Moist very stiff brown coarse sandy silt w/ some fine sand and clay, trace of fine gravel. 21" RECOVERY | A-4(0) | |
| | | | 8.0' | 7 16 13 21 | Moist medium dense orangish brown clayey fine gravelly coarse sand w/some fine sand and silt. 15" RECOVERY | A-2-4(0) | |
| 10.5 | | 6 | 10.0' | 17 13 13 19 | Moist medium dense orange coarse to fine sand w/some fine gravel and silt. 17" RECOVERY | A-1-b | |
| | | | 12.0' | 3 6 5 5 | Moist medium dense orange coarse to fine sand w/some silt, trace of fine gravel. 17" RECOVERY | A-2-4(0) | |
| 14 | | 8 | 14.0' | 4 4 3 5 | Moist loose orange fine to coarse sand w/ some silt, trace of fine gravel. 18" RECOVERY | A-2-4(0) | |
| | | | 16.0' | 5 5 5 5 | Moist loose orange coarse to fine sand w/ some silt, trace of fine gravel. 16" RECOVERY | A-1-b | |
| 17.5 | | 9 | 16.0' | 5 5 5 5 | Moist loose orange coarse to fine sand w/ some silt, trace of fine gravel. 16" RECOVERY | A-1-b | |
| | | | 18.0' | 4 5 4 5 | Moist loose orange fine to coarse sand w/ some silt. 17" RECOVERY | A-2-4(0) | Mud Rotary @ 18.0'. |
| | | | 20.0' | | | | |

Remarks:

Reviewed By: Hany Fekry

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301 Maryland State Line to S.R. 1

Boring No.: R1-110

Contract: 25-113-01

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|---------|
| 21 | | | | | | | |
| 24.5 | | 11 | 24.0' | 2 4 5 7 | Wet loose orangish brown coarse to fine sand w/some silt, trace of fine gravel. 15" RECOVERY | A-1-b | |
| | | | 26.0' | | | | |
| 28 | | | | | | | |
| | | 12 | 29.0' | 7 7 8 8 | Wet medium dense orangish brown coarse to fine sand w/some silt, trace of fine gravel. 17" RECOVERY | A-1-b | |
| | | | 31.0' | | | | |
| 31.5 | | | | | | | |
| | | 13 | 34.0' | 9 10 10 9 | Wet medium dense orangish brown fine sand w/some coarse sand and fine gravel, trace of silt. 15" RECOVERY | A-3 | |
| 35 | | | 36.0' | | | | |
| | | | | | | | |
| 38.5 | | | | | | | |
| | | 14 | 39.0' | 16 25 16 14 | Wet dense orangish brown fine sand w/some coarse sand and silt. 7" RECOVERY | A-2-4(0) | |
| | | | 41.0' | | | | |
| 42 | | | | | | | |
| | | 15 | 44.0' | 9 10 13 20 | Wet medium dense orange fine to coarse sand w/some silt. 18" RECOVERY | A-2-4(0) | |
| 45.5 | | | 46.0' | | | | |
| | | | | | | | |
| 49 | | 16 | 48.0' | 5 6 6 10 | Wet medium dense orange fine sand w/some coarse sand and silt. 17" RECOVERY | A-2-4(0) | |
| | | | 50.0' | | | | |
| | | | | | End of Boring | | |
| 52.5 | | | | | | | |

DRAFT
NOT FOR BIDDING
AUGUST 2015

KEY TO SYMBOLS

Symbol Description

Strata symbols



Poorly graded clayey
silty sand



Poorly graded gravel
with silt



Clayey sand



Silty sand



Poorly graded sand
with silt

DRAFT
NOT FOR BIDDING
AUGUST 2015

Notes:

1. Exploratory borings were drilled on February 8, 2011 using 3 1/4 inch continuous flight power auger. Rig is an ATV mounted CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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 blows are uncorrected.

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301 Maryland State Line to S.R. 1

Boring No.: RI-111

Contract: 25-113-01

Boring Location: STA. 1014+25 90' Rt. C.L.

Boring Surface Elev.: + 35.40

Reference:

Wt. of Casing Hammer:
Wt. of Sample Hammer: 140
Type of: D-Sampler: Split Barrel
S-Sampler:
U-Sampler:
Core Bit:

Lbs.
Lbs.
O.D.
O.D.
O.D.
O.D.

Average Fall:
Average Fall: 30
O.D. of Sampler: 2
O.D. of Samp. Tube:
O.D. of Samp. Tube:
O.D. of Rock Core:

IN.
IN.
IN.
IN.
IN.
IN.

Casing Size: 3 1/4
Hollow Stem Auger: Inches

From Depth of:
From Depth of: 0.0
To:
To: 30.0

| Water Level Readings | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
|----------------------|--------|------|---------------|-----------------|----------------|----------------|
| | 2/8/11 | | 24.0 | 24.0 | 22.2 | |

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

Boring Contractor: Walton Corporation
Driller: Jason Truver
Helpers: J. Lafferty

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|--------------|
| | 2/8/11 | 1 | 0.0' | | No Sampling | | Asphalt - 4" |
| | | | 2.0' | | 0" RECOVERY | | |
| 3.5 | | 2 | 2.0' | 12 24 27 32 | Moist very dense brown clayey fine gravel and coarse to fine sand w/some silt. | A-1-b | |
| | | | 4.0' | | 7" RECOVERY | | |
| | | 3 | 4.0' | 4 4 5 14 | Wet stiff tan silt w/some clay, trace of fine to coarse sand. | A-4(3) | |
| | | | 6.0' | | 15" RECOVERY | | |
| 7 | | 4 | 6.0' | 5 9 11 | Wet very stiff tannish orange fine sandy silt w/some coarse sand, trace of fine gravel. | A-4(0) | |
| | | | 8.0' | | 18" RECOVERY | | |
| | | 5 | 8.0' | 4 6 6 7 | Wet medium dense orange fine sand w/some silt, trace of coarse sand. | A-2-4(0) | |
| | | | 10.0' | | 17" RECOVERY | | |
| 10.5 | | 6 | 10.0' | 6 8 10 11 | Wet medium dense tannish orange fine sand w/some coarse sand and silt. | A-2-4(0) | |
| | | | 12.0' | | 18" RECOVERY | | |
| | | 7 | 12.0' | | No Sample | | |
| | | | 14.0' | | 0" RECOVERY | | |
| | | 8 | 14.0' | 4 5 6 6 | Wet medium dense tannish orange fine to coarse sand w/some silt, trace of fine gravel. | A-2-4(0) | |
| | | | 16.0' | | 18" RECOVERY | | |
| | | 9 | 16.0' | 7 6 6 9 | Wet medium dense tannish orange coarse to fine sand w/some silt, trace of fine gravel. | A-1-b | |
| 17.5 | | | 18.0' | | 19" RECOVERY | | |
| | | 10 | 18.0' | 4 4 6 6 | Wet loose orange coarse to fine sand w/trace of silt and fine gravel. | A-1-b | |

Remarks:

Reviewed By: Hany Fekry

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301 Maryland State Line to S.R. 1
Contract: 25-113-01

Boring No.: RI-111


| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|---------|
| 21 | | | 20.0' | | 15" RECOVERY | | |
| 24.5 | | 11 | 24.0' | 6 8 9 10 | Wet medium dense orange fine sand w/some coarse sand, trace of fine gravel and silt. | A-3 | |
| | | | 26.0' | | 19" RECOVERY | | |
| 28 | | 12 | 28.0' | 10 16 14 13 | Wet medium dense orange fine sand w/some coarse sand, trace of fine gravel and silt. | A-3 | |
| | | | 30.0' | | 21" RECOVERY | | |
| 31.5 | | | | | End of Boring | | |
| 35 | | | | | | | |
| 38.5 | | | | | | | |
| 42 | | | | | | | |
| 45.5 | | | | | | | |
| 49 | | | | | | | |
| 52.5 | | | | | | | |


DRAFT
NOT FOR BIDDING
AUGUST 2015


KEY TO SYMBOLS


Symbol Description


Strata symbols


 Poorly graded clayey silty sand

 Silty low plasticity clay

 Silt

 Silty sand

 Well graded sand with silt

 Poorly graded sand with silt

DRAFT
NOT FOR BIDDING
AUGUST 2015

Notes:

1. Exploratory borings were drilled on February 8, 2011 using 3 1/4 inch continuous flight power auger. Rig is an ATV mounted CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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 blows are uncorrected.

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: US 301 Maryland State Line to SR-1

Boring No.: R1-072

Contract: 28-113-01

Boring Location: Sta. 890+00 0' C.L.

Boring Surface Elev.: +20.52

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: | | To: |
| | Hollow Stem Auger: | | From Depth of: | 0.0 | To: 10.0 |

| | | | | | | |
|----------------------|---------|------|---------------|-----------------|----------------|----------------|
| Water Level Readings | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| | 7/20/10 | | 10.0 | 8.0 | Dry | |

Pay Quantities:

| | | | | | |
|---------------------------------------|------|------|------------------------|-----------------------|-----|
| 2 1/2 in. Dia. Dry Sample Boring: | 10.0 | Ft.; | | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of: | U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | | Ft. |

Boring Contractor: Walton Corporation
Driller: Bill Holden
Helpers: T. Kane

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|--------------------|--|-------------|---------------|
| | 7/20/10 | 1 | 0.0' | 7 8 10 8 | Moist medium dense brown silty fine to coarse sand w/some fine gravel. | A-2-4(0) | Topsoil - 3". |
| 2.6 | | 2 | 2.0' 2.0' | 8 9 11 10 | 14" RECOVERY Moist medium dense brown fine sand w/some silt and coarse sand, trace fine gravel. | A-2-4(0) | |
| 5.2 | | 3 | 4.0' 4.0' | 10 10 8 9 | 16" RECOVERY Moist medium dense brown fine sand w/some coarse sand, trace silt. | A-3 | |
| 7.8 | | 4 | 6.0' 6.0' | 6 8 7 9 | 15" RECOVERY Wet medium dense brown silty fine sand w/ trace coarse sand. | A-2-4(0) | |
| 10.4 | | 5 | 8.0' 8.0' | 6 6 7 6 | 18" RECOVERY Wet medium dense brown fine sand w/some silt, trace coarse sand. | A-2-4(0) | |
| 13 | | | 10.0' | | 18" RECOVERY End of Boring | | |

Remarks:

Reviewed By: Hany Fekry

Soils Supervisor: Randy Ferguson

KEY TO SYMBOLS

Symbol Description

Strata symbols



Silty sand



Poorly graded sand
with silt

DRAFT
NOT FOR BIDDING
AUGUST 2015

Notes:

1. Exploratory borings were drilled on July 20, 2010 using a 3 1/4-inch diameter continuous flight power auger. Rig is a CME 55 ATV.
2. Groundwater levels recorded at the time of drilling and re-checked to following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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 blows are uncorrected.

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: US 301 Maryland State Line to SR-1

Boring No.: R1-077

Contract: 28-113-01

Boring Location: Sta. 1000+00.0' C.L.

Boring Surface Elev.: + 21.20

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: | | To: | |
| Hollow Stem Auger: | | From Depth of: 0.0 | | To: 10.0 | |

| | | | | | | |
|-----------------------------|-------------|-------------|----------------------|------------------------|-----------------------|-----------------------|
| Water Level Readings | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| | 7/19/10 | | 10.0 | 8.0 | Dry | |

Pay Quantities:
 2 1/2 in. Dia. Dry Sample Boring: 10.0 Ft.;
 No. of 2 in. Dia. Shelby Tubes: ;
 2 1/2 in. Dia. Contin. Sample Boring: Ft.;
 Dia. U-Sample Boring: Ft.
 U-Samples: ;
 Core Drilling in Rock: Ft.

Boring Contractor: Walton Corporation
Driller: Bill Holden
Helpers: T. Kane

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|---------------|
| | 7/19/10 | 1 | 0.5' | 6 7 | Moist medium dense brown fine gravel w/ some coarse sand, trace fine sand and silt. | A-1-a | Topsoil - 4". |
| | | | 2.0' | | 6" RECOVERY | | |
| 2.6 | | 2 | 2.0' | 4 5 6 6 | Moist medium dense brown coarse to fine sand w/some fine gravel and silt. | A-1-b | |
| | | | 4.0' | | 16" RECOVERY | | |
| | | 3 | 4.0' | 6 10 12 14 | Moist medium dense brown coarse to fine sand w/some fine gravel, clay and silt. | A-2-4(0) | |
| 5.2 | | | 6.0' | | 14" RECOVERY | | |
| | | 4 | 6.0' | 17 18 14 13 | Moist dense brown coarse to fine sand w/trace fine gravel and silt. | A-1-b | |
| 7.8 | | | 8.0' | | 20" RECOVERY | | |
| | | 5 | 8.0' | 13 11 10 9 | Moist medium dense brown coarse to fine sand w/some silt and fine gravel. | A-1-b | |
| | | | 10.0' | | 22" RECOVERY | | |
| 10.4 | | | | | End of Boring | | |
| | | | | | | | |
| | | | | | | | |
| 13 | | | | | | | |

Remarks:

Reviewed By: Hany Fekry

Soils Supervisor: Randy Ferguson

KEY TO SYMBOLS

Symbol Description

Strata symbols



Well graded gravel
with silt



Silty sand



Poorly graded clayey
silty sand



Poorly graded sand

DRAFT
NOT FOR BIDDING
AUGUST 2015

Notes:

1. Exploratory borings were drilled on July 19, 2010 using a 3 1/4-inch diameter continuous flight power auger. Rig is a CME 55 ATV.
2. Groundwater levels recorded at the time of drilling and re-checked to following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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 blows are uncorrected.

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: US 301 Maryland State Line to SR-1

Boring No.: R1-078

Contract: 28-113-01

Boring Location: Sta. 1005+00.0' C.L.

Boring Surface Elev.: + 25.20

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: | | To: | |
| Hollow Stem Auger: | | From Depth of: 0.0 | | To: 10.0 | |

| | | | | | |
|-----------------------------|-------------|----------------------|------------------------|-----------------------|-----------------------|
| Water Level Readings | | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| Date 7/19/10 | Time | 10.0 | 8.0 | Dry | |

Pay Quantities:
 2 1/2 in. Dia. Dry Sample Boring: 10.0 Ft.;
 No. of 2 in. Dia. Shelby Tubes: ;
 2 1/2 in. Dia. Contin. Sample Boring: Ft.;
 Dia. U-Sample Boring: Ft.
 U-Samples: ;
 Core Drilling in Rock: Ft.

Boring Contractor: Walton Corporation
Driller: Bill Holden
Helpers: T. Kane

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|---------------|
| | 7/19/10 | 1 | 0.5' | 8 8 5 | Moist medium dense brown coarse sandy fine gravel w/some fine sand, trace silt. | A-1-a | Topsoil - 6". |
| | | | 2.0' | | 6" RECOVERY | | |
| 2.6 | | 2 | 2.0' | 7 3 1 5 | No Sample Recovery | | |
| | | | 4.0' | | 0" RECOVERY | | |
| | | 3 | 4.0' | 5 8 15 17 | Moist medium dense brown coarse to fine sand w/some fine gravel and silt. | A-1-b | |
| 5.2 | | | 6.0' | | 15" RECOVERY | | |
| | | 4 | 6.0' | 17 13 12 17 | Moist medium dense brown fine to coarse sand w/some silt and fine gravel. | A-2-4(0) | |
| 7.8 | | | 8.0' | | 18" RECOVERY | | |
| | | 5 | 8.0' | 17 25 50/4" | Moist very dense brown fine to coarse sand and fine gravel w/some silt. | A-1-b | |
| | | | 10.0' | | 12" RECOVERY | | |
| 10.4 | | | | | End of Boring | | |
| | | | | | | | |
| | | | | | | | |
| 13 | | | | | | | |

Remarks:

Reviewed By: Hany Fekry

Soils Supervisor: Randy Ferguson

KEY TO SYMBOLS

Symbol Description

Strata symbols



Poorly graded gravel
with silt



Silty sand

DRAFT
NOT FOR BIDDING
AUGUST 2015

Notes:

1. Exploratory borings were drilled on July 19, 2010 using a 3 1/4-inch diameter continuous flight power auger. Rig is a CME 55 ATV.
2. Groundwater levels recorded at the time of drilling and re-checked to following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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 blows are uncorrected.

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: US 301 Maryland State Line to SR-1

Boring No.: R1-079

Contract: 28-113-01

Boring Location: Sta. 1010+00.0' C.L.

Boring Surface Elev.: + 26.64

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: | | To: | |
| Hollow Stem Auger: | | From Depth of: 0.0 | | To: 10.0 | |

| | | | | | | |
|-----------------------------|-------------|-------------|----------------------|------------------------|-----------------------|-----------------------|
| Water Level Readings | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| | 7/19/10 | | 10.0 | 10.0 | Dry | |

Pay Quantities:

| | | | | |
|---------------------------------------|------|-------------|-------------------------------|------------|
| 2 1/2 in. Dia. Dry Sample Boring: | 10.0 | Ft.; | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | Ft. |

Boring Contractor: Walton Corporation
Driller: Bill Holden
Helpers: T. Kane

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|------------------|---|-------------|----------------|
| | 7/19/10 | 1 | 1.0' | 5 3 | Moist medium dense brown silty coarse to fine sand w/trace fine gravel and clay. 6" RECOVERY | A-2-4(0) | Topsoil - 10". |
| 2.6 | | 2 | 2.0' | 4 5 4 4 | Moist loose brown coarse to fine sand w/some silt, trace fine gravel. 16" RECOVERY | A-1-b | |
| | | 3 | 4.0' | 4 4 3 4 | Moist loose brown fine to coarse sand w/some silt, trace fine gravel. 14" RECOVERY | A-2-4(0) | |
| 5.2 | | 4 | 6.0' | 4 5 5 6 | Moist loose brown fine sand w/some coarse sand and silt, trace fine gravel. 20" RECOVERY | A-2-4(0) | |
| 7.8 | | 5 | 8.0' | 4 5 5 5 | Moist loose brown fine to coarse sand w/some silt, trace fine gravel. 22" RECOVERY | A-2-4(0) | |
| 10.4 | | | 10.0' | | End of Boring | | |
| 13 | | | | | | | |

Remarks:

Reviewed By: Hany Fekry

Soils Supervisor: Randy Ferguson

KEY TO SYMBOLS

Symbol Description

Strata symbols



Poorly graded clayey
silty sand



Poorly graded sand
with silt



Silty sand

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NOT FOR BIDDING
AUGUST 2015

Notes:

1. Exploratory borings were drilled on July 19, 2010 using a 3 1/4-inch diameter continuous flight power auger. Rig is a CME 55 ATV.
2. Groundwater levels recorded at the time of drilling and re-checked to following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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 blows are uncorrected.

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: US 301 Maryland State Line to SR-1

Boring No.: R1-080

Contract: 28-113-01

Boring Location: Sta. 1013+00.0' C.L.

Boring Surface Elev.: +24.62

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: | | To: | |
| Hollow Stem Auger: | | From Depth of: 0.0 | | To: 10.0 | |

| | | | | | |
|-----------------------------|-------------|----------------------|------------------------|-----------------------|-----------------------|
| Water Level Readings | | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| Date 7/19/10 | Time | 10.0 | 8.0 | 6.5 | |

Pay Quantities:
 2 1/2 in. Dia. Dry Sample Boring: 10.0 Ft.;
 No. of 2 in. Dia. Shelby Tubes: ;
 2 1/2 in. Dia. Contin. Sample Boring: Ft.;
 Dia. U-Sample Boring: Ft.
 U-Samples: ;
 Core Drilling in Rock: Ft.

Boring Contractor: Walton Corporation
Driller: Bill Holden
Helpers: T. Kane

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|--------------------|---|-------------|---------------|
| | 7/19/10 | 1 | 0.5' | 2 9 13 14 | No Sieve Analysis - Indication of wet medium dense brown silty sand. | | Topsoil - 4". |
| 2.6 | | 2 | 2.0' | 8 10 9 10 | 2" RECOVERY No Sample Recovery | | |
| 5.2 | | 3 | 4.0' | 5 4 4 5 | 0" RECOVERY Wet loose orange coarse sand w/some fine sand and silt, trace fine gravel. | A-1-b | |
| 7.8 | | 4 | 6.0' | 4 5 5 7 | 16" RECOVERY Wet loose brown coarse to fine sand w/some silt, trace fine gravel. | A-1-b | |
| 10.4 | | 5 | 8.0' | 7 6 7 9 | 20" RECOVERY Wet medium dense brown fine to coarse sand w/trace silt. | A-3 | |
| 13 | | | 10.0' | | 16" RECOVERY End of Boring | | |

Remarks:

Reviewed By: Hany Fekry

Soils Supervisor: Randy Ferguson

KEY TO SYMBOLS

Symbol Description

Strata symbols



Poorly graded sand
with silt

DRAFT
NOT FOR BIDDING
AUGUST 2015

Notes:

1. Exploratory borings were drilled on July 19, 2010 using a 3 1/4-inch diameter continuous flight power auger. Rig is a CME 55 ATV.
2. Groundwater levels recorded at the time of drilling and re-checked to following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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 blows are uncorrected.

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95

Boring No.: RW1-1-01

Contract: 25-113-01

Boring Location: Sta. 741+00, 180.00' Lt. C.L.

Boring Surface Elev.: +20.5

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: | | To: | |
| Hollow Stem Auger: | | From Depth of: 0.0 | | To: 29.0 | |

| | | | | | | |
|-----------------------------|-------------|-------------|----------------------|------------------------|-----------------------|-----------------------|
| Water Level Readings | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| | 1/30/2009 | | 16.0' | 14.0' | 13.1' | |

Pay Quantities:

| | | | | |
|---------------------------------------|------|-------------|-------------------------------|------------|
| 2 1/2 in. Dia. Dry Sample Boring: | 51.0 | Ft.; | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | Ft. |

Boring Contractor: Walton Corporation
Driller: Gary Truver
Helpers: T. Kane

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|----------------|----------------------|---|-------------|--------------------------------|
| | 1/30/09 | 1 | 0.0' | | No Sieve Analysis | | Asphalt - 12". Subgrade - 12". |
| 2.45 | | 2 | 2.0' 2.0' | 12 13 13 14 | 0" RECOVERY Moist medium dense orange coarse to fine sand w/some silt and gravel. | A-1-b | |
| 4.9 | | 3 | 4.0' 4.0' | 8 9 9 14 | 20" RECOVERY Moist medium dense orange fine to coarse sand w/some gravel and silt. | A-1-b | |
| 7.35 | | 4 | 6.0' 6.0' | 22 19 19 16 | 18" RECOVERY Moist dense orange coarse to fine sand and gravel w/some silt. | A-1-b | |
| 9.8 | | 5 | 8.0' 8.0' | 6 6 7 11 | 19" RECOVERY Moist medium dense orange coarse to fine sand w/some silt, trace of gravel. | A-1-b | |
| 12.25 | | 6 | 10.0' 10.0' | 10 8 18 28 | 19" RECOVERY Moist medium dense orange fine to coarse sand w/some gravel and silt. | A-1-b | |
| | | 7 | 12.0' 12.0' | 9 12 7 4 | 13" RECOVERY Wet medium dense orange gravel and fine sand w/trace of coarse sand and silt. | A-1-b | |

Remarks: Mud Rotary @ 29.0'.

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: RW1-1-01

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|------------------------|---|-------------|---------------------|
| | | | 14.0' | | 3" RECOVERY | | |
| 14.7 | | 8 | 14.0' | 1 2 3 3 | Saturated loose orange fine sand w/some coarse sand, trace of silt and gravel. | A-3 | |
| | | | 16.0' | | 18" RECOVERY | | |
| 17.15 | | 9 | 16.0' | 1 2 3 4 | Saturated loose orange fine sand w/some coarse sand, trace of silt and gravel. | A-3 | |
| | | | 18.0' | | 17" RECOVERY | | |
| 19.6 | | 10 | 18.0' | W/R 1 2 2 | Saturated very loose orange fine sand w/some coarse sand, trace of silt. | A-3 | |
| | | | 20.0' | | 14" RECOVERY | | |
| 22.05 | | | | | | | |
| 24.5 | | 11 | 24.0' | W/R 1 W/R W/R | Saturated very loose orange fine sand w/some coarse sand, trace of silt and gravel. | A-3 | |
| | | | 26.0' | | 15" RECOVERY | | |
| 26.95 | | | | | | | |
| 29.4 | | 12 | 29.0' | 2 4 7 8 | Saturated medium dense light brown silty fine sand w/some coarse sand, trace of gravel. | A-2-4(0) | Mud Rotary @ 29.0'. |
| | | | 31.0' | | 21" RECOVERY | | |
| 31.85 | | | | | | | |
| 34.3 | | 13 | 34.0' | 3 7 8 10 | Saturated medium dense light brown silty fine sand w/some coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 36.0' | | 21" RECOVERY | | |
| 36.75 | | | | | | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: RW1-1-01

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|-------------------|--|-------------|---------|
| 39.2 | | 14 | 39.0' | 3 3 5 | Saturated loose gray silty fine clayey sand w/ some coarse sand, trace of organic matter and gravel. 19" RECOVERY | A-2-4(0) | |
| 41.65 | 41.0' | | | | | | |
| 44.1 | | 15 | 44.0' | 3 4 7 9 | Saturated medium dense gray silty fine sand w/trace of coarse sand, gravel and organic matter. 22" RECOVERY | A-2-4(0) | |
| 46.55 | 46.0' | | | | | | |
| 49 | | 16 | 49.0' | 6 9 9 13 | Saturated medium dense gray silty fine sand w/trace of gravel, organic matter and coarse sand. 24" RECOVERY | A-2-4(0) | |
| 51.45 | 51.0' | | | | | | |
| 53.9 | | | | | End of Boring | | |
| 56.35 | | | | | | | |
| 58.8 | | | | | | | |

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KEY TO SYMBOLS

Symbol Description

Strata symbols



Silty sand



Poorly graded sand
with silt

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Notes:

1. Exploratory borings were drilled on 1/30/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to I-95

Boring No.: RW1-1-02

Contract: 25-113-01

Boring Location: Sta. 742+00, 180.00' Lt. C.L.

Boring Surface Elev.: +19.7

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: | 34.0 |
| Hollow Stem Auger: | | From Depth of: | | To: | |

| | | | | | | |
|-----------------------------|-------------|-------------|----------------------|------------------------|-----------------------|-----------------------|
| Water Level Readings | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| | 1/29/2009 | | 18.0' | 16.0' | 14.7' | |

Pay Quantities:

| | | | | |
|---------------------------------------|-------|-------------|-------------------------------|------------|
| 2 1/2 in. Dia. Dry Sample Boring: | 101.0 | Ft.; | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | Ft. |

Boring Contractor: Walton Corporation
Driller: Gary Truver
Helpers: T. Kane

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|----------------|----------------------|---|-------------|-------------------------------|
| | 1/29/09 | 1 | 0.0' | | No Sieve Analysis | | Asphalt - 6". Subgrade - 18". |
| 2.45 | | 2 | 2.0' 2.0' | 8 15 13 13 | 0" RECOVERY Moist medium dense orange fine to coarse sand w/some silt and gravel. | A-2-4(0) | |
| 4.9 | | 3 | 4.0' 4.0' | 5 6 5 6 | 18" RECOVERY Moist medium dense orange coarse to fine sand w/some silt and gravel. | A-1-b | |
| 7.35 | | 4 | 6.0' 6.0' | 9 11 11 8 | 16" RECOVERY Moist medium dense orange coarse to fine sand w/some silt and gravel. | A-1-b | |
| 9.8 | | 5 | 8.0' 8.0' | 7 6 9 20 | 20" RECOVERY Moist medium dense orange coarse to fine sand w/some gravel and silt. | A-1-b | |
| 12.25 | | 6 | 10.0' 10.0' | 20 25 29 28 | 19" RECOVERY Moist very dense orange coarse to fine sand w/some silt, trace of gravel. | A-1-b | |
| | | 7 | 12.0' 12.0' | 33 38 45 30 | 19" RECOVERY No Sample Recovery | | |

Remarks: Mud rotary @ 34.0'.

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: RW1-1-02

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|---|-------------|---------------------|
| | | | 14.0' | | 0" RECOVERY | | |
| 14.7 | | 8 | 14.0' | 5 8 6 5 | Wet medium dense light brown coarse to fine sand w/some gravel and silt. | A-1-b | |
| | | | 16.0' | | 17" RECOVERY | | |
| | | 9 | 16.0' | 5 2 | Wet loose light brown coarse to fine sand w/ some silt, trace of gravel. | A-1-b | |
| 17.15 | | | 17.0' | | 12" RECOVERY | | |
| | | 9A | 17.0' | 2 4 | Wet loose gray silty fine to coarse sand w/ some gravel. | A-2-4(0) | |
| | | | 18.0' | | 12" RECOVERY | | |
| | | 10 | 18.0' | 6 14 14 15 | Wet medium dense orange gravel and coarse sand w/some fine sand, trace of silt. | A-1-a | |
| 19.6 | | | 20.0' | | 18" RECOVERY | | |
| | | | | | | | |
| 22.05 | | | | | | | |
| | | | | | | | |
| 24.5 | | 11 | 24.0' | 2 5 | Saturated loose brown silty fine sand w/some coarse sand. | A-2-4(0) | |
| | | | 25.0' | | 8" RECOVERY | | |
| | | 11A | 25.0' | 6 7 | Saturated medium dense gray silty fine sand w/some coarse sand. | A-2-4(0) | |
| | | | 26.0' | | 12" RECOVERY | | |
| 26.95 | | | | | | | |
| | | | | | | | |
| 29.4 | | 12 | 29.0' | 2 4 5 6 | Saturated stiff gray fine sandy silt w/trace of coarse sand and organic matter. | A-4(0) | |
| | | | 31.0' | | 21" RECOVERY | | |
| 31.85 | | | | | | | |
| | | | | | | | |
| 34.3 | | 13 | 34.0' | 3 4 6 8 | Saturated loose gray silty fine sand w/trace of coarse sand and organic matter. | A-2-4(0) | Mud rotary @ 34.0'. |
| | | | 36.0' | | 24" RECOVERY | | |
| 36.75 | | | | | | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: RW1-1-02

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|------------|
| 39.2 | | 14 | 39.0' | 4 4 5 7 | Saturated stiff gray fine sandy silt w/trace of coarse sand and organic matter. 20" RECOVERY | A-4(0) | |
| 41.65 | 41.0' | | | | | | |
| 44.1 | | 15 | 44.0' | 5 7 10 11 | Saturated medium dense gray silty fine sand w/trace of coarse sand. 20" RECOVERY | A-2-4(0) | |
| 46.55 | 46.0' | | | | | | |
| 49 | | 16 | 49.0' | 5 8 9 11 | Saturated very stiff gray fine sandy silt w/ some clay, trace of organic matter, coarse sand and gravel. 22" RECOVERY | A-4(1) | |
| 51.45 | 51.0' | | | | | | |
| 53.9 | | 17 | 54.0' | 5 7 14 15 | Saturated very stiff gray fine sandy silt w/ some clay, trace of organic matter and coarse sand. 21" RECOVERY | A-4(0) | |
| 56.35 | 56.0' | | | | | | |
| 58.8 | | 18 | 59.0' | 11 13 24 25 | Saturated dense green silty fine sand w/trace or organic matter and coarse sand. | A-2-4(0) | Glauconite |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: RW1-1-02

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|---|-------------|------------|
| 61.25 | | | 61.0' | | 21" RECOVERY | | |
| 63.7 | | 19 | 64.0' | 7 10 11 15 | Saturated medium dense green silty fine sand w/trace of coarse sand, organic matter and gravel. | A-2-4(0) | Glauconite |
| 66.15 | | | 66.0' | | 21" RECOVERY | | |
| 68.6 | | | | | | | |
| 71.05 | | 20 | 69.0' | 4 6 8 11 | Saturated stiff gray clay w/some organic matter, trace of fine sand. | A-7-6(26) | |
| 73.5 | | | 71.0' | | 23" RECOVERY | | |
| 75.95 | | 21 | 74.0' | 5 10 15 20 | Saturated medium dense grayish green silty fine sand w/trace of organic matter, gravel and coarse sand. | A-2-4(0) | |
| 78.4 | | | 76.0' | | 21" RECOVERY | | |
| 80.85 | | 22 | 79.0' | 6 10 17 16 | Saturated very stiff gray silty fine sand w/trace of organic matter. | A-4(0) | |
| | | | 81.0' | | 20" RECOVERY | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: RW1-1-02

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|---------|
| 83.3 | | | | | | | |
| | | 23 | 84.0' | 12 14 21 30 | Saturated hard gray fine sandy silt w/trace of organic matter. | A-4(0) | |
| 85.75 | | | 86.0' | | 24" RECOVERY | | |
| | | | | | | | |
| 88.2 | | | | | | | |
| | 1/30/09 | 24 | 89.0' | 4 6 13 17 | Saturated very stiff gray clayey fine sandy silt w/some organic matter. | A-4(4) | |
| 90.65 | | | 91.0' | | 22" RECOVERY | | |
| | | | | | | | |
| 93.1 | | | | | | | |
| | | 25 | 94.0' | 6 8 13 17 | Saturated very stiff gray silty clay w/some fine sand and organic matter. | A-7-6(16) | |
| 95.55 | | | 96.0' | | 23" RECOVERY | | |
| | | | | | | | |
| 98 | | | | | | | |
| | | 26 | 99.0' | 7 8 10 10 | Saturated very stiff gray silty clay w/some organic matter and fine sand. | A-7-5(15) | |
| 100.45 | | | 101.0' | | 24" RECOVERY | | |
| | | | | | End of Boring | | |
| 102.9 | | | | | | | |
| | | | | | | | |
| 105.35 | | | | | | | |

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KEY TO SYMBOLS

Symbol Description

Strata symbols



Silty sand



Poorly graded sand



Poorly graded clayey
silty sand



Low plasticity
clay



Silt

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Notes:

1. Exploratory borings were drilled on 1/29/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01
Boring Location: Sta. 743+00, 180.00' Lt. C.L.

Boring No.: RW1-1-03

Boring Surface Elev.: +17.20

Reference:

Wt. of Casing Hammer:
Wt. of Sample Hammer: 140
Type of: D-Sampler: Split-Barrel
S-Sampler:
U-Sampler:
Core Bit:

Lbs.
Lbs.
O.D.
O.D.
O.D.
O.D.

Average Fall:
Average Fall: 30
O.D. of Sampler: 2
O.D. of Samp. Tube:
O.D. of Samp. Tube:
O.D. of Rock Core:

IN.
IN.
IN.
IN.
IN.
IN.

Casing Size: 3 1/4"
Hollow Stem Auger:

Inches

From Depth of:
From Depth of: 0.0

To:
To: 49.0

Water Level Readings

| Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
|-----------|------|---------------|-----------------|----------------|----------------|
| 1/12/2009 | | 16.0' | 14.0' | 13.0' | |

Pay Quantities:

| | | | | | |
|---------------------------------------|------|------|------------------------|-----------------------|-----|
| 2 1/2 in. Dia. Dry Sample Boring: | 51.0 | Ft.; | | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of | U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | | Ft. |

Boring Contractor: Walton Corporation
Driller: Gary Truver
Helpers: T. Kane

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|--------------|
| | 1/12/09 | 1 | 1.0' | 5 9 | Moist medium dense orange fine sand w/some coarse sand, silt and gravel. 9" RECOVERY | A-2-4(0) | Topsoil - 9" |
| 2.45 | | 2 | 2.0' | 9 16 20 18 | Moist dense orange silty fine to coarse sand w/trace of gravel. 12" RECOVERY | A-2-4(0) | |
| 4.9 | | 3 | 4.0' | 8 12 14 14 | Moist medium dense orange fine sand w/some coarse sand and silt, trace of gravel. 20" RECOVERY | A-2-4(0) | |
| 7.35 | | 4 | 6.0' | 15 16 19 21 | Moist dense orange fine to coarse sand w/some silt, trace of gravel. 13" RECOVERY | A-2-4(0) | |
| 9.8 | | 5 | 8.0' | 10 18 18 21 | Wet dense orange fine to coarse sand w/some silt, trace of gravel. 13" RECOVERY | A-2-4(0) | |
| 12.25 | | 6 | 10.0' | 25 26 23 26 | Wet dense orange fine sand w/some coarse sand and silt, trace of gravel. 24" RECOVERY | A-2-4(0) | |
| | | 7 | 12.0' | 6 8 11 13 | Wet medium dense orange fine to coarse sand w/some silt, trace of gravel. 18" RECOVERY | A-3 | |
| 14.7 | | 8 | 14.0' | 8 12 11 | Wet medium dense brown fine sand w/some | A-2-4(0) | |

Remarks:

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: RW1-1-03

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|----------------|--------------------|---|-------------|------------------------|
| | | | | 9 | coarse sand and silt, trace of gravel. | | |
| | | | 16.0' | | 18" RECOVERY | | |
| 17.15 | | 9 | 16.0' | 7 8 8 9 | Wet medium dense brown fine to coarse sand w/some silt, trace of gravel. | A-2-4(0) | |
| | | | 18.0' | | 16" RECOVERY | | |
| 19.6 | | 10 | 18.0' | 3 8 13 6 | Wet medium dense brown fine to coarse sand w/some gravel and silt. | A-3 | |
| | | | 20.0' | | 13" RECOVERY | | |
| 22.05 | | | | | | | |
| 24.5 | | 11 | 24.0' 24.5' | 50/2" | No Sample Recovery 0" RECOVERY | | Cobble blocking spoon. |
| 26.95 | | | | | | | |
| 29.4 | | 12 | 29.0' | W/H 2 3 3 | Saturated loose gray silty fine sand w/some coarse sand. | A-2-4(0) | |
| | | | 31.0' | | 20" RECOVERY | | |
| 31.85 | | | | | | | |
| 34.3 | | 13 | 34.0' | 1 3 4 4 | Saturated loose gray silty fine sand w/trace of coarse sand and organic matter. | A-2-4(0) | |
| | | | 36.0' | | 21" RECOVERY | | |
| 36.75 | | | | | | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: RW1-1-03

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|--------------------|---|-------------|---------|
| 39.2 | | 14 | 39.0' | 3 5 5 6 | Saturated loose gray silty fine sand w/trace of coarse sand, organic matter and gravel. | A-2-4(0) | |
| | | | 41.0' | | 21" RECOVERY | | |
| 41.65 | | | | | | | |
| 44.1 | | 15 | 44.0' | 3 8 7 10 | Saturated medium dense gray silty fine sand w/trace of gravel, organic matter and coarse sand. | A-2-4(0) | |
| | | | 46.0' | | 21" RECOVERY | | |
| 46.55 | | | | | | | |
| 49 | | 16 | 49.0' | 3 6 11 12 | Saturated very stiff gray clayey fine sandy silt w/trace of organic matter, coarse sand and gravel. | A-4(0) | |
| | | | 51.0' | | 23" RECOVERY | | |
| 51.45 | | | | | End of Boring | | |
| 53.9 | | | | | | | |
| 56.35 | | | | | | | |
| 58.8 | | | | | | | |

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AUGUST 2015

KEY TO SYMBOLS

Symbol Description

Strata symbols



Silty sand



Poorly graded sand
with silt



Clayey sand

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AUGUST 2015

Notes:

1. Exploratory borings were drilled on 1/12/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a ATV CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to I-95

Boring No.: RW1-1-04

Contract: 25-113-01

Boring Location: Sta. 744+00, 180.00' Lt. C.L.

Boring Surface Elev.: + 16.50

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: | | To: | |
| Hollow Stem Auger: | | From Depth of: 0.0 | | To: 49.0 | |

| | | | | | | |
|-----------------------------|-------------|-------------|----------------------|------------------------|-----------------------|-----------------------|
| Water Level Readings | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| | 1/12/2009 | | 24' | 24' | 17.0' | |

Pay Quantities:

| | | | | |
|---------------------------------------|------|-------------|-------------------------------|------------|
| 2 1/2 in. Dia. Dry Sample Boring: | 51.0 | 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: Gary Truver
Helpers: T. kane

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|---------------|
| | 1/12/09 | 1 | 0.5' | 5 10 8 | Moist very stiff orange clayey coarse sandy silt w/some fine sand, trace of gravel. | A-4(1) | Topsoil - 5". |
| | | | 2.0' | | 15" RECOVERY | | |
| 2.45 | | 2 | 2.0' | 12 15 17 21 | Moist dense orange fine to coarse sand w/ some silt, trace of gravel. | A-2-4(0) | |
| | | | 4.0' | | 19" RECOVERY | | |
| 4.9 | | 3 | 4.0' | 5 15 20 28 | Moist dense orange fine to coarse sand w/ some silt, trace of gravel. | A-2-4(0) | |
| | | | 6.0' | | 14" RECOVERY | | |
| 7.35 | | 4 | 6.0' | 20 20 26 30 | Moist dense orange silty coarse to fine sand w/trace of gravel. | A-2-4(0) | |
| | | | 8.0' | | 20" RECOVERY | | |
| 9.8 | | 5 | 8.0' | 5 16 15 16 | Wet dense orange fine to coarse sand w/some silt and gravel. | A-2-4(0) | |
| | | | 10.0' | | 18" RECOVERY | | |
| 12.25 | | 6 | 10.0' | 23 25 27 28 | Wet very dense orange fine to coarse sand w/ some silt, trace of gravel. | A-2-4(0) | |
| | | | 12.0' | | 21" RECOVERY | | |
| | | 7 | 12.0' | 7 12 13 17 | Wet medium dense orange fine to coarse sand w/some silt, trace of gravel. | A-2-4(0) | |
| | | | 14.0' | | 17" RECOVERY | | |
| | | | | 6 | | | |

Remarks:

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: RW1-1-04

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|-------------------|--|-------------|---------|
| 14.7 | | 8 | 14.0' | 10 8 7 | Wet medium dense brown fine to coarse sand w/trace of silt and gravel. | A-3 | |
| | | | 16.0' | | 18" RECOVERY | | |
| 17.15 | | 9 | 16.0' | 3 4 5 | Saturated loose brown fine sand w/some coarse sand and gravel, trace of silt. | A-3 | |
| | | | 18.0' | | 19" RECOVERY | | |
| 19.6 | | 10 | 18.0' | 1 2 4 | Saturated loose brown fine to coarse sand w/trace of gravel and silt. | A-3 | |
| | | | 20.0' | | 13" RECOVERY | | |
| 22.05 | | | | | | | |
| 24.5 | | 11 | 24.0' | 6 14 6 8 | Saturated medium dense gray clayey fine sand w/some coarse sand, trace of gravel and organic matter. | A-2-4(0) | |
| | | | 26.0' | | 10" RECOVERY | | |
| 26.95 | | | | | | | |
| 29.4 | | 12 | 29.0' | 3 4 6 | Saturated loose gray clayey fine sand w/trace of coarse sand, organic matter and gravel. | A-2-4(0) | |
| | | | 31.0' | | 19" RECOVERY | | |
| 31.85 | | | | | | | |
| 34.3 | | 13 | 34.0' | 2 4 4 5 | Saturated firm gray fine sandy silt w/trace of coarse sand, clay, organic matter and gravel. | A-4(0) | |
| | | | 36.0' | | 24" RECOVERY | | |
| 36.75 | | | | | | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: RW1-1-04


| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|---|-------------|---------|
| 39.2 | | 14 | 39.0' | 4 6 7 10 | Saturated medium dense gray silty fine sand w/trace of coarse sand and organic matter. | A-2-4(0) | |
| 41.65 | | | 41.0' | | 21" RECOVERY | | |
| 44.1 | | 15 | 44.0' | 6 7 10 12 | Saturated very stiff gray clayey fine sandy silt w/trace of organic matter, gravel and coarse sand. | A-4(0) | |
| 46.55 | | | 46.0' | | 21" RECOVERY | | |
| 49 | | 16 | 49.0' | 6 12 13 17 | Saturated very stiff gray clayey fine sandy silt w/trace of organic matter, coarse sand and gravel. | A-4(0) | |
| 51.45 | | | 51.0' | | 24" RECOVERY | | |
| 51.45 | | | | | End of Boring | | |
| 53.9 | | | | | | | |
| 56.35 | | | | | | | |
| 58.8 | | | | | | | |


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KEY TO SYMBOLS


Symbol Description


Strata symbols

 Silty low plasticity clay

 Silty sand

 Poorly graded sand with silt

 Poorly graded clayey silty sand

 Clayey sand

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Notes:

1. Exploratory borings were drilled on 1/12/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a Track CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to I-95

Boring No.: RW1-1-05

Contract: 25-113-01

Boring Location: Sta. 745+00, 180.00' Lt. C.L.

Boring Surface Elev.: + 16.45

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: | | To: | |
| Hollow Stem Auger: | | From Depth of: 0.0 | | To: 49.0 | |

| | | | | | |
|-----------------------------|-------------|----------------------|------------------------|-----------------------|-----------------------|
| Water Level Readings | | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| Date 1/13/2009 | Time | 12.0' | 10.0' | 10.0' | |

Pay Quantities:

| | | | | |
|---------------------------------------|------|-------------|-------------------------------|------------|
| 2 1/2 in. Dia. Dry Sample Boring: | 51.0 | 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: Gary Truver
Helpers: T. Kane

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|---------------|
| | 1/13/09 | 1 | 0.5' | 5 5 | Moist firm brown clayey coarse sandy silt w/ some fine sand, trace of gravel. | A-4(0) | Topsoil - 4". |
| | | | 2.0' | | 15" RECOVERY | | |
| 2.45 | | 2 | 2.0' | 6 9 50 | Moist very dense orange fine to coarse sand w/some silt, trace of gravel. | A-2-4(0) | |
| | | | 3.5' | | 10" RECOVERY | | |
| | | 3 | 4.0' | 5 15 21 19 | Moist dense orange fine to coarse sand w/ some silt, trace of gravel. | A-2-4(0) | |
| 4.9 | | | 6.0' | | 16" RECOVERY | | |
| | | 4 | 6.0' | 25 23 23 18 | Moist dense orange coarse to fine sand w/ some gravel and silt. | A-1-b | |
| 7.35 | | | 8.0' | | 18" RECOVERY | | |
| | | 5 | 8.0' | 6 18 29 23 | Wet dense brown coarse to fine sand w/some silt and gravel. | A-1-b | |
| 9.8 | | | 10.0' | | 19" RECOVERY | | |
| | | 6 | 10.0' | 21 20 20 12 | Wet dense brown coarse to fine sand and gravel w/some silt. | A-1-b | |
| | | | 12.0' | | 14" RECOVERY | | |
| 12.25 | | 7 | 12.0' | 2 2 3 6 | Wet loose brown fine to coarse sand w/trace of gravel and silt. | A-3 | |
| | | | 14.0' | | 13" RECOVERY | | |
| | | | | 2 | | | |

Remarks:

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: RW1-1-05

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|------------------------|---|-------------|---------|
| 14.7 | | 8 | 14.0' | 2 4 4 | Wet loose brown fine to coarse sand w/some gravel, trace of silt. | A-1-b | |
| | | | 16.0' | | 12" RECOVERY | | |
| 17.15 | | 9 | 16.0' | 2 2 1 | Saturated very loose gray fine sand w/some coarse sand and silt, trace of gravel. | A-2-4(0) | |
| | | | 18.0' | | 17" RECOVERY | | |
| 19.6 | | 10 | 18.0' | W/H W/R W/R 1 | Saturated very loose brownish red fine sand w/some coarse sand and silt. | A-2-4(0) | |
| | | | 20.0' | | 17" RECOVERY | | |
| 22.05 | | | | | | | |
| 24.5 | | 11 | 24.0' | 3 3 5 5 | Saturated loose gray clayey fine sand w/some coarse sand, trace of organic matter and gravel. | A-2-4(0) | |
| | | | 26.0' | | 21" RECOVERY | | |
| 26.95 | | | | | | | |
| 29.4 | | 12 | 29.0' | 2 4 4 10 | Saturated loose gray silty fine sand w/trace of coarse sand and organic matter. | A-2-4(0) | |
| | | | 31.0' | | 19" RECOVERY | | |
| 31.85 | | | | | | | |
| 34.3 | | 13 | 34.0' | 3 5 6 8 | Saturated stiff gray fine sandy silt w/trace of coarse sand and organic matter. | A-4(0) | |
| | | | 36.0' | | 22" RECOVERY | | |
| 36.75 | | | | | | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: RW1-1-05

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|--------------------|--|-------------|---------|
| 39.2 | | 14 | 39.0' | 4 7 10 15 | Saturated medium dense gray silty fine sand w/trace of coarse sand, organic matter and gravel. 21" RECOVERY | A-2-4(0) | |
| 41.65 | 41.0' | | | | | | |
| 44.1 | | 15 | 44.0' | 6 8 9 12 | Saturated very stiff gray fine sandy silt w/ trace of organic matter and coarse sand. 23" RECOVERY | A-4(0) | |
| 46.55 | 46.0' | | | | | | |
| 49 | | 16 | 49.0' | 6 9 13 13 | Saturated very stiff gray fine sandy silt w/ trace of organic matter and clay. 24" RECOVERY | A-4(1) | |
| 51.45 | 51.0' | | | | | | |
| 53.9 | | | | | End of Boring | | |
| 56.35 | | | | | | | |
| 58.8 | | | | | | | |

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KEY TO SYMBOLS

Symbol Description

Strata symbols



Poorly graded clayey
silty sand



Silty sand



Poorly graded sand
with silt



Clayey sand

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AUGUST 2015

Notes:

1. Exploratory borings were drilled on 1/13/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a Track CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to I-95

Boring No.: RW1-1-06

Contract: 25-113-01

Boring Location: Sta. 746+00, 180.00' Lt. C.L.

Boring Surface Elev.: + 16.0

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: Ball Sampler | | O.D. | O.D. of Samp. Tube: 3 | | IN. |
| Core Bit: | | O.D. | O.D. of Rock Core: | | IN. |

| | | | | | |
|----------------------------|---------------|---------------------------|--|-----------------|--|
| Casing Size: 3 1/4" | Inches | From Depth of: | | To: | |
| Hollow Stem Auger: | | From Depth of: 0.0 | | To: 51.0 | |

| | | | | | |
|-----------------------------|-------------|----------------------|------------------------|-----------------------|-----------------------|
| Water Level Readings | | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| Date 1/5/2009 | Time | 14.0' | 12.0' | 9.8' | |

Pay Quantities:

| | | | | | |
|---------------------------------------|------|-------------|-------------------------------|------------------------------|------------|
| 2 1/2 in. Dia. Dry Sample Boring: | 66.0 | Ft.; | 3 | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | 3" | U-Samples: 2 | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | | Ft. |

Boring Contractor: Walton Corporation
Driller: Gary Truver
Helpers: T. Kane

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|-------------------|
| | 1/5/2009 | 1 | 0.5' | 3 5 4 | Moist stiff orange coarse to fine sandy silt w/ trace of clay and gravel. | A-4(0) | Topsoil - 2". |
| | | | 2.0' | | 15" RECOVERY | | |
| 2.45 | | 2 | 2.0' | 5 14 18 22 | Moist dense orange fine to coarse sand w/ some silt and gravel. | A-2-4(0) | |
| | | | 4.0' | | 19" RECOVERY | | |
| | | 3 | 4.0' | 7 15 16 18 | Moist dense orange coarse to fine sand w/ some silt and gravel. | A-1-b | |
| 4.9 | | | 6.0' | | 17" RECOVERY | | |
| | | 4 | 6.0' | 38 39 45 42 | No Sample Recovery | | Driving a cobble. |
| 7.35 | | | 8.0' | | 0" RECOVERY | | |
| | | 5 | 8.0' | 3 14 10 6 | Wet medium dense orange coarse to fine sand w/some gravel and silt. | A-1-b | |
| | | | 10.0' | | 16" RECOVERY | | |
| 9.8 | | 6 | 10.0' | 4 3 3 2 | Wet loose orange coarse to fine sand w/some silt, trace of gravel. | A-2-4(0) | |
| | | | 12.0' | | 20" RECOVERY | | |
| 12.25 | | 7 | 12.0' | W/R W/R 1 1 | No Sample Recovery | | |
| | | | 14.0' | | 0" RECOVERY | | |
| | | | | W/R | | | |

Remarks: Mud Rotary @ 51.0'.

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: RW1-1-06

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|-------------------|---|-------------|-----------------------------|
| 14.7 | | 8 | 14.0' | W/R W/R W/R | No Sieve Analysis - Indication of saturated soft gray clayey silt. | | |
| | | | 16.0' | | 2" RECOVERY | | |
| 17.15 | | 9 | 16.0' | 1 2 2 3 | Saturated very loose grayish brown silty fine sand w/some coarse sand. | A-2-4(0) | |
| | | | 18.0' | | 12" RECOVERY | | |
| | | 10 | 18.0' | 2 4 3 3 | Saturated loose gray silty fine sand w/some coarse sand, trace of organic matter. | A-2-4(0) | |
| 19.6 | | | 20.0' | | 16" RECOVERY | | |
| 22.05 | | | | | | | |
| 24.5 | | 11 | 24.0' | 2 2 3 4 | Saturated loose gray silty fine sand w/trace of coarse sand, organic matter and gravel. | A-2-4(0) | |
| | | | 26.0' | | 19" RECOVERY | | |
| 26.95 | | U-1 | 27.0' | | No Sample Recovery | | Press Sample - Shelby Tube. |
| | | | 29.0' | | 0" RECOVERY | | |
| 29.4 | | 12 | 29.0' | 1 2 2 | Saturated very loose gray silty fine sand w/ trace of coarse sand, organic matter and gravel. | A-2-4(0) | |
| | | | 31.0' | | 24" RECOVERY | | |
| 31.85 | | | | | | | |
| 34.3 | | 13 | 34.0' | 1 1 3 4 | Saturated soft gray fine sandy silt w/trace of coarse sand, organic matter and gravel. | A-4(0) | |
| | | | 36.0' | | 20" RECOVERY | | |
| 36.75 | | | | | | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: RW1-1-06

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|---|-------------|-----------------------------------|
| 39.2 | | 14 | 39.0' | 2 2 2 3 | Saturated very loose gray silty fine sand w/ trace of coarse sand and organic matter. | A-2-4(0) | |
| | | | 41.0' | | 23" RECOVERY | | |
| 41.65 | | | | | | | |
| 44.1 | | 15 | 44.0' | 2 4 6 6 | Saturated stiff gray clayey fine sandy silt w/ trace of organic matter, coarse sand and gravel. | A-4(0) | |
| | | | 46.0' | | 23" RECOVERY | | |
| 46.55 | | | | | | | |
| | | U-2 | 47.0' | | Saturated gray clayey fine to coarse sand. | A-4(0) | |
| | | | 49.0' | | 24" RECOVERY | | |
| 49 | | 16 | 49.0' | 5 7 10 10 | Saturated very stiff gray fine sandy silt w/ trace of organic matter, clay, coarse sand and gravel. | A-4(0) | |
| | | | 51.0' | | 17" RECOVERY | | |
| 51.45 | | | | | | | |
| 53.9 | | | | | | | |
| | 1/6/2009 | 17 | 54.0' | 7 11 15 23 | Saturated medium dense green silty fine sand w/trace or organic matter and coarse sand. | A-2-4(0) | Mud Rotary @ 51.0'. Glauconite |
| | | | 56.0' | | 19" RECOVERY | | |
| 56.35 | | | | | | | |
| 58.8 | | 18 | 59.0' | 6 9 16 23 | Saturated medium dense green silty fine sand w/trace of organic matter and coarse sand. | A-2-4(0) | Glauconite |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: RW1-1-06

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|--|-------------|------------|
| 61.25 | | | 61.0' | | 20" RECOVERY | | |
| 63.7 | | | | | | | |
| | | 19 | 64.0' | 7 10 18 20 | Saturated very stiff green clay w/some fine sand and organic matter, trace of coarse sand. | A-7-6(25) | Glauconite |
| 66.15 | | | 66.0' | | 20" RECOVERY | | |
| | | | | | End of Boring | | |
| 68.6 | | | | | | | |
| 71.05 | | | | | | | |
| 73.5 | | | | | | | |
| 75.95 | | | | | | | |
| 78.4 | | | | | | | |
| 80.85 | | | | | | | |
| 83.3 | | | | | | | |

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AUGUST 2015

KEY TO SYMBOLS

Symbol Description

Strata symbols



Silty sand



Poorly graded sand
with silt



Poorly graded clayey
silty sand



Low plasticity
clay

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AUGUST 2015

Notes:

1. Exploratory borings were drilled on 1/5/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a Track CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to I-95

Boring No.: RW1-1-07

Contract: 25-113-01

Boring Location: Sta. 747+00, 180.00' Lt. C.L.

Boring Surface Elev.: + 16.25

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: | | To: | |
| Hollow Stem Auger: | | From Depth of: 0.0 | | To: 49.0 | |

| | | | | | |
|-----------------------------|-------------|----------------------|------------------------|-----------------------|-----------------------|
| Water Level Readings | | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| Date 1/13/2009 | Time | 14.0' | 12.0' | 8.0' | |

Pay Quantities:

| | | | | |
|---------------------------------------|------|-------------|-------------------------------|------------|
| 2 1/2 in. Dia. Dry Sample Boring: | 51.0 | Ft.; | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | Ft. |

Boring Contractor: Walton Corporation
Driller: Gary Truver
Helpers: T. Kane

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|---------------|
| | 1/13/08 | 1 | 1.0' | 7 7 | Moist medium dense orange clayey gravel and fine to coarse sand. 12" RECOVERY | A-2-4(0) | Topsoil - 8". |
| 2.45 | | 2 | 2.0' | 10 16 16 17 | Moist dense orange fine to coarse sand w/ some silt, trace of gravel. 20" RECOVERY | A-2-4(0) | |
| 4.9 | | 3 | 4.0' | 11 17 23 34 | Moist dense orange coarse sand w/some silt, fine sand and gravel. 17" RECOVERY | A-1-b | |
| 7.35 | | 4 | 6.0' | 16 17 16 15 | Wet dense light brown coarse to fine sand w/ some silt, trace of gravel. 18" RECOVERY | A-1-b | |
| 9.8 | | 5 | 8.0' | 7 7 6 6 | Wet medium dense light brown coarse to fine sand w/some silt, trace of gravel. 14" RECOVERY | A-2-4(0) | |
| 12.25 | | 6 | 10.0' | 3 3 3 2 | Wet loose light brown coarse to fine sand w/ some silt, trace of gravel. 23" RECOVERY | A-2-4(0) | |
| | | 7 | 12.0' | 2 1 | Saturated very loose brown fine sand w/some silt, coarse sand and gravel, trace of organic matter. 6" RECOVERY | A-2-4(0) | |
| | | 7A | 13.0' | 3 4 | Saturated loose brown silty fine sand w/some coarse sand, trace of gravel. 12" RECOVERY | A-2-4(0) | |
| 14.7 | | 8 | 14.0' | 10 4 4 | | | |

Remarks:

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: RW1-1-07

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|------------------|--|-------------|---------|
| | | | 16.0' | 5 | Saturated loose gray silty fine sand w/some coarse sand, trace of gravel. | | |
| | | | 16.0' | | 16" RECOVERY | | |
| 17.15 | | 9 | 16.0' | 3 4 5 7 | Saturated loose gray silty fine sand w/trace of coarse sand and organic matter. | A-2-4(0) | |
| | | | 18.0' | | 16" RECOVERY | | |
| | | 10 | 18.0' | 2 3 3 5 | Saturated loose gray silty fine sand w/some coarse sand, trace of organic matter. | A-2-4(0) | |
| 19.6 | | | 20.0' | | 20" RECOVERY | | |
| | | | | | | | |
| 22.05 | | | | | | | |
| | | | | | | | |
| 24.5 | | 11 | 24.0' | 1 2 3 5 | Saturated loose gray silty fine sand w/some coarse sand, trace of organic matter. | A-2-4(0) | |
| | | | 26.0' | | 21" RECOVERY | | |
| 26.95 | | | | | | | |
| | | | | | | | |
| 29.4 | | 12 | 29.0' | 2 3 3 5 | Saturated loose gray silty fine sand w/trace of coarse sand, clay and organic matter. | A-2-4(0) | |
| | | | 31.0' | | 20" RECOVERY | | |
| 31.85 | | | | | | | |
| | | | | | | | |
| 34.3 | | 13 | 34.0' | 4 5 6 6 | Saturated medium dense gray silty fine sand w/trace of coarse sand, gravel and organic matter. | A-2-4(0) | |
| | | | 36.0' | | 20" RECOVERY | | |
| 36.75 | | | | | | | |

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AUGUST 2015

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: RW1-1-07

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|--|-------------|---------|
| 39.2 | | 14 | 39.0' | 3 5 6 8 | Saturated medium dense gray silty fine sand w/trace of coarse sand and organic matter. | A-2-4(0) | |
| | | | 41.0' | | 21" RECOVERY | | |
| 41.65 | | | | | | | |
| 44.1 | 1/14/08 | 15 | 44.0' | 6 7 10 16 | Saturated very stiff gray fine sandy silt w/ some clay, trace of organic matter and coarse sand. | A-4(0) | |
| | | | 46.0' | | 22" RECOVERY | | |
| 46.55 | | | | | | | |
| 49 | | 16 | 49.0' | 8 14 18 44 | Saturated hard gray fine sandy silt w/some clay, trace of organic matter. | A-4(0) | |
| | | | 51.0' | | 24" RECOVERY | | |
| 51.45 | | | | | End of Boring | | |
| 53.9 | | | | | | | |
| 56.35 | | | | | | | |
| 58.8 | | | | | | | |

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KEY TO SYMBOLS

Symbol Description

Strata symbols



Poorly graded clayey
silty sand



Poorly graded sand
with silt



Silty sand

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Notes:

1. Exploratory borings were drilled on 1/13/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a ATV CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to I-95

Boring No.: RW1-1-08

Contract: 25-113-01

Boring Location: Sta. 748+00, 180.00' Lt. C.L.

Boring Surface Elev.: +17.44

Reference:

Wt. of Casing Hammer:
Wt. of Sample Hammer: 140
Type of: D-Sampler: split-Barrel
S-Sampler:
U-Sampler:
Core Bit:

Lbs.
Lbs.
O.D.
O.D.
O.D.
O.D.

Average Fall:
Average Fall: 30
O.D. of Sampler: 2
O.D. of Samp. Tube:
O.D. of Samp. Tube:
O.D. of Rock Core:

IN.
IN.
IN.
IN.
IN.
IN.

Casing Size: 3 1/4"
Hollow Stem Auger:

Inches

From Depth of:
From Depth of: 0.0

To:
To: 49.0

Water Level Readings

| Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
|-----------|------|---------------|-----------------|----------------|----------------|
| 1/14/2009 | | 12.0' | 10.0' | 9.0' | |

Pay Quantities:

2 1/2 in. Dia. Dry Sample Boring: 51.0
No. of 2 in. Dia. Shelby Tubes:
2 1/2 in. Dia. Contin. Sample Boring:

Ft.;
Ft.;

No. of:
Core Drilling in Rock:

Dia. U-Sample Boring:
U-Samples:

Ft.
Ft.

Boring Contractor: Walton Corporation

Driller: Gary Truver

Helpers: T. Kane

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|---------------|
| | 1/14/08 | 1 | 0.5' | 6 7 8 | Moist stiff brown clayey silt w/some coarse to fine sand, trace of gravel. | A-4(3) | Topsoil - 6". |
| | | | 2.0' | | 13" RECOVERY | | |
| 2.45 | | 2 | 2.0' | 8 11 14 13 | Moist medium dense orange silty coarse to fine sand w/some gravel. | A-2-4(0) | |
| | | | 4.0' | | 17" RECOVERY | | |
| 4.9 | | 3 | 4.0' | 11 18 21 20 | Moist dense orange coarse to fine sand w/some silt, trace of gravel. | A-1-b | |
| | | | 6.0' | | 17" RECOVERY | | |
| 7.35 | | 4 | 6.0' | 14 10 11 9 | Wet medium dense orange fine to coarse sand w/some silt, trace of gravel. | A-2-4(0) | |
| | | | 8.0' | | 20" RECOVERY | | |
| 9.8 | | 5 | 8.0' | 6 6 6 5 | Wet medium dense orange fine sand w/some silt and coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 10.0' | | 18" RECOVERY | | |
| | | 6 | 10.0' | 6 4 4 4 | Saturated loose brown fine sand w/some coarse sand and silt. | A-2-4(0) | |
| | | | 12.0' | | 15" RECOVERY | | |
| 12.25 | | 7 | 12.0' | 1 3 5 4 | Saturated loose brown fine sand w/some silt and coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 14.0' | | 19" RECOVERY | | |
| | | | | 3 | | | |

Remarks:

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: RW1-1-08

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|-------------------|--|-------------|---------|
| 14.7 | | 8 | 14.0' | 4 7 9 | Saturated medium dense brown silty fine sand w/some coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 16.0' | | 20" RECOVERY | | |
| 17.15 | | 9 | 16.0' | 6 8 8 | Saturated medium dense gray silty fine sand w/some coarse sand. | A-2-4(0) | |
| | | | 18.0' | | 20" RECOVERY | | |
| | | 10 | 18.0' | 2 4 5 | Saturated loose gray clayey fine sand w/some coarse sand, trace of organic matter. | A-2-4(0) | |
| 19.6 | | | 20.0' | | 20" RECOVERY | | |
| 22.05 | | | | | | | |
| 24.5 | | 11 | 24.0' | 3 3 4 6 | Saturated firm gray fine sandy silt w/trace of coarse sand and organic matter. | A-4(0) | |
| | | | 26.0' | | 21" RECOVERY | | |
| 26.95 | | | | | | | |
| 29.4 | | 12 | 29.0' | 3 3 5 8 | Saturated loose gray silty fine sand w/trace of coarse sand and organic matter. | A-2-4(0) | |
| | | | 31.0' | | 21" RECOVERY | | |
| 31.85 | | | | | | | |
| 34.3 | | 13 | 34.0' | 4 5 8 10 | Saturated medium dense gray silty fine sand w/trace of coarse sand, organic matter and gravel. | A-2-4(0) | |
| | | | 36.0' | | 23" RECOVERY | | |
| 36.75 | | | | | | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: RW1-1-08

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|--|-------------|---------|
| 39.2 | | 14 | 39.0' | 6 8 7 11 | Saturated medium dense gray silty fine sand w/trace of coarse sand, organic matter and gravel. | A-2-4(0) | |
| 41.65 | | | 41.0' | | 22" RECOVERY | | |
| 44.1 | | 15 | 44.0' | 7 9 11 14 | Saturated very stiff gray fine sandy silt w/trace of organic matter and coarse sand. | A-4(0) | |
| 46.55 | | | 46.0' | | 21" RECOVERY | | |
| 49 | | 16 | 49.0' | 8 10 13 18 | Saturated very stiff gray fine sandy silt w/trace of clay and organic matter. | A-4(0) | |
| 51.45 | | | 51.0' | | 23" RECOVERY | | |
| 53.9 | | | | | End of Boring | | |
| 56.35 | | | | | | | |
| 58.8 | | | | | | | |

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AUGUST 2015

KEY TO SYMBOLS

Symbol Description

Strata symbols



Low plasticity
clay



Silty sand



Poorly graded sand
with silt



Poorly graded clayey
silty sand

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Notes:

1. Exploratory borings were drilled on 1/14/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a Track CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to I-95

Boring No.: RW1-1-09

Contract: 25-113-01

Boring Location: Sta. 749+00, 180.00' Lt. C.L.

Boring Surface Elev.: +19.37

Reference:

Wt. of Casing Hammer:
Wt. of Sample Hammer: 140
Type of: D-Sampler: Split-Barrel
S-Sampler:
U-Sampler:
Core Bit:

Lbs.
Lbs.
O.D.
O.D.
O.D.
O.D.

Average Fall:
Average Fall: 30
O.D. of Sampler: 2
O.D. of Samp. Tube:
O.D. of Samp. Tube:
O.D. of Rock Core:

IN.
IN.
IN.
IN.
IN.
IN.

Casing Size: 3 1/4" **Inches**
Hollow Stem Auger:

From Depth of: **To:**
From Depth of: 0.0 **To:** 49.0

Water Level Readings

| Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
|----------|------|---------------|-----------------|----------------|----------------|
| 1/9/2009 | | 10.0' | 8.0' | 8.0' | |

Pay Quantities:

| | | | | |
|---------------------------------------|------|------|------------------------|-----|
| 2 1/2 in. Dia. Dry Sample Boring: | 51.0 | Ft.; | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | Ft. |

Boring Contractor: Walton Corporation

Driller: Gary Truver

Helpers: T. Kane

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|---------------|
| | 1/8/2008 | 1 | 1.0' | 7 8 | Moist medium dense orange coarse to fine sand w/some gravel and silt. 10" RECOVERY | A-1-b | Topsoil - 8". |
| 2.45 | | 2 | 2.0' | 10 8 18 26 | Moist medium dense orange coarse to fine sand w/some silt and gravel. 14" RECOVERY | A-1-b | |
| 4.9 | | 3 | 4.0' | 10 21 22 22 | Moist dense orange silty fine to coarse sand w/trace of gravel. 17" RECOVERY | A-2-4(0) | |
| 7.35 | | 4 | 6.0' | 15 18 20 12 | Wet dense brown fine sand w/some silt and coarse sand, trace of gravel. 19" RECOVERY | A-2-4(0) | |
| 9.8 | | 5 | 8.0' | 3 5 5 | Saturated loose brown fine sand w/some silt and coarse sand. 16" RECOVERY | A-2-4(0) | |
| 12.25 | 1/9/2008 | 7 | 12.0' | 3 4 2 1 | Saturated loose brown fine sand w/some coarse sand and silt. 21" RECOVERY | A-2-4(0) | |
| 14.7 | | 8 | 14.0' | 1 1 1 | Saturated very loose brown fine sand w/some | A-2-4(0) | |

Remarks:

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: RW1-1-09

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|------------------------|--|-------------|---------|
| | | | 16.0' | 1 | silt and coarse sand. | | |
| | | | 16.0' | | 18" RECOVERY | | |
| 17.15 | | 9 | 16.0' | 2 3 3 | Saturated loose brown fine sand w/some silt and coarse sand. | A-2-4(0) | |
| | | | 18.0' | | 15" RECOVERY | | |
| | | 10 | 18.0' | W/R W/R W/R 1 | Saturated very loose brown fine sand w/some silt and coarse sand. | A-2-4(0) | |
| 19.6 | | | 20.0' | | 18" RECOVERY | | |
| | | | | | | | |
| 22.05 | | | | | | | |
| | | | | | | | |
| 24.5 | | 11 | 24.0' | 5 7 10 10 | Saturated medium dense gray silty fine sand w/trace of coarse sand and gravel. | A-2-4(0) | |
| | | | 26.0' | | 22" RECOVERY | | |
| 26.95 | | | | | | | |
| | | | | | | | |
| 29.4 | | 12 | 29.0' | 3 4 5 5 | Saturated stiff gray fine sandy silt w/trace of coarse sand and gravel. | A-4(0) | |
| | | | 31.0' | | 21" RECOVERY | | |
| 31.85 | | | | | | | |
| | | | | | | | |
| 34.3 | | 13 | 34.0' | 5 7 9 13 | Saturated medium dense gray silty fine sand w/trace of coarse sand and gravel. | A-2-4(0) | |
| | | | 36.0' | | 22" RECOVERY | | |
| 36.75 | | | | | | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: RW1-1-09

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|--|-------------|---------|
| 39.2 | | 14 | 39.0' | 5 7 11 12 | Saturated very stiff gray fine sandy silt w/ trace of coarse sand. 20" RECOVERY | A-4(0) | |
| | | | 41.0' | | | | |
| 41.65 | | | | | | | |
| 44.1 | | 15 | 44.0' | 5 10 10 15 | Saturated very stiff gray fine sandy silt w/ some clay, trace of organic matter, coarse sand and gravel. 24" RECOVERY | A-4(2) | |
| | | | 46.0' | | | | |
| 46.55 | | | | | | | |
| 49 | | 16 | 49.0' | 5 10 13 20 | Saturated very stiff gray fine sandy silt w/ trace of coarse sand and gravel. 22" RECOVERY | A-4(0) | |
| | | | 51.0' | | | | |
| 51.45 | | | | | End of Boring | | |
| 53.9 | | | | | | | |
| 56.35 | | | | | | | |
| 58.8 | | | | | | | |

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AUGUST 2015

KEY TO SYMBOLS

Symbol Description

Strata symbols



Silty sand



Low plasticity
clay

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Notes:

1. Exploratory borings were drilled on 1/8/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a ATV CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to I-95

Boring No.: RW1-1-09A

Contract: 25-113-01

Boring Location:

Boring Surface Elev.: + 19.00

Reference:

Wt. of Casing Hammer:
Wt. of Sample Hammer: 140
Type of: D-Sampler: Split-Barrel
S-Sampler:
U-Sampler:
Core Bit:

Lbs.
Lbs.
O.D.
O.D.
O.D.
O.D.

Average Fall:
Average Fall: 30
O.D. of Sampler: 2
O.D. of Samp. Tube:
O.D. of Samp. Tube:
O.D. of Rock Core:

IN.
IN.
IN.
IN.
IN.
IN.

Casing Size: 3 1/4"
Hollow Stem Auger:

Inches

From Depth of:
From Depth of: 0.0 **To:** 8.0

Water Level Readings

| Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
|----------|------|---------------|-----------------|----------------|----------------|
| 1/9/2009 | | 12.0' | 10.0' | 8.0' | |

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: Gary Truver

Helpers: T. Kane

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|--------------------|
| 4.9 | 1/9/2008 | 1 | 4.0' | 10 13 15 21 | Moist medium dense orange silty fine to coarse sand w/trace of gravel. | A-2-4(0) | |
| | | | 6.0' | | 18" RECOVERY | | |
| 7.35 | | | | | | | |
| 9.8 | | 2 | 8.0' | 3 5 5 4 | Saturated loose brown fine sand w/some coarse sand and silt. | A-2-4(0) | Mud Rotary @ 8.0'. |
| | | | 10.0' | | 18" RECOVERY | | |
| 12.25 | | 3 | 10.0' | 5 4 4 5 | Saturated loose brown fine sand w/some silt and coarse sand. | A-2-4(0) | |
| | | | 12.0' | | 21" RECOVERY | | |
| | | 4 | 12.0' | 1 2 2 2 | Saturated very loose brown fine sand w/some silt and coarse sand. | A-2-4(0) | |
| | | | 14.0' | | 17" RECOVERY | | |
| 14.7 | | 5 | 14.0' | W/H 1 1 2 | Saturated very loose brown fine sand w/some silt and coarse sand. | A-2-4(0) | |
| | | | 16.0' | | 18" RECOVERY | | |
| 17.15 | | 6 | 16.0' | 1 2 2 2 | Saturated very loose brown fine sand w/some silt and coarse sand. | A-2-4(0) | |

Remarks: Mud Rotary @ 8.0'.

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: RW1-1-09A

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|---------|
| | | | 18.0' | | 21" RECOVERY | | |
| | | 7 | 18.0' | W/R W/R 1 2 | Saturated very loose brown fine sand w/some coarse sand and silt. | A-2-4(0) | |
| 19.6 | | | 20.0' | | 19" RECOVERY | | |
| | | 8 | 20.0' | 2 2 5 5 | Saturated loose brown silty fine sand w/some coarse sand, trace of gravel. | A-2-4(0) | |
| 22.05 | | | 22.0' | | 22" RECOVERY | | |
| | | 9 | 22.0' | 3 2 3 4 | Saturated firm gray clayey fine sandy silt w/ trace of coarse sand and gravel. | A-4(0) | |
| 24.5 | | | 24.0' | | 22" RECOVERY | | |
| | | 10 | 24.0' | 3 3 4 4 | Saturated loose gray silty fine sand w/trace of clay and coarse sand. | A-2-4(0) | |
| 26.95 | | | 26.0' | | 20" RECOVERY | | |
| | | 11 | 26.0' | 4 5 7 9 | Saturated medium dense gray silty fine sand w/trace of coarse sand and gravel. | A-2-4(0) | |
| 29.4 | | | 28.0' | | 18" RECOVERY | | |
| | | 12 | 28.0' | 5 7 7 7 | Saturated stiff gray clayey fine sandy silt w/ trace of coarse sand and gravel. | A-4(0) | |
| 31.85 | | | 30.0' | | 24" RECOVERY | | |
| | | | | | End of Boring | | |
| 34.3 | | | | | | | |
| 36.75 | | | | | | | |
| 39.2 | | | | | | | |

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AUGUST 2015

KEY TO SYMBOLS

Symbol Description

Strata symbols



Silty sand



Clayey sand



Poorly graded clayey
silty sand

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Notes:

1. Exploratory borings were drilled on 1/9/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a ATV CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to I-95

Boring No.: RW1-1-10

Contract: 25-113-01

Boring Location: Sta. 750+00, 180.00' Lt. C.L.

Boring Surface Elev.: +22.18

Reference:

Wt. of Casing Hammer:
Wt. of Sample Hammer: 140
Type of: D-Sampler: Split-Barrel
S-Sampler:
U-Sampler:
Core Bit:

Lbs.
Lbs.
O.D.
O.D.
O.D.
O.D.

Average Fall:
Average Fall: 30
O.D. of Sampler: 2
O.D. of Samp. Tube:
O.D. of Samp. Tube:
O.D. of Rock Core:

IN.
IN.
IN.
IN.
IN.
IN.

Casing Size: 3 1/4"
Hollow Stem Auger:

Inches

From Depth of:
From Depth of: 0.0

To:
To: 49.0

Water Level Readings

Date
1/8/2009

Time

Depth of Hole
12.0'

Depth of Casing
10.0'

Depth of Water
9.4'

Elev. of Water

Pay Quantities:

2 1/2 in. Dia. Dry Sample Boring: 51.0
No. of 2 in. Dia. Shelby Tubes:
2 1/2 in. Dia. Contin. Sample Boring:

Ft.;
Ft.;

No. of:
Core Drilling in Rock:

Dia. U-Sample Boring:
U-Samples:

Ft.
Ft.

Boring Contractor: Walton Corporation

Driller: Gary Truver

Helpers: T. Kane

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|---------------|
| | 1/8/09 | 1 | 0.5' | 7 10 9 | Moist medium dense brown silty coarse to fine sand and gravel. | A-1-b | Topsoil - 2". |
| | | | 2.0' | | 12" RECOVERY | | |
| 2.45 | | 2 | 2.0' | 12 14 22 22 | Moist dense orange coarse to fine sand w/ some clay, trace of gravel. | A-2-4(0) | |
| | | | 4.0' | | 19" RECOVERY | | |
| 4.9 | | 3 | 4.0' | 4 25 17 20 | Moist dense orange coarse to fine sand w/ some silt, trace of gravel. | A-2-4(0) | |
| | | | 6.0' | | 15" RECOVERY | | |
| 7.35 | | 4 | 6.0' | 21 15 11 10 | Wet medium dense orange fine sand w/some coarse sand and silt, trace of gravel. | A-2-4(0) | |
| | | | 8.0' | | 21" RECOVERY | | |
| 9.8 | | 5 | 8.0' | 3 4 5 5 | Saturated loose orange fine sand w/some silt and coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 10.0' | | 14" RECOVERY | | |
| 12.25 | | 6 | 10.0' | 7 9 9 11 | Saturated medium dense orange fine sand w/ some silt and coarse sand. | A-2-4(0) | |
| | | | 12.0' | | 18" RECOVERY | | |
| | | 7 | 12.0' | 1 4 5 6 | Saturated loose orange fine sand w/some silt and coarse sand. | A-2-4(0) | |
| | | | 14.0' | | 15" RECOVERY | | |
| | | | | 2 | | | |

Remarks:

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: RW1-1-10

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|--------------------|--|-------------|---------|
| 14.7 | | 8 | 14.0' | 2 4 3 | Saturated loose brownish red fine sand w/ some coarse sand and silt. | A-2-4(0) | |
| | | | 16.0' | | 18" RECOVERY | | |
| 17.15 | | 9 | 16.0' | 4 4 5 4 | Saturated loose brownish red fine sand w/ some silt and coarse sand. | A-2-4(0) | |
| | | | 18.0' | | 16" RECOVERY | | |
| 19.6 | | 10 | 18.0' | 1 1 1 | Saturated very loose brown fine sand w/some silt and coarse sand. | A-2-4(0) | |
| | | | 20.0' | | 15" RECOVERY | | |
| 22.05 | | | | | | | |
| 24.5 | | 11 | 24.0' | 1 1 2 2 | Saturated very loose brown fine sand w/some coarse sand and silt. | A-2-4(0) | |
| | | | 26.0' | | 20" RECOVERY | | |
| 26.95 | | | | | | | |
| 29.4 | | 12 | 29.0' | 3 6 10 13 | Saturated medium dense light brown silty fine sand w/trace of coarse sand and gravel. | A-2-4(0) | |
| | | | 31.0' | | 24" RECOVERY | | |
| 31.85 | | | | | | | |
| 34.3 | | 13 | 34.0' | 2 5 11 12 | Saturated medium dense gray silty fine sand w/some clay, trace of coarse sand and gravel. | A-2-4(0) | |
| | | | 36.0' | | 18" RECOVERY | | |
| 36.75 | | | | | | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to I-95
Contract: 25-113-01

Boring No.: RW1-1-10

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|--------------------|---|-------------|---------|
| 39.2 | | 14 | 39.0' | 1 4 6 5 | Saturated loose gray silty fine sand w/trace of coarse sand and gravel. | A-2-4(0) | |
| 41.65 | | | 41.0' | | 18" RECOVERY | | |
| 44.1 | | 15 | 44.0' | 4 8 9 11 | Saturated very stiff gray fine sandy silt w/ trace of organic matter, clay and coarse sand. | A-4(1) | |
| 46.55 | | | 46.0' | | 20" RECOVERY | | |
| 49 | | 16 | 49.0' | 4 7 12 15 | Saturated very stiff gray clayey fine sandy silt w/trace of organic matter and gravel. | A-4(0) | |
| 51.45 | | | 51.0' | | 22" RECOVERY | | |
| 51.45 | | | | | End of Boring | | |
| 53.9 | | | | | | | |
| 56.35 | | | | | | | |
| 58.8 | | | | | | | |

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KEY TO SYMBOLS

Symbol Description

Strata symbols



Silty sand



Poorly graded clayey
silty sand



Clayey sand

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Notes:

1. Exploratory borings were drilled on 1/8/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a ATV CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-2-01

Contract: 28-113-01

Boring Location: Sta. 883+66, 35' Rt. C.L.

Boring Surface Elev.: + 10.9

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: | 3 | IN. |
| | U-Sampler: Ball Sampler | O.D. | O.D. of Samp. Tube: | 3 | IN. |
| | Core Bit: | O.D. | O.D. of Rock Core: | | IN. |

| | | | | | | |
|---------------------------|-------|---------------|-----------------------|-----|------------|------|
| Casing Size: | 3 1/4 | Inches | From Depth of: | | To: | |
| Hollow Stem Auger: | | | From Depth of: | 0.0 | To: | 29.0 |

| | | | | | |
|-----------------------------|-------------|----------------------|------------------------|-----------------------|-----------------------|
| Water Level Readings | | | | | |
| Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| 6/19/2009 | | 8.0 | 6.0 | 4.1 | |

Pay Quantities:

| | | | | | |
|---------------------------------------|----|-------------|---|-------------------------------|------------|
| 2 1/2 in. Dia. Dry Sample Boring: | 51 | Ft.; | 3 | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | | U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | | | Core Drilling in Rock: | Ft. |

Boring Contractor: Walton Corporation
Driller: Gary Truver
Helpers: D. Zmijewski/J. Williams

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|----------------------------|
| | 6/19/09 | 1 | 0.0' | | Asphalt - 12". Augered to 2' to start SPT. | | |
| | | | 2.0' | | 0" RECOVERY | | |
| 3 | | 2 | 2.0' | 10 10 11 10 | Moist medium dense orangish brown silty coarse sand and gravel w/some fine sand. | A-2-4(0) | |
| | | | 4.0' | | 14" RECOVERY | | |
| | | 3 | 4.0' | 2 4 5 6 | Moist stiff brownish gray fine sandy silt w/ some clay and coarse sand, trace of gravel. | A-4(0) | Organics |
| 6 | | | 6.0' | | 14" RECOVERY | | |
| | | 4 | 6.0' | 4 2 2 2 | Wet soft gray fine to coarse sandy silt w/some clay, trace of gravel. | A-4(0) | Organics |
| | | | 8.0' | | 20" RECOVERY | | |
| 9 | | 5 | 8.0' | W/H W/H 1 2 | Wet soft gray clayey silt w/some fine sand, trace of coarse sand and gravel. | A-4(4) | Organics |
| | | | 10.0' | | 7" RECOVERY | | |
| | | U-1 | 10.0' | | Wet gray clayey silt w/some gravel, trace of fine sand. | A-4(5) | Press Sample - Shelby Tube |
| 12 | | | 12.0' | | 13" RECOVERY | | |
| | | 7 | 12.0' | 3 6 5 6 | Wet stiff gray silt w/some coarse to fine sand, trace of gravel. | A-4(2) | |
| | | | 14.0' | | 17" RECOVERY | | |
| 15 | | 8 | 14.0' | 1 2 | Wet firm gray clayey silt w/some fine sand, trace of coarse sand and gravel. | A-4(6) | |
| | | 8A | 15.0' | 5 5 | 12" RECOVERY No Sieve Analysis - Indication of saturated firm black organic silt. | | Possibly peat. |
| | | U-2 | 16.0' | | 12" RECOVERY | A-5(4) | Press Sample - Shelby Tube |

Remarks: Mud Rotary @ 29.0 feet

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-2-01

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|--|-------------|---------------------|
| 18 | | | 18.0' | | Wet gray silty peat w/trace of sand and gravel. 24" RECOVERY | | |
| | | 10 | 18.0' | 2 13 31 38 | Wet dense blackish gray gravel and fine to coarse sand w/trace of silt. 15" RECOVERY | A-1-b | Organics |
| 21 | | | 20.0' | | | | |
| 24 | | | 24.0' | W/R 1 2 3 | Wet very loose gray clayey fine sand w/trace of coarse sand and gravel. 24" RECOVERY | A-2-4(0) | |
| 27 | | | 26.0' | | | | |
| 30 | 6/22/09 | 12 | 29.0' | 4 8 10 14 | Wet medium dense gray silty fine sand w/trace of coarse sand and gravel. 23" RECOVERY | A-2-4(0) | Mud Rotary @ 29.0'. |
| 33 | | | 31.0' | | | | |
| 36 | | 13 | 34.0' | 5 8 9 11 | Wet very stiff gray fine sandy silt w/trace of coarse sand and gravel. 21" RECOVERY | A-4(0) | |
| 39 | | | 36.0' | | | | |
| 42 | | 14 | 39.0' | 6 7 7 9 | Wet medium dense gray fine sand w/trace of organic matter, silt, gravel and coarse sand. 21" RECOVERY | A-3 | |
| 45 | | | 41.0' | | | | |
| 45 | | 15 | 44.0' | 3 5 6 11 | Wet stiff gray clayey fine sandy silt w/some organic matter, trace of coarse sand and | A-4(0) | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-2-01

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|--|-------------|-------------|
| | | | 46.0' | | gravel. 20" RECOVERY | | |
| 48 | | | | | | | |
| | | 16 | 49.0' | 9 14 21 31 | Wet hard dark gray fine sandy silt w/some organic matter, trace of coarse sand and gravel. 24" RECOVERY | A-4(0) | Glauconitic |
| 51 | | | 51.0' | | | | |
| | | | | | End of Boring | | |
| 54 | | | | | | | |
| 57 | | | | | | | |
| 60 | | | | | | | |
| 63 | | | | | | | |
| 66 | | | | | | | |
| 69 | | | | | | | |
| 72 | | | | | | | |

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AUGUST 2015

KEY TO SYMBOLS

Symbol Description

Strata symbols



Silty sand



Poorly graded clayey
silty sand



Low plasticity
clay



Silty low plasticity
clay



Poorly graded sand



Silt



Poorly graded sand
with silt



Clayey sand

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AUGUST 2015

Notes:

1. Exploratory borings were drilled on 6/19/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-2-03

Contract: 28-113-01

Boring Location: Sta. 886+66, 35' Rt. C.L.

Boring Surface Elev.: +13.2

Reference:

Wt. of Casing Hammer:
Wt. of Sample Hammer: 140
Type of: D-Sampler: Split Barrel
S-Sampler:
U-Sampler:
Core Bit:

Lbs.
Lbs.
O.D.
O.D.
O.D.
O.D.

Average Fall:
Average Fall: 30
O.D. of Sampler: 2
O.D. of Samp. Tube:
O.D. of Samp. Tube:
O.D. of Rock Core:

IN.
IN.
IN.
IN.
IN.
IN.

Casing Size: 3 1/4
Hollow Stem Auger:

Inches

From Depth of:
From Depth of: 0.0

To:
To: 29.0

Water Level Readings

Date
6/19/2009

Time

Depth of Hole

6.0

Depth of Casing

4.0

Depth of Water

3.1

Elev. of Water

Pay Quantities:

2 1/2 in. Dia. Dry Sample Boring: 51

No. of 2 in. Dia. Shelby Tubes:

2 1/2 in. Dia. Contin. Sample Boring:

Ft.;

Ft.;

Dia. U-Sample Boring:

No. of U-Samples:

Core Drilling in Rock:

Ft.

Ft.

Boring Contractor: Walton Corporation

Driller: Gary Truver

Helpers: D. Zmijewski

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|----------------|
| | 6/19/09 | 1 | 0.0' | | DRAFT | | Asphalt - 12". |
| | | | 2.0' | | 0" RECOVERY | | |
| 3 | | 2 | 2.0' | 6 18 13 17 | Moist dense orange fine sand and gravel w/ some coarse sand, trace of silt. | A-3 | |
| | | | 4.0' | | 15" RECOVERY | | |
| | | 3 | 4.0' | 8 6 6 4 | Wet medium dense orange fine sand w/some silt, coarse sand and gravel. | A-2-4(0) | |
| 6 | | | 6.0' | | 14" RECOVERY | | |
| | | 4 | 6.0' | 4 6 8 10 | Wet medium dense orange fine to coarse sand w/trace of silt and gravel. | A-3 | |
| | | | 8.0' | | 18" RECOVERY | | |
| 9 | | 5 | 8.0' | 1 2 4 1 | Wet firm orange fine sandy silt w/some coarse sand, trace of gravel. | A-4(0) | |
| | | | 10.0' | | 12" RECOVERY | | |
| | | 6 | 10.0' | 4 3 4 5 | Wet loose orange fine sand w/some coarse sand and silt. | A-2-4(0) | |
| 12 | | | 12.0' | | 20" RECOVERY | | |
| | | 7 | 12.0' | 1 2 2 3 | Wet very loose orange silty fine sand w/some coarse sand. | A-2-4(0) | |
| | | | 14.0' | | 18" RECOVERY | | |
| 15 | | 8 | 14.0' | W/H W/H 1 1 | Wet very loose orange fine sand w/some coarse sand and silt, trace of gravel. | A-2-4(0) | |
| | | | 16.0' | | 16" RECOVERY | | |
| | | 9 | 16.0' | W/H 2 3 | Wet loose orange fine sand w/some coarse | A-3 | |

Remarks: Mud Rotary @ 29.0 feet

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-2-03

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|---|-------------|---------------------|
| 18 | | | 18.0' | 6 | sand, trace of silt and gravel. 22" RECOVERY | | |
| | | 10 | 18.0' | 1 2 4 5 | Wet loose brown silty fine sand w/some coarse sand, trace of gravel. 18" RECOVERY | A-2-4(0) | |
| 21 | | | 20.0' | | | | |
| 24 | | | | | | | |
| | | 11 | 24.0' | 4 4 6 6 | Wet loose gray silty fine sand w/trace of coarse sand, organic matter and gravel. 24" RECOVERY | A-2-4(0) | |
| 27 | | | 26.0' | | | | |
| | | 12 | 29.0' | 5 6 6 8 | Wet firm gray clayey fine sandy silt w/trace of coarse sand and organic matter. 21" RECOVERY | A-4(0) | Mud Rotary @ 29.0'. |
| 30 | | | 31.0' | | | | |
| 33 | | | | | | | |
| | | 13 | 34.0' | 4 7 7 7 | Wet medium dense gray silty fine sand w/ trace of coarse sand, organic matter and gravel. 20" RECOVERY | A-2-4(0) | |
| 36 | | | 36.0' | | | | |
| | | | | | | | |
| 39 | | | | | | | |
| | | 14 | 39.0' | 7 10 12 16 | Wet very stiff gray fine sandy silt w/trace of organic matter, coarse sand and gravel. 24" RECOVERY | A-4(0) | |
| 42 | | | 41.0' | | | | |
| | | | | | | | |
| 45 | | 15 | 44.0' | 7 12 22 23 | Wet dense gray fine sand w/some clay and organic matter, trace of coarse sand. | A-2-4(0) | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-2-03

Contract: 28-113-01

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|---------|
| | | | 46.0' | | 24" RECOVERY | | |
| 48 | | | | | | | |
| | | 16 | 49.0' | 12 15 24 34 | Wet hard gray clayey fine sandy silt w/some organic matter, trace of coarse sand. | A-4(0) | |
| 51 | | | 51.0' | | 24" RECOVERY | | |
| | | | | | End of Boring | | |
| 54 | | | | | | | |
| 57 | | | | | | | |
| 60 | | | | | | | |
| 63 | | | | | | | |
| 66 | | | | | | | |
| 69 | | | | | | | |
| 72 | | | | | | | |

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NOT FOR BIDDING
AUGUST 2015

KEY TO SYMBOLS

Symbol Description

Strata symbols



Poorly graded sand
with silt



Silty sand



Poorly graded clayey
silty sand

DRAFT
NOT FOR BIDDING
AUGUST 2015

Notes:

1. Exploratory borings were drilled on 6/19/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-2-05

Contract: 28-113-01

Boring Location: Sta. 889+66, 35' Rt. C.L.

Boring Surface Elev.: + 21.2

Reference:

Wt. of Casing Hammer:
Wt. of Sample Hammer: 140
Type of: D-Sampler: Split Barrel
S-Sampler:
U-Sampler:
Core Bit:

Lbs.
Lbs.
O.D.
O.D.
O.D.
O.D.

Average Fall:
Average Fall: 30
O.D. of Sampler: 2
O.D. of Samp. Tube:
O.D. of Samp. Tube:
O.D. of Rock Core:

IN.
IN.
IN.
IN.
IN.
IN.

Casing Size: 3 1/4
Hollow Stem Auger:

Inches

From Depth of:
From Depth of: 0.0

To:
To: 20.0

Water Level Readings

Date
7/7/2009

Time

Depth of Hole
12.0

Depth of Casing
10.0

Depth of Water
8.5

Elev. of Water

Pay Quantities:

2 1/2 in. Dia. Dry Sample Boring: 51
No. of 2 in. Dia. Shelby Tubes:
2 1/2 in. Dia. Contin. Sample Boring:

Ft.;
Ft.;

No. of:
Core Drilling in Rock:

Dia. U-Sample Boring:
U-Samples:

Ft.
Ft.

Boring Contractor: Walton Corporation

Driller: Gary Truver

Helpers: M. Derr

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|--------------------|--|-------------|---|
| | 7/7/09 | 1 | 0.0' | | Moist brown gravel w/some coarse to fine sand, trace of silt. | A-1-a | Asphalt - 12". Crusher Run - 12". Sample from Auger Cuttings. |
| | | | 2.0' | | 0" RECOVERY | | |
| 3 | | 2 | 2.0' | 13 4 4 4 | Moist firm brown silt w/some fine to coarse sand and clay, trace of gravel. | A-4(1) | |
| | | | 4.0' | | 16" RECOVERY | | |
| | | 3 | 4.0' | 7 6 7 11 | Moist medium dense brown coarse sand and gravel w/some fine sand and silt. | A-1-b | |
| 6 | | | 6.0' | | 18" RECOVERY | | |
| | | 4 | 6.0' | 13 11 7 6 | Moist medium dense brown fine to coarse sand w/trace of clay and gravel. | A-2-4(0) | |
| | | | 8.0' | | 20" RECOVERY | | |
| 9 | | 5 | 8.0' | 5 6 6 7 | Wet medium dense brown fine sand w/some silt, trace of coarse sand and gravel. | A-2-4(0) | |
| | | | 10.0' | | 20" RECOVERY | | |
| | | 6 | 10.0' | 6 7 8 9 | Wet medium dense brown fine sand w/some silt and coarse sand. | A-2-4(0) | |
| 12 | | | 12.0' | | 24" RECOVERY | | |
| | | 7 | 12.0' | 3 4 6 6 | Wet loose brown fine sand w/some coarse sand and silt, trace of gravel. | A-2-4(0) | |
| | | | 14.0' | | 20" RECOVERY | | |
| 15 | | 8 | 14.0' | 2 2 2 2 | Wet very loose brown fine to coarse sand w/some silt, trace of gravel. | A-2-4(0) | |
| | | | 16.0' | | 24" RECOVERY | | |
| | | 9 | 16.0' | 1 1 1 | Wet very loose brown fine sand w/some | A-2-4(0) | |

Remarks: Mud Rotary @ 20.0 feet

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-2-05

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|------------------|--|-------------|---------------------|
| 18 | | | 18.0' | 1 | coarse sand and silt. 24" RECOVERY | | |
| | | 10 | 18.0' | 1 1 2 3 | Wet very loose brown fine sand w/some coarse sand, trace of silt and gravel. 24" RECOVERY | A-3 | Mud Rotary @ 20.0'. |
| 21 | | | 20.0' | | | | |
| 24 | | | | | | | |
| | | 11 | 24.0' | 2 3 5 4 | Wet loose grayish green mottled clayey fine sand w/some coarse sand, trace of organic matter. 20" RECOVERY | A-2-4(0) | |
| | | | 26.0' | | | | |
| 27 | | | | | | | |
| | | 12 | 29.0' | 2 2 3 3 | Wet firm grayish green mottled clayey fine sandy silt w/trace of coarse sand and organic matter. 24" RECOVERY | A-4(0) | |
| 30 | | | 31.0' | | | | |
| 33 | | | | | | | |
| | | 13 | 34.0' | 2 2 3 3 | Wet firm grayish green clayey fine sandy silt w/trace of coarse sand, organic matter and gravel. 24" RECOVERY | A-4(0) | |
| 36 | | | 36.0' | | | | |
| 39 | | | | | | | |
| | | 14 | 39.0' | 6 6 7 7 | Wet medium dense grayish green fine sand w/ some silt and gravel, trace of coarse sand. 14" RECOVERY | A-2-4(0) | |
| | | | 41.0' | | | | |
| 42 | | | | | | | |
| | | 15 | 44.0' | 4 5 6 7 | Wet medium dense grayish green silty fine sand w/some coarse sand, trace of organic | A-2-4(0) | |
| 45 | | | | | | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-2-05

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|--------------------|---|-------------|---------|
| | | | 46.0' | | matter and gravel. 20" RECOVERY | | |
| 48 | | | | | | | |
| | | 16 | 49.0' | 5 9 11 13 | Wet very stiff grayish green clayey fine sandy silt w/some organic matter, trace of coarse sand and gravel. | A-4(1) | |
| 51 | | | 51.0' | | 24" RECOVERY | | |
| | | | | | End of Boring | | |
| 54 | | | | | | | |
| 57 | | | | | | | |
| 60 | | | | | | | |
| 63 | | | | | | | |
| 66 | | | | | | | |
| 69 | | | | | | | |
| 72 | | | | | | | |

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KEY TO SYMBOLS

Symbol Description

Strata symbols



Well graded gravel



Silty low plasticity
clay



Silty sand



Poorly graded sand
with silt



Poorly graded sand



Clayey sand



Poorly graded clayey
silty sand

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Notes:

1. Exploratory borings were drilled on 7/7/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-2-07A

Contract: 28-113-01

Boring Location: Sta. 892+66, 30' Rt. C.L.

Boring Surface Elev.: +25.9

Reference:

Wt. of Casing Hammer:
Wt. of Sample Hammer: 140
Type of: D-Sampler: Split Barrel
S-Sampler:
U-Sampler:
Core Bit:

Lbs.
Lbs.
O.D.
O.D.
O.D.
O.D.

Average Fall:
Average Fall: 30
O.D. of Sampler: 2
O.D. of Samp. Tube:
O.D. of Samp. Tube:
O.D. of Rock Core:

IN.
IN.
IN.
IN.
IN.

Casing Size: 3 1/4
Hollow Stem Auger:

Inches

From Depth of:
From Depth of: 0.0

To:
To: 29.0

Water Level Readings

Date
7/8/2009

Time

Depth of Hole

14.0

Depth of Casing

12.0

Depth of Water

12.3

Elev. of Water

Pay Quantities:

2 1/2 in. Dia. Dry Sample Boring: 51
No. of 2 in. Dia. Shelby Tubes:
2 1/2 in. Dia. Contin. Sample Boring:

Ft.;
Ft.;

No. of:
Core Drilling in Rock:

Dia. U-Sample Boring:
U-Samples:

Ft.
Ft.

Boring Contractor: Walton Corporation

Driller: Gary Truver

Helpers: J. Williams

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|-------------------------------------|
| | 7/8/09 | 1 | 0.0' | | 0" RECOVERY | | Asphalt - 12". Crushed Stone - 12". |
| 3 | | 2 | 2.0' | 12 11 10 7 | Moist very stiff brown clayey silt w/some fine to coarse sand. | A-4(4) | |
| 6 | | 3 | 4.0' | 5 10 16 16 | Moist medium dense brown fine to coarse sand w/some silt and gravel. | A-2-4(0) | |
| | | 4 | 6.0' | 5 11 19 19 | Moist very stiff brown clayey coarse to fine sandy silt w/trace of gravel. | A-4(1) | |
| 9 | | 5 | 8.0' | 6 11 12 13 | Moist medium dense brown coarse to fine sand w/some silt, trace of gravel. | A-2-4(0) | |
| | | 6 | 10.0' | 14 12 12 33 | Moist medium dense brown coarse to fine sand w/some silt, trace of gravel. | A-2-4(0) | |
| 12 | | 7 | 12.0' | 8 9 7 9 | Wet medium dense brown fine to coarse sand w/some gravel, trace of silt. | A-3 | |
| | | 8 | 14.0' | 2 4 6 8 | Wet loose brown fine sand w/some coarse sand, trace of silt. | A-3 | |
| 15 | | 9 | 16.0' | 7 8 9 | Wet medium dense brown fine sand w/some | A-2-4(0) | |

Remarks: Mud Rotary @ 29.0 feet

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-2-07A

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|--------------------|--|-------------|---------------------|
| 18 | | | 18.0' | 8 | silt and coarse sand. 21" RECOVERY | | |
| | | 10 | 18.0' | 2 4 6 8 | Wet loose brown fine sand w/some silt and coarse sand. 17" RECOVERY | A-2-4(0) | |
| 21 | | | 20.0' | | | | |
| 24 | | 11 | 24.0' | W/R 3 2 3 | Wet loose brown fine sand w/some coarse sand and silt, trace of gravel. 15" RECOVERY | A-2-4(0) | |
| 27 | | | 26.0' | | | | |
| 30 | | 12 | 29.0' | 4 4 6 6 | Wet loose brownish black clayey fine sand w/ some coarse sand, trace of gravel. 20" RECOVERY | A-2-4(0) | Mud Rotary @ 29.0'. |
| 33 | | | 31.0' | | | | |
| 36 | | 13 | 34.0' | 4 4 6 6 | Wet loose gray silty fine sand w/some coarse sand, trace of organic matter. 19" RECOVERY | A-2-4(0) | |
| 39 | | | 36.0' | | | | |
| 42 | | 14 | 39.0' | 3 3 5 6 | Wet firm gray fine sandy clay w/trace of coarse sand, organic matter and gravel. 24" RECOVERY | A-6(0) | |
| | | | 41.0' | | | | |
| 45 | | 15 | 44.0' | 4 5 5 5 | Wet loose gray silty fine sand w/trace of coarse sand, organic matter and gravel. | A-2-4(0) | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-2-07A

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|------------------|---|-------------|---------|
| | | | 46.0' | | 19" RECOVERY | | |
| 48 | | | | | | | |
| | | 16 | 49.0' | 4 6 8 8 | Wet stiff gray fine sandy silt w/trace of organic matter, coarse sand and gravel. | A-4(0) | |
| 51 | | | 51.0' | | 21" RECOVERY | | |
| | | | | | End of Boring | | |
| 54 | | | | | | | |
| 57 | | | | | | | |
| 60 | | | | | | | |
| 63 | | | | | | | |
| 66 | | | | | | | |
| 69 | | | | | | | |
| 72 | | | | | | | |

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AUGUST 2015

KEY TO SYMBOLS

Symbol Description

Strata symbols



Low plasticity
clay



Silty sand



Clayey sand



Poorly graded sand
with silt



Poorly graded clayey
silty sand

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Notes:

1. Exploratory borings were drilled on 7/8/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-2-09

Contract: 28-113-01

Boring Location: Sta. 895+66, 30' Rt. C.L.

Boring Surface Elev.: + 31.4

Reference:

Wt. of Casing Hammer:
Wt. of Sample Hammer: 140
Type of: D-Sampler: Split Barrel
S-Sampler:
U-Sampler:
Core Bit:

Lbs.
Lbs.
O.D.
O.D.
O.D.
O.D.

Average Fall:
Average Fall: 20
O.D. of Sampler: 2
O.D. of Samp. Tube:
O.D. of Samp. Tube:
O.D. of Rock Core:

IN.
IN.
IN.
IN.
IN.

Casing Size: 3 1/4
Hollow Stem Auger:

Inches

From Depth of:
From Depth of: 0.0

To:
To: 18.0

Water Level Readings

| Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
|-----------|------|---------------|-----------------|----------------|----------------|
| 6/26/2009 | | 12.0 | 10.0 | 8.7 | |

Pay Quantities:

| | | | | |
|---------------------------------------|----|------|------------------------|-----|
| 2 1/2 in. Dia. Dry Sample Boring: | 50 | Ft.; | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | Ft. |

Boring Contractor: Walton Corporation
Driller: Jason Truver
Helpers: J. Williams

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|----------------|
| | 6/26/09 | 1 | 0.5' | 2 3 11 | Moist stiff brown silt w/some clay and fine to coarse sand, trace of gravel. 14" RECOVERY | A-4(1) | Topsoil - 5". |
| 3 | | 2 | 2.0' | 8 9 9 11 | Moist medium dense silty coarse to fine sand w/trace of gravel. 14" RECOVERY | A-2-4(0) | |
| | | 3 | 4.0' | 9 11 12 11 | Moist medium dense tan silty coarse to fine sand w/trace of gravel. 15" RECOVERY | A-2-4(0) | |
| 6 | | 4 | 6.0' | 13 13 11 10 | Moist medium dense tan fine to coarse sand w/trace of silt. 16" RECOVERY | A-3 | |
| 9 | | 5 | 8.0' | 5 7 8 9 | Moist medium dense brown fine to coarse sand w/some silt, trace of gravel. 14" RECOVERY | A-2-4(0) | |
| | | 6 | 10.0' | 11 8 7 11 | Wet medium dense brown fine to coarse sand w/some silt, trace of gravel. 18" RECOVERY | A-2-4(0) | |
| 12 | | 7 | 12.0' | 11 7 7 7 | Wet medium dense brown fine sand w/some coarse sand and gravel, trace of silt. 15" RECOVERY | A-3 | Cemented sands |
| | | 8 | 14.0' | 4 5 8 8 | Wet medium dense brown fine sand w/some coarse sand, trace of silt and gravel. 16" RECOVERY | A-3 | |
| 15 | | 9 | 16.0' | 5 8 7 11 | Wet medium dense brown fine sand w/some coarse sand, trace of silt and gravel. | A-3 | |

Remarks: Mud Rotary @ 18.0 feet

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-2-09

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|---|-------------|---------------------|
| 18 | | | 18.0' | | 19" RECOVERY | | |
| | | 10 | 18.0' | 3 4 4 5 | Wet loose brown fine sand w/some coarse sand, trace of silt. | A-3 | Mud Rotary @ 18.0'. |
| | | | 20.0' | | 21" RECOVERY | | |
| 21 | | | | | | | |
| | | 11 | 23.0' | 5 4 8 11 | Wet medium dense brown clayey fine sand w/ some coarse sand. | A-2-4(0) | |
| 24 | | | 25.0' | | 17" RECOVERY | | |
| | | | | | | | |
| 27 | | | | | | | |
| | | 12 | 28.0' | 4 6 9 11 | No Sieve Analysis - Indication of wet medium dense gray clayey sand w/trace of organic matter and gravel. | | |
| 30 | | | 30.0' | | 20" RECOVERY | | |
| | | | | | | | |
| 33 | | | | | | | |
| | | 13 | 33.0' | 6 7 15 18 | Wet medium dense gray clayey fine sand w/ trace of coarse sand, organic matter and gravel. | A-2-4(0) | |
| | | | 35.0' | | 16" RECOVERY | | |
| 36 | | | | | | | |
| | | 14 | 38.0' | 9 10 16 20 | Wet medium dense gray silty fine sand w/ trace of coarse sand, organic matter and gravel. | A-2-4(0) | |
| 39 | | | 40.0' | | 22" RECOVERY | | |
| | | | | | | | |
| 42 | | | | | | | |
| | | 15 | 43.0' | 9 13 18 23 | Wet hard gray fine sandy silt w/trace of organic matter and coarse sand. | A-4(0) | |
| 45 | | | 45.0' | | 15" RECOVERY | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-2-09

Contract: 28-113-01


| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|---|-------------|---------|
| 48 | | | | | | | |
| | | 16 | 48.0' | 7 11 12 14 | Wet medium dense gray clayey fine sandy silt w/trace of organic matter, coarse sand and gravel. 18" RECOVERY | A-4(1) | |
| | | | 50.0' | | End of Boring | | |
| 51 | | | | | | | |
| 54 | | | | | | | |
| 57 | | | | | | | |
| 60 | | | | | | | |
| 63 | | | | | | | |
| 66 | | | | | | | |
| 69 | | | | | | | |
| 72 | | | | | | | |


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KEY TO SYMBOLS


Symbol Description


Strata symbols


 Silty low plasticity clay

 Silty sand

 Poorly graded sand with silt

 Poorly graded sand

 Clayey sand

 Poorly graded clayey silty sand

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Notes:

1. Exploratory borings were drilled on 6/26/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-2-11

Contract: 28-113-01

Boring Location: Sta. 898+68, 12' Rt. C.L.

Boring Surface Elev.: + 35.5

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: | | To: | |
| Hollow Stem Auger: | | From Depth of: 0.0 | | To: 18.0 | |

| | | | | | | |
|-----------------------------|-------------|-------------|----------------------|------------------------|-----------------------|-----------------------|
| Water Level Readings | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| | 6/24/2009 | | 18.0 | 16.0 | 15.9 | |

Pay Quantities:

| | | | | |
|---------------------------------------|----|-------------|-------------------------------|------------|
| 2 1/2 in. Dia. Dry Sample Boring: | 51 | Ft.; | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | Ft. |

Boring Contractor: Walton Corporation
Driller: Jason Truver
Helpers: D. Zmijewski

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|---------------|
| | 6/24/09 | 1 | 0.5' | 7 8 14 | Moist very stiff brown silt w/some coarse to fine sand and clay, trace of gravel. 11" RECOVERY | A-4(1) | Topsoil - 3". |
| 3 | | 2 | 2.0' | 21 17 19 21 | Moist dense orange coarse to fine sand and gravel w/trace of silt. 16" RECOVERY | A-1-b | |
| | | 3 | 4.0' | 7 11 12 14 | Moist medium dense orange fine to coarse sand w/some silt. 18" RECOVERY | A-2-4(0) | |
| 6 | | 4 | 6.0' | 11 10 9 9 | Moist medium dense orange fine to coarse sand w/some silt, trace of gravel. 24" RECOVERY | A-2-4(0) | |
| 9 | | 5 | 8.0' | 3 4 5 4 | Moist loose yellowish orange silty fine to coarse sand w/trace of gravel. 20" RECOVERY | A-2-4(0) | |
| | | 6 | 10.0' | 10 10 8 8 | Moist medium dense orangish tan fine to coarse sand w/trace of silt and gravel. 24" RECOVERY | A-3 | |
| 12 | | 7 | 12.0' | 5 8 8 9 | Moist medium dense orange fine to coarse sand w/some silt, trace of gravel. 21" RECOVERY | A-2-4(0) | |
| | | 8 | 14.0' | 7 8 6 8 | Moist medium dense orange coarse to fine sand w/trace of silt and gravel. 18" RECOVERY | A-1-b | |
| 15 | | 9 | 16.0' | 13 14 16 16 | Wet medium dense orange fine to coarse sand and gravel w/some silt. | A-1-b | |

Remarks: Mud Rotary @ 18.0 feet.

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-2-11

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|-------------------|--|-------------|-----------------------------|
| 18 | | | 18.0' | | 19" RECOVERY | | |
| | | 10 | 18.0' | 7 8 4 7 | No Sample Recovery | | |
| | | | 20.0' | | 0" RECOVERY | | |
| 21 | | | | | | | |
| | | 11 | 23.0' | 1 2 3 2 | Wet loose orange fine sand w/some silt and coarse sand. | A-2-4(0) | |
| 24 | | | 25.0' | | 21" RECOVERY | | |
| | | | | | | | |
| 27 | | | | | | | |
| | | 12 | 28.0' | 2 2 3 4 | Wet loose brown to gray silty fine sand w/ some coarse sand, trace of organic matter and gravel. | A-2-4(0) | |
| 30 | | | 30.0' | | 24" RECOVERY | | |
| | | | | | | | |
| 33 | | 13 | 33.0' | 2 3 3 4 | Wet loose gray fine sand w/some clay, trace of coarse sand and gravel. | A-2-4(0) | |
| | | | 35.0' | | 24" RECOVERY | | |
| 36 | | U-1 | 35.0' | | No Sample Recovery | | Press Sample - Shelby Tube. |
| | | | 37.0' | | 0" RECOVERY | | |
| | | 14 | 37.0' | 3 4 5 5 | No Sample Recovery | | |
| 39 | | | 39.0' | | 0" RECOVERY | | |
| | | | | | | | |
| 42 | | | | | | | |
| | | 15 | 44.0' | 5 5 5 10 | Wet loose gray silty fine sand w/trace of coarse sand and gravel. | A-2-4(0) | |
| 45 | | | | | | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-2-11

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|--------------------|--|-------------|---------|
| | | | 46.0' | | 24" RECOVERY | | |
| 48 | | | | | | | |
| | | 16 | 49.0' | 4 8 10 10 | Wet medium dense gray silty fine sand w/ trace of coarse sand and gravel. | A-2-4(0) | |
| 51 | | | 51.0' | | 24" RECOVERY | | |
| | | | | | End of Boring | | |
| 54 | | | | | | | |
| 57 | | | | | | | |
| 60 | | | | | | | |
| 63 | | | | | | | |
| 66 | | | | | | | |
| 69 | | | | | | | |
| 72 | | | | | | | |

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NOT FOR BIDDING
AUGUST 2015

KEY TO SYMBOLS

Symbol Description

Strata symbols



Silty low plasticity
clay



Poorly graded sand
with silt



Silty sand



Poorly graded clayey
silty sand

DRAFT
NOT FOR BIDDING
AUGUST 2015

Notes:

1. Exploratory borings were drilled on 6/24/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-2-13

Contract: 28-113-01

Boring Location: Sta. 901+70, 4' Rt. C.L.

Boring Surface Elev.: + 34.0

Reference:

Wt. of Casing Hammer:
Wt. of Sample Hammer: 140
Type of: D-Sampler: Split Barrel
S-Sampler:
U-Sampler:
Core Bit:

Lbs.
Lbs.
O.D.
O.D.
O.D.
O.D.

Average Fall:
Average Fall: 30
O.D. of Sampler: 2
O.D. of Samp. Tube:
O.D. of Samp. Tube:
O.D. of Rock Core:

IN.
IN.
IN.
IN.
IN.
IN.

Casing Size: 3 1/4
Hollow Stem Auger:

Inches

From Depth of:
From Depth of: 0.0

To:
To: 18.0

Water Level Readings

| Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
|-----------|------|---------------|-----------------|----------------|----------------|
| 6/25/2009 | | 20.0 | 18.0 | 17.3 | |

Pay Quantities:

| | | | | |
|---------------------------------------|------|------|------------------------|-----|
| 2 1/2 in. Dia. Dry Sample Boring: | 60.0 | Ft.; | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | Ft. |

Boring Contractor: Walton Corporation

Driller: Jason Truver

Helpers: D. Zmijewski

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|------------------|---|-------------|-------------------|
| | 6/25/09 | 1 | 0.0' | 3 4 4 5 | Moist firm brown clayey fine sandy silt w/ trace of coarse sand and gravel. | A-4(2) | Forest Duff - 2". |
| | | | 2.0' | | 14" RECOVERY | | |
| 3 | | 2 | 2.0' | 4 4 4 8 | Moist firm brown clayey silt w/some fine to coarse sand. | A-4(3) | |
| | | | 4.0' | | 17" RECOVERY | | |
| | | 3 | 4.0' | 5 6 8 8 | Moist medium dense tan clayey coarse to fine sand w/some gravel. | A-2-4(0) | |
| 6 | | | 6.0' | | 15" RECOVERY | | |
| | | 4 | 6.0' | 8 9 8 8 | Moist medium dense orange fine to coarse sand w/some silt. | A-2-4(0) | |
| | | | 8.0' | | 19" RECOVERY | | |
| 9 | | 5 | 8.0' | 3 5 6 7 | Moist medium dense brown fine to coarse sand w/some silt, trace of gravel. | A-2-4(0) | |
| | | | 10.0' | | 16" RECOVERY | | |
| | | 6 | 10.0' | 4 9 7 7 | Moist medium dense orange fine to coarse sand w/some silt. | A-2-4(0) | |
| 12 | | | 12.0' | | 20" RECOVERY | | |
| | | 7 | 12.0' | 4 5 8 6 | Moist medium dense orange coarse to fine sand w/some silt, trace of gravel. | A-1-b | |
| | | | 14.0' | | 20" RECOVERY | | |
| 15 | | 8 | 14.0' | 5 6 6 7 | Moist medium dense orange coarse to fine sand w/some silt, trace of gravel. | A-1-b | |
| | | | 16.0' | | 19" RECOVERY | | |
| | | 9 | 16.0' | 9 8 7 | Moist medium dense orange silty coarse to | A-2-4(0) | |

Remarks: Mud Rotary @ 18.0 feet

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-2-13

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|---|-------------|---------------------------------------|
| 18 | | | 18.0' | 10 | fine sand w/trace of gravel. 20" RECOVERY | | |
| | | 10 | 18.0' | 8 10 10 13 | Wet medium dense orange fine to coarse sand w/trace of silt and gravel. 14" RECOVERY | A-3 | Mud Rotary @ 18.0'. Cemented sands |
| 21 | | | 20.0' | | | | |
| 24 | | | | | | | |
| | | 11 | 24.0' | 5 6 5 7 | Wet medium dense brown fine sand w/some coarse sand, trace of silt and gravel. 18" RECOVERY | A-3 | Cemented sands |
| 27 | | | 26.0' | | | | |
| 30 | | 12 | 29.0' | 4 5 5 6 | Wet loose orange fine sand w/some coarse sand and silt. 20" RECOVERY | A-2-4(0) | |
| | | | 31.0' | | | | |
| 33 | | | | | | | |
| | | 13 | 34.0' | 1 2 2 3 | Wet very loose orange fine sand w/some silt and coarse sand. 24" RECOVERY | A-2-4(0) | |
| 36 | | | 36.0' | | | | |
| 39 | | | | | | | |
| | | 14 | 39.0' | 2 4 5 5 | Wet loose grayish orange mottled silty fine sand w/trace of coarse sand and gravel. 18" RECOVERY | A-2-4(0) | |
| 42 | | | 41.0' | | | | |
| | | | | | | | |
| 45 | | 15 | 44.0' | 4 5 10 15 | Wet medium dense gray clayey fine sand w/trace of coarse sand and gravel. | A-2-4(0) | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-2-13

Contract: 28-113-01







| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|---------|
| | | | 46.0' | | 24" RECOVERY | | |
| 48 | | | | | | | |
| | | 16 | 49.0' | 1 1 2 1 | Wet very loose brown fine sand w/trace of silt, coarse sand and gravel. | A-3 | |
| 51 | | | 51.0' | | 24" RECOVERY | | |
| | | | | | | | |
| 54 | | | | | | | |
| | | 17 | 54.0' | 10 10 10 11 | Wet very stiff gray clayey fine sandy silt w/ trace of coarse sand and gravel. | A-4(0) | |
| | | | 56.0' | | 24" RECOVERY | | |
| 57 | | | | | | | |
| | | 18 | 58.0' | 8 8 9 10 | Wet very stiff gray clayey fine sandy silt w/ some organic matter. | A-4(1) | |
| 60 | | | 60.0' | | 24" RECOVERY | | |
| | | | | | End of Boring | | |
| 63 | | | | | | | |
| | | | | | | | |
| 66 | | | | | | | |
| | | | | | | | |
| 69 | | | | | | | |
| | | | | | | | |
| 72 | | | | | | | |

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KEY TO SYMBOLS

Symbol Description

Strata symbols

| | |
|--|------------------------------------|
|  | Low plasticity clay |
|  | Silty low plasticity clay |
|  | Clayey sand |
|  | Silty sand |
|  | Poorly graded sand with silt |
|  | Poorly graded clayey silty sand |

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Notes:

1. Exploratory borings were drilled on 6/25/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-2-15

Contract: 28-113-01

Boring Location: Sta. 904+73, 7' Rt. C.L.

Boring Surface Elev.: + 36.6

Reference:

Wt. of Casing Hammer:
Wt. of Sample Hammer: 140
Type of: D-Sampler: Split Barrel
S-Sampler:
U-Sampler:
Core Bit:

Lbs.
Lbs.
O.D.
O.D.
O.D.
O.D.

Average Fall:
Average Fall: 30
O.D. of Sampler: 2
O.D. of Samp. Tube:
O.D. of Samp. Tube:
O.D. of Rock Core:

IN.
IN.
IN.
IN.
IN.
IN.

Casing Size: 3 1/4
Hollow Stem Auger: Inches

From Depth of:
From Depth of: 0.0
To:
To: 29.0

Water Level Readings

| Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
|-----------|------|---------------|-----------------|----------------|----------------|
| 6/25/2009 | | 24.0 | 24.0 | 20.4 | |

Pay Quantities:

| | | | | |
|---------------------------------------|----|------|------------------------|-----|
| 2 1/2 in. Dia. Dry Sample Boring: | 51 | Ft.; | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | Ft. |

Boring Contractor: Walton Corporation

Driller: Gary Truver

Helpers: J. Williams

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|---------------|
| | 6/25/09 | 1 | 0.5' | 12 11 12 | Moist very stiff brown clayey fine to coarse sandy silt w/trace of gravel. 14" RECOVERY | A-4(0) | Topsoil - 5". |
| 3 | | 2 | 2.0' | 11 14 16 16 | Moist very stiff grayish brown clay w/trace of fine to coarse sand and gravel. 16" RECOVERY | A-6(11) | |
| | | 3 | 4.0' | 2 6 11 27 | Moist very stiff brown clayey silt w/trace of fine to coarse sand and gravel. 13" RECOVERY | A-4(8) | |
| 6 | | 4 | 6.0' | 21 28 25 22 | Moist very dense silty coarse to fine sand w/trace of gravel. 19" RECOVERY | A-2-4(0) | |
| | | 5 | 8.0' | 7 12 13 11 | Moist medium dense brown fine to coarse sand w/some silt, trace of gravel. 17" RECOVERY | A-2-4(0) | |
| 9 | | 6 | 10.0' | 9 8 8 9 | Moist medium dense brown fine to coarse sand w/some silt, trace of gravel. 20" RECOVERY | A-2-4(0) | |
| 12 | | 7 | 12.0' | 5 10 12 12 | Moist medium dense brown fine to coarse sand w/some silt, trace of gravel. 18" RECOVERY | A-2-4(0) | |
| | | 8 | 14.0' | 6 10 10 9 | Moist medium dense tan coarse to fine sand w/some silt, trace of gravel. 17" RECOVERY | A-2-4(0) | |
| 15 | | 9 | 16.0' | 6 6 9 10 | Moist medium dense tan fine to coarse sand w/some silt, trace of gravel. | A-2-4(0) | |

Remarks: Mud Rotary @ 29.0 feet

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-2-15

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|---------------------|
| 18 | | | 18.0' | | 19" RECOVERY | | |
| | | 10 | 18.0' | 8 13 13 15 | Wet medium dense tan fine to coarse sand w/ some silt, trace of gravel. | A-2-4(0) | |
| | | | 20.0' | | 18" RECOVERY | | |
| 21 | | | | | | | |
| | | | | | | | |
| 24 | | | | | | | |
| | | 11 | 24.0' | W/R 3 8 10 | Wet medium dense tan coarse sand and gravel w/trace of fine sand and silt. | A-1-b | |
| | | | 26.0' | | 16" RECOVERY | | |
| 27 | | | | | | | |
| | | | | | | | |
| 30 | | 12 | 29.0' | 41 22 17 15 | Wet dense tan coarse sand and gravel w/trace of silt and fine sand. | A-1-b | |
| | | | 31.0' | | 14" RECOVERY | | |
| 33 | | | | | | | |
| | | | | | | | |
| 36 | | 13 | 34.0' | 15 15 15 20 | Wet medium dense tan coarse sand w/some gravel and fine sand, trace of silt. | A-1-b | |
| | | | 36.0' | | 17" RECOVERY | | |
| 39 | | | | | | | |
| | | 14 | 39.0' | 16 22 26 44 | Wet dense tan coarse sand w/some gravel and fine sand, trace of silt. | A-1-b | Mud Rotary @ 39.0'. |
| | | | 41.0' | | 13" RECOVERY | | |
| 42 | | | | | | | |
| | | | | | | | |
| 45 | | 15 | 44.0' | 25 45 50/5" | Wet very dense tan coarse sand and gravel w/ trace of silt and fine sand. | A-1-b | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-2-15

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|---------|
| | | | 46.0' | | 16" RECOVERY | | |
| 48 | | | | | | | |
| | | 16 | 49.0' | 10 15 19 20 | Wet dense brown fine sand w/some silt, trace of coarse sand and gravel. | A-2-4(0) | |
| 51 | | | 51.0' | | 18" RECOVERY | | |
| | | | | | End of Boring | | |
| 54 | | | | | | | |
| 57 | | | | | | | |
| 60 | | | | | | | |
| 63 | | | | | | | |
| 66 | | | | | | | |
| 69 | | | | | | | |
| 72 | | | | | | | |

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KEY TO SYMBOLS

Symbol Description

Strata symbols



Poorly graded clayey
silty sand



Low plasticity
clay



Silty sand



Poorly graded sand



Well graded sand
with silt

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AUGUST 2015

Notes:

1. Exploratory borings were drilled on 6/25/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-3-01

Contract: 28-113-01

Boring Location: Sta. 726+50, 10.00' Lt. C.L.

Boring Surface Elev.: + 25.0

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: | | To: | |
| Hollow Stem Auger: | | From Depth of: 0.0 | | To: 49.0 | |

| | | | | | |
|-----------------------------|-----------------------|----------------------|------------------------|-----------------------|-----------------------|
| Water Level Readings | | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| Date 1/19/2009 | Time 8:00 a.m. | 10.0' | 8.0' | 9.8' | |

Pay Quantities:

| | | | | |
|---------------------------------------|------|-------------|-------------------------------|------------|
| 2 1/2 in. Dia. Dry Sample Boring: | 51.0 | Ft.; | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | | Core Drilling in Rock: | Ft. |

Boring Contractor: Walton Corporation
Driller: Gary Truver
Helpers:

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|---------------|
| | 1/19/09 | 1 | 0.5' | 15 16 20 | Moist dense brown fine to coarse sand w/ some clay, trace of gravel. 12" RECOVERY | A-2-4(0) | Topsoil - 4". |
| 3 | | 2 | 2.0' | 7 10 18 16 | Moist very stiff brown coarse to fine sandy silt w/some clay and gravel. 13" RECOVERY | A-4(0) | |
| | | 3 | 4.0' | 2 4 5 7 | Moist stiff brown clayey silt w/some fine sand, trace of coarse sand and gravel. 16" RECOVERY | A-4(4) | |
| 6 | | 4 | 6.0' | 12 12 12 12 | Moist medium dense orange coarse to fine sand w/some silt, trace of gravel. 18" RECOVERY | A-2-4(0) | |
| 9 | | 5 | 8.0' | 9 10 9 13 | Wet medium dense orange fine sand w/some coarse sand and silt, trace of gravel. 18" RECOVERY | A-2-4(0) | |
| | | 6 | 10.0' | 17 8 7 5 | Wet medium dense orange fine to coarse sand w/some gravel and silt. 18" RECOVERY | A-2-4(0) | |
| 12 | | 7 | 12.0' | 1 2 3 5 | saturated loose orange fine sand w/some silt and coarse sand, trace of gravel. 16" RECOVERY | A-2-4(0) | |
| | | 8 | 14.0' | 9 8 8 10 | Saturated medium dense orange fine sand w/ some coarse sand and silt, trace of gravel. 18" RECOVERY | A-2-4(0) | |
| 15 | | 9 | 16.0' | 10 10 8 11 | Saturated medium dense orange fine sand w/ some coarse sand, trace of silt and gravel. | A-3 | |

Remarks:

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3-01

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|----------------|---------------------|---|-------------|---------|
| 18 | | | 18.0' | | 13" RECOVERY | | |
| | | 10 | 18.0' | 6 10 14 14 | Saturated medium dense orange fine sand w/ some coarse sand, trace of silt and gravel. | A-3 | |
| | | | 20.0' | | 16" RECOVERY | | |
| 21 | | | | | | | |
| | | | | | | | |
| 24 | | | | | | | |
| | | 11 | 24.0' | 2 3 6 9 | Saturated loose brown fine sand w/some coarse sand, trace of silt. | A-3 | |
| | | | 26.0' | | 17" RECOVERY | | |
| 27 | | | | | | | |
| | | | | | | | |
| 30 | | 12 | 29.0' | 4 4 6 7 | Saturated loose brown fine sand w/some coarse sand, trace of silt. | A-3 | |
| | | | 31.0' | | 20" RECOVERY | | |
| 33 | | | | | | | |
| | | | | | | | |
| 36 | | 13 | 34.0' | 1 3 5 6 | Saturated loose brown fine sand w/some silt, trace of coarse sand and gravel. | A-2-4(0) | |
| | | | 36.0' | | 17" RECOVERY | | |
| 39 | | | | | | | |
| | | 14 | 39.0' | 4 6 9 | Saturated medium dense brown silty fine sand w/some coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 40.5' | | 16" RECOVERY | | |
| 42 | | 14A | 40.5' 41.0' | 13 | Saturated medium dense gray silty fine sand w/trace of coarse sand and gravel. | A-2-4(0) | |
| | | | | | 4" RECOVERY | | |
| 45 | 1/20/09 | 15 | 44.0' | 4 6 10 15 | Saturated medium dense gray silty fine ssand w/trace of coarse sand and gravel. | A-2-4(0) | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3-01

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|--------------------|--|-------------|---------|
| | | | 46.0' | | 22" RECOVERY | | |
| 48 | | | | | | | |
| | | 16 | 49.0' | 6 9 12 16 | Saturated medium dense gray silty fine sand w/trace of coarse sand and gravel. | A-2-4(0) | |
| 51 | | | 51.0' | | 23" RECOVERY | | |
| | | | | | End of Boring | | |
| 54 | | | | | | | |
| 57 | | | | | | | |
| 60 | | | | | | | |
| 63 | | | | | | | |
| 66 | | | | | | | |
| 69 | | | | | | | |
| 72 | | | | | | | |

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KEY TO SYMBOLS

Symbol Description

Strata symbols



Poorly graded clayey
silty sand



Low plasticity
clay



Silty sand



Poorly graded sand
with silt

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AUGUST 2015

Notes:

1. Exploratory borings were drilled on 1/19/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-3-02

Contract: 28-113-01

Boring Location: Sta. 727+50, 10.00' Lt. C.L.

Boring Surface Elev.: + 25.0

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: | | To: | |
| Hollow Stem Auger: | | From Depth of: 0.0 | | To: 48.0 | |

| | | | | | | |
|-----------------------------|-------------|-------------|----------------------|------------------------|-----------------------|-----------------------|
| Water Level Readings | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| | 1/14/2009 | 8:00 a.m. | 14.0' | 12.0' | 12.1' | |

Pay Quantities:

| | | | | |
|---------------------------------------|------|-------------|-------------------------------|------------|
| 2 1/2 in. Dia. Dry Sample Boring: | 50.0 | Ft.; | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | Ft. |

Boring Contractor: Walton Corporation
Driller: Dave Burt
Helpers:

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|--------------------|---|-------------|---------------|
| | 1/14/09 | 1 | 0.5' | 8 6 7 14 | Moist medium dense brown silty fine to coarse sand and gravel w/trace of clay. 15" RECOVERY | A-2-4(0) | Topsoil - 6". |
| 3 | | 2 | 2.0' | 9 8 10 14 | Moist very stiff brown fine to coarse sandy silt w/some clay and gravel. 18" RECOVERY | A-4(0) | |
| | | 3 | 4.0' | 3 6 7 8 | Moist stiff brown clayey fine sandy silt w/trace of coarse sand and gravel. 15" RECOVERY | A-4(4) | |
| 6 | | 4 | 6.0' | 10 10 9 8 | Moist medium dense orange silty fine sand w/some coarse sand, trace of gravel. 20" RECOVERY | A-2-4(0) | |
| 9 | | 5 | 8.0' | 3 10 7 7 | Moist medium dense yellowish orange coarse to fine sand w/some silt, trace of gravel. 18" RECOVERY | A-1-b | |
| | | 6 | 10.0' | 10 10 7 7 | Wet medium dense orange coarse to fine sand w/some silt, trace of gravel. 21" RECOVERY | A-2-4(0) | |
| 12 | | 7 | 12.0' | 3 6 3 5 | Wet loose orange gravel and coarse sand w/some fine sand, trace of silt. 7" RECOVERY | A-1-a | |
| | | 8 | 14.0' | 3 4 6 9 | Saturated loose orange fine sand w/some coarse sand, trace of silt and gravel. 20" RECOVERY | A-3 | |
| 15 | | 9 | 16.0' | 7 8 12 19 | Saturated medium dense orange fine sand w/some coarse sand and silt, trace of gravel. | A-3 | |

Remarks:

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3-02

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|--|-------------|---------|
| 18 | | | 18.0' | | 18" RECOVERY | | |
| | | 10 | 18.0' | 3 6 6 8 | Saturated medium dense orange fine sand w/ some coarse sand, trace of silt and gravel. | A-3 | |
| | | | 20.0' | | 20" RECOVERY | | |
| 21 | | | | | | | |
| | | | | | | | |
| 24 | | | | | | | |
| | | 11 | 24.0' | 3 4 7 12 | Saturated medium dense orange fine sand w/ some coarse sand, trace of silt. | A-3 | |
| | | | 26.0' | | 21" RECOVERY | | |
| 27 | | | | | | | |
| | | | | | | | |
| | | 12 | 29.0' | 5 9 11 15 | Saturated medium dense brown fine sand w/ some coarse sand, trace of silt. | A-3 | |
| 30 | | | 31.0' | | 23" RECOVERY | | |
| | | | | | | | |
| 33 | | | | | | | |
| | | 13 | 34.0' | 3 4 4 5 | Saturated loose brown fine sand w/trace of silt and coarse sand. | A-3 | |
| | | | 36.0' | | 23" RECOVERY | | |
| 36 | | | | | | | |
| | | | | | | | |
| 39 | | | | | | | |
| | | 14 | 39.0' | 3 5 5 9 | Saturated loose brown fine sand w/some coarse sand, trace of silt and gravel. | A-3 | |
| | | | 41.0' | | 24" RECOVERY | | |
| 42 | | | | | | | |
| | | | | | | | |
| 45 | | 15 | 44.0' | 8 10 20 19 | Saturated medium dense brownish gray silty fine sand w/some coarse sand, trace of gravel. | A-2-4(0) | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-3-02

Contract: 28-113-01

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|--------------------|--|-------------|---------|
| | | | 46.0' | | 19" RECOVERY | | |
| 48 | | 16 | 48.0' | 8 9 14 19 | Saturated medium dense gray silty fine sand w/some coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 50.0' | | 12" RECOVERY | | |
| 51 | | | | | End of Boring | | |
| 54 | | | | | | | |
| 57 | | | | | | | |
| 60 | | | | | | | |
| 63 | | | | | | | |
| 66 | | | | | | | |
| 69 | | | | | | | |
| 72 | | | | | | | |

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KEY TO SYMBOLS

Symbol Description

Strata symbols



Silty sand



Poorly graded clayey
silty sand



Low plasticity
clay



Poorly graded sand
with silt

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Notes:

1. Exploratory borings were drilled on 1/14/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-3-03

Contract: 28-113-01

Boring Location: Sta. 728+50, 10.00' Lt. C.L.

Boring Surface Elev.: + 26.0

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: | | To: |
| Hollow Stem Auger: | | | From Depth of: | 0.0 | To: 48.0 |

| | | | | | | |
|----------------------|-----------|-----------|---------------|-----------------|----------------|----------------|
| Water Level Readings | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| | 1/15/2009 | 8:00 a.m. | 14.0' | 12.0' | 12.1' | |

Pay Quantities:

| | | | | | |
|---------------------------------------|------|------|------------------------|--|-----|
| 2 1/2 in. Dia. Dry Sample Boring: | 50.0 | Ft.; | Dia. U-Sample Boring: | | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of U-Samples: | | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | | Ft. |

Boring Contractor: Walton Corporation
Driller: Dave Burt
Helpers:

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|-------------------------------|
| | 1/15/09 | 1 | 1.0' | 10 11 | Moist medium dense brown silty fine sand and gravel w/some coarse sand. | A-2-4(0) | Topsoil - 8". |
| | | | 2.0' | | 11" RECOVERY | | |
| 3 | | 2 | 2.0' | 8 7 8 10 | Moist medium dense brown silty fine sand w/ some gravel and coarse sand, trace of clay. | A-2-4(0) | |
| | | | 4.0' | | 13" RECOVERY | | |
| | | 3 | 4.0' | 4 5 5 7 | Moist loose brown silty gravel and fine to coarse sand. | A-1-b | |
| 6 | | | 6.0' | | 11" RECOVERY | | |
| | | 4 | 6.0' | 6 4 6 8 | Moist loose yellow fine to coarse sand w/ some silt, trace of gravel. | A-2-4(0) | |
| | | | 8.0' | | 22" RECOVERY | | |
| 9 | | 5 | 8.0' | 6 7 8 8 | Moist medium dense yellow coarse to fine sand w/some silt, trace of gravel. | A-1-b | Sample obtained after offset. |
| | | | 10.0' | | 17" RECOVERY | | |
| | | 6 | 10.0' | 10 11 14 17 | Moist medium dense orange fine to coarse sand w/some silt, trace of gravel. | A-2-4(0) | |
| 12 | | | 12.0' | | 9" RECOVERY | | |
| | | 7 | 12.0' | 17 10 7 7 | Wet medium dense brownish orange fine sand and gravel w/some coarse sand and silt. | A-2-4(0) | |
| | | | 14.0' | | 18" RECOVERY | | |
| 15 | | 8 | 14.0' | 3 6 6 8 | Saturated medium dense brown fine sand w/ some coarse sand, trace of silt and gravel. | A-3 | |
| | | | 16.0' | | 18" RECOVERY | | |
| | | 9 | 16.0' | 9 10 10 12 | Saturated medium dense brown fine sand w/ some coarse sand and silt, trace of gravel. | A-2-4(0) | |

Remarks:

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3-03

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|--|-------------|---------|
| | | 10 | 18.0' | | 20" RECOVERY | A-3 | |
| | | | 18.0' | 5 6 9 7 | Saturated medium dense brown fine sand w/ some coarse sand, trace of gravel. | | |
| 21 | | | 20.0' | | 22" RECOVERY | | |
| 24 | | 11 | 24.0' | 3 5 7 10 | Saturated medium dense brown fine sand w/ some coarse sand, trace of silt and gravel. | A-3 | |
| | | | 26.0' | | 24" RECOVERY | | |
| 27 | | | | | | | |
| 30 | | 12 | 29.0' | 1 4 4 5 | Saturated loose orangish brown fine sand w/ some coarse sand, trace of silt. | A-3 | |
| | | | 31.0' | | 23" RECOVERY | | |
| 33 | | | | | | | |
| 36 | | 13 | 34.0' | 3 4 10 10 | Saturated medium dense brown fine sand w/ some coarse sand, trace of silt. | A-3 | |
| | | | 36.0' | | 18" RECOVERY | | |
| 39 | | | | | | | |
| 42 | | 14 | 39.0' | 3 2 6 12 | Saturated loose brownish gray fine sand w/ some silt and coarse sand. | A-2-4(0) | |
| | | | 41.0' | | 24" RECOVERY | | |
| 45 | | 15 | 44.0' | 8 10 17 24 | Saturated medium dense gray clayey fine sand w/trace of coarse sand and gravel. | A-2-4(0) | |
| | | | 46.0' | | 18" RECOVERY | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-3-03

Contract: 28-113-01

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|---------|
| 48 | | | | | | | |
| | | 16 | 48.0' | 10 11 14 20 | Saturated medium dense gray silty fine sand w/some coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 50.0' | | 18" RECOVERY | | |
| 51 | | | | | End of Boring | | |
| 54 | | | | | | | |
| 57 | | | | | | | |
| 60 | | | | | | | |
| 63 | | | | | | | |
| 66 | | | | | | | |
| 69 | | | | | | | |
| 72 | | | | | | | |

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KEY TO SYMBOLS

Symbol Description

Strata symbols



Silty sand



Poorly graded sand
with silt



Poorly graded clayey
silty sand

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AUGUST 2015

Notes:

1. Exploratory borings were drilled on 1/14/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-3-04

Contract: 28-113-01

Boring Location: Sta. 729+50, 10.00' Lt. C.L.

Boring Surface Elev.: + 26.0

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: | | To: |
| Hollow Stem Auger: | | | From Depth of: | 0.0 | To: 48.0 |

| | | | | | | |
|----------------------|-----------|-----------|---------------|-----------------|----------------|----------------|
| Water Level Readings | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| | 1/13/2009 | 8:00 a.m. | 14.0' | 12.0' | 12.8' | |

Pay Quantities:

| | | | | | |
|---------------------------------------|------|------|------------------------|--|-----|
| 2 1/2 in. Dia. Dry Sample Boring: | 50.0 | Ft.; | Dia. U-Sample Boring: | | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of U-Samples: | | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | | Ft. |

Boring Contractor: Walton Corporation
Driller: Dave Burt
Helpers:

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|---------------|
| | 1/13/09 | 1 | 0.5' | 6 24 34 | Moist very dense brownish black gravel and fine to coarse sand w/some silt. 18" RECOVERY | A-1-b | Topsoil - 6". |
| 3 | | 2 | 2.0' | 45 50/5" | Moist very dense black gravel and coarse sand w/trace of fine sand and silt. 11" RECOVERY | A-1-a | |
| | | 3 | 3.0' | | | | |
| | | 3 | 4.0' | 4 5 5 6 | Moist loose brownish orange coarse to fine sand w/some silt and gravel. | A-1-b | |
| 6 | | | 6.0' | | 16" RECOVERY | | |
| | | 4 | 6.0' | 14 13 11 12 | Moist medium dense orangish brown fine to coarse sand w/some silt, trace of gravel. | A-2-4(0) | |
| | | | 8.0' | | 20" RECOVERY | | |
| 9 | | 5 | 8.0' | 3 4 4 5 | Moist loose orangish brown coarse to fine sand w/some silt, trace of gravel. | A-2-4(0) | |
| | | | 10.0' | | 15" RECOVERY | | |
| | | 6 | 10.0' | 6 5 6 6 | Moist medium dense orangish brown fine to coarse sand w/trace of silt and gravel. | A-3 | |
| 12 | | | 12.0' | | 19" RECOVERY | | |
| | | 7 | 12.0' | 5 6 13 10 | Wet medium dense orangish brown coarse to fine sand and gravel w/some silt. | A-1-b | |
| | | | 14.0' | | 12" RECOVERY | | |
| 15 | | 8 | 14.0' | 5 4 6 9 | Saturated loose orangish brown fine sand w/some coarse sand, trace of silt and gravel. | A-3 | |
| | | | 16.0' | | 24" RECOVERY | | |
| | | 9 | 16.0' | 4 6 11 12 | Saturated medium dense orangish brown fine sand w/some coarse sand, trace of silt and | A-3 | |

Remarks:

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3-04

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|---------|
| 18 | | | 18.0' | | gravel. 18" RECOVERY | | |
| | | 10 | 18.0' | 4 5 6 | Saturated medium dense orangish brown fine sand w/some coarse sand, trace of silt and gravel. 20" RECOVERY | A-3 | |
| 21 | | | 20.0' | | | | |
| 24 | | | 24.0' | 10 10 10 13 | Saturated medium dense orange fine sand w/ some coarse sand, trace of silt. 22" RECOVERY | A-3 | |
| 27 | | | 26.0' | | | | |
| 30 | | 12 | 29.0' | 5 5 6 8 | Saturated medium dense orange fine sand w/ some coarse sand, trace of silt and gravel. 22" RECOVERY | A-3 | |
| | | | 31.0' | | | | |
| 33 | | | | | | | |
| 36 | | 13 | 34.0' | 2 5 6 | Saturated medium dense orange fine sand w/ some coarse sand, trace of silt. 24" RECOVERY | A-3 | |
| | | | 36.0' | | | | |
| 39 | | | 39.0' | 10 12 22 28 | Saturated dense brownish orange silty fine sand w/some coarse sand, trace of gravel and shell fragments. 18" RECOVERY | A-2-4(0) | |
| 42 | | | 41.0' | | | | |
| 45 | | 15 | 44.0' | 6 8 12 24 | Saturated very stiff dark gray fine sandy silt w/trace of coarse sand and clay. | A-4(0) | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3-04

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|--------------------|---|-------------|---------|
| | | | 46.0' | | 17" RECOVERY | | |
| 48 | | 16 | 48.0' | 6 8 12 16 | Saturated medium dense dark gray silty fine sand w/trace of coarse sand, organic matter and gravel. | A-2-4(0) | |
| | | | 50.0' | | 22" RECOVERY | | |
| 51 | | | | | End of Boring | | |
| 54 | | | | | | | |
| 57 | | | | | | | |
| 60 | | | | | | | |
| 63 | | | | | | | |
| 66 | | | | | | | |
| 69 | | | | | | | |
| 72 | | | | | | | |

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KEY TO SYMBOLS

Symbol Description

Strata symbols



Silty sand



Well graded sand



Poorly graded sand
with silt

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Notes:

1. Exploratory borings were drilled on 1/13/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-3-05

Contract: 28-113-01

Boring Location: Sta. 730+50, 10.00' Lt. C.L.

Boring Surface Elev.: + 26.0

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: | | To: | |
| Hollow Stem Auger: | | From Depth of: 0.0 | | To: 48.0 | |

| | | | | | | |
|-----------------------------|-------------|-------------|----------------------|------------------------|-----------------------|-----------------------|
| Water Level Readings | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| | 1/13/2009 | 9:00 a.m. | 18.0' | 16.0' | 17.1' | |

Pay Quantities:

| | | | | |
|---------------------------------------|------|-------------|-------------------------------|------------|
| 2 1/2 in. Dia. Dry Sample Boring: | 50.0 | Ft.; | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | Ft. |

Boring Contractor: Walton Corporation
Driller: Dave Burt
Helpers:

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|---------------|
| | 1/13/09 | 1 | 0.5' | 8 20 30 50 | Moist very dense black gravel w/some coarse sand, trace of fine sand and silt. 15" RECOVERY | A-1-a | Topsoil - 7". |
| 3 | | 2 | 2.0' 2.5' | 50/5" | No Sieve Analysis - Indication of moist very dense black gravel w/some coarse sand, trace of fine sand and silt. 4" RECOVERY | | |
| | | 3 | 4.0' | 8 16 13 20 | Moist medium dense black silty fine to coarse sand w/some gravel, trace of clay. 19" RECOVERY | A-2-4(0) | |
| 6 | | 4 | 6.0' | 27 13 12 11 | Moist medium dense orange coarse to fine sand w/some silt, trace of gravel. 15" RECOVERY | A-2-4(0) | |
| 9 | | 5 | 8.0' | 3 3 3 2 | Moist loose orange coarse to fine sand w/ some silt, trace of gravel. 16" RECOVERY | A-1-b | |
| | | 6 | 10.0' | 5 4 7 9 | Moist medium dense orangish brown coarse to fine sand w/some silt, trace of gravel. 17" RECOVERY | A-1-b | |
| 12 | | 7 | 12.0' | 8 3 4 5 | Wet loose orangish brown fine sand w/some coarse sand and gravel, trace of silt. 10" RECOVERY | A-3 | |
| | | 8 | 14.0' | 1 3 4 4 | Wet loose orange fine sand w/some coarse sand, trace of silt and gravel. 19" RECOVERY | A-3 | |
| 15 | | 9 | 16.0' | 3 4 5 6 | Wet loose orange fine sand w/some coarse sand, trace of silt and gravel. | A-3 | |

Remarks:

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3-05

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|--------------------|--|-------------|---------|
| 18 | | | 18.0' | | 22" RECOVERY | | |
| | | 10 | 18.0' | 4 4 4 5 | Saturated loose orange fine sand w/some coarse sand, trace of silt and gravel. | A-3 | |
| | | | 20.0' | | 22" RECOVERY | | |
| 21 | | | | | | | |
| | | | | | | | |
| 24 | | | | | | | |
| | | 11 | 24.0' | 1 2 5 5 | Saturated loose orange fine sand w/some coarse sand, trace of silt. | A-3 | |
| | | | 26.0' | | 24" RECOVERY | | |
| 27 | | | | | | | |
| | | | | | | | |
| 30 | | 12 | 29.0' | 1 3 4 3 | Saturated loose orange fine sand w/some coarse sand, trace of silt. | A-3 | |
| | | | 31.0' | | 24" RECOVERY | | |
| 33 | | | | | | | |
| | | | | | | | |
| 36 | | 13 | 34.0' | 5 6 9 14 | Saturated medium dense brownish gray fine sand w/some silt and coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 36.0' | | 21" RECOVERY | | |
| 39 | | | | | | | |
| | | 14 | 39.0' | 3 5 12 12 | Saturated very stiff gray clayey fine sandy silt w/trace of coarse sand and organic matter. | A-4(0) | |
| | | | 41.0' | | 17" RECOVERY | | |
| 42 | | | | | | | |
| | | | | | | | |
| 45 | | 15 | 44.0' | 6 7 10 10 | Saturated medium dense gray silty fine sand w/trace of coarse sand, organic matter and gravel. | A-2-4(0) | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3-05

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|------------------|---|-------------|---------|
| | | | 46.0' | | 24" RECOVERY | | |
| 48 | | 16 | 48.0' | 5 7 9 9 | Saturated medium dense gray clayey fine sand w/trace of coarse sand, organic matter and gravel. | A-2-4(0) | |
| | | | 50.0' | | 23" RECOVERY | | |
| 51 | | | | | End of Boring | | |
| 54 | | | | | | | |
| 57 | | | | | | | |
| 60 | | | | | | | |
| 63 | | | | | | | |
| 66 | | | | | | | |
| 69 | | | | | | | |
| 72 | | | | | | | |

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AUGUST 2015

KEY TO SYMBOLS

Symbol Description

Strata symbols



Poorly graded gravel



Silty sand



Poorly graded sand
with silt



Poorly graded clayey
silty sand

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Notes:

1. Exploratory borings were drilled on 1/13/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-3-06

Contract: 28-113-01

Boring Location: Sta. 860+66, 10' Lt. C.L.

Boring Surface Elev.: + 25.9

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: | | To: | |
| Hollow Stem Auger: | | From Depth of: 0.0 | | To: 20.0 | |

| | | | | | | |
|-----------------------------|-------------|-------------|----------------------|------------------------|-----------------------|-----------------------|
| Water Level Readings | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| | 6/15/2009 | | 16.0 | 14.0 | 13.6 | |

Pay Quantities:

| | | | | |
|---------------------------------------|----|-------------|-------------------------------|------------|
| 2 1/2 in. Dia. Dry Sample Boring: | 51 | Ft.; | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | Ft. |

Boring Contractor: Walton Corporation
Driller: Jason Truver
Helpers: J. Laffert

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|---|-------------|---------------|
| | 6/15/09 | 1 | 0.5' | 61 50/2" | Moist very dense blackish gray gravel (asphalt millings) w/some coarse sand, trace of fine sand and silt. | A-1-a | Topsoil - 6". |
| | | 2 | 2.0' | 38 30 | 8" RECOVERY | A-1-a | |
| 3 | | 2A | 3.0' | 40 45 | Moist very dense blackish gray gravel (asphalt millings) w/some coarse sand, trace of fine sand and silt. | A-1-a | |
| | | 3 | 4.0' | 10 14 10 9 | 10" RECOVERY | A-2-4(0) | |
| | | | | | Moist very dense gray gravel w/trace of coarse to fine sand and silt. | | |
| 6 | | 4 | 6.0' | 7 7 6 6 | 12" RECOVERY | A-1-b | |
| | | | | | Moist medium dense coarse to fine sand w/ some silt. | | |
| | | 5 | 8.0' | 5 5 6 7 | 17" RECOVERY | A-1-b | |
| 9 | | | | | Moist medium dense orangish brown coarse to fine sand w/trace of silt and gravel. | | |
| | | 6 | 10.0' | 11 7 7 6 | 21" RECOVERY | A-1-b | |
| | | | | | Moist medium dense orangish brown coarse to fine sand w/some silt and gravel. | | |
| | | | 10.0' | | 13" RECOVERY | A-3 | |
| 12 | | 7 | 12.0' | 5 4 4 4 | Wet medium dense orangish brown fine sand w/some coarse sand, trace of silt and gravel. | A-3 | |
| | | | | | 3" RECOVERY | | |
| | | 8 | 14.0' | 4 4 5 7 | Wet loose orangish brown fine sand w/some coarse sand and gravel, trace of silt. | A-3 | |
| 15 | | | | | 13" RECOVERY | | |
| | | | 14.0' | | Wet loose brown fine sand w/some coarse sand, trace of silt and gravel. | A-3 | |
| | | 9 | 16.0' | 5 6 9 10 | 20" RECOVERY | A-3 | |
| | | | | | Wet medium dense brown fine sand w/some coarse sand, trace of silt. | | |

Remarks: Mud Rotary @ 20.0 ft.

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3-06

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|--|-------------|---------------------|
| 18 | | | 18.0' | | 23" RECOVERY | | |
| | | 10 | 18.0' | 3 6 8 10 | Wet medium dense brown fine sand w/some coarse sand, trace of silt. | A-3 | Mud Rotary @ 20.0'. |
| | | | 20.0' | | 23" RECOVERY | | |
| 21 | | | | | | | |
| | | | | | | | |
| 24 | | | | | | | |
| | | 11 | 24.0' | 5 5 7 9 | Wet medium dense brown fine sand w/some coarse sand, trace of silt. | A-3 | |
| | | | 26.0' | | 20" RECOVERY | | |
| 27 | | | | | | | |
| | | | | | | | |
| 30 | | 12 | 29.0' | 3 4 5 7 | Wet loose brown fine sand w/some silt and coarse sand. | A-2-4(0) | |
| | | | 31.0' | | 17" RECOVERY | | |
| 33 | | | | | | | |
| | | | | | | | |
| 36 | | 13 | 34.0' | 5 5 8 9 | Wet medium dense brown silty fine sand w/ some coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 36.0' | | 24" RECOVERY | | |
| 39 | | | | | | | |
| | | 14 | 39.0' | 7 8 11 13 | Wet medium dense tan and gray clayey fine sand w/some coarse sand. | A-2-4(0) | |
| | | | 41.0' | | 17" RECOVERY | | |
| 42 | | | | | | | |
| | | | | | | | |
| 45 | | 15 | 44.0' | 8 10 11 15 | Wet very stiff gray fine sandy silt w/trace of coarse sand, clay and organic matter. | A-4(0) | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-3-06

Contract: 28-113-01

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|---|-------------|---------|
| | | | 46.0' | | 22" RECOVERY | | |
| 48 | | | | | | | |
| | | 16 | 49.0' | 6 15 11 11 | Wet medium dense gray clayey fine sand w/ trace of coarse sand and organic matter. | A-2-4(0) | |
| 51 | | | 51.0' | | 22" RECOVERY | | |
| | | | | | End of Boring | | |
| 54 | | | | | | | |
| 57 | | | | | | | |
| 60 | | | | | | | |
| 63 | | | | | | | |
| 66 | | | | | | | |
| 69 | | | | | | | |
| 72 | | | | | | | |

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KEY TO SYMBOLS

Symbol Description

Strata symbols



Well graded gravel



Poorly graded gravel
with silt



Silty sand



Well graded sand
with silt



Poorly graded sand
with silt



Clayey sand



Poorly graded clayey
silty sand

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AUGUST 2015

Notes:

1. Exploratory borings were drilled on 6/15/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-3-08

Contract: 28-113-01

Boring Location: Sta. 873+66, 10' Lt. C.L.

Boring Surface Elev.: + 24.12

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: | To: |
| Hollow Stem Auger: | | From Depth of: 0.0 | To: 18.0 |

| | | | | | | |
|-----------------------------|-------------|-------------|----------------------|------------------------|-----------------------|-----------------------|
| Water Level Readings | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| | 6/16/2009 | | 14.0 | 12.0 | 11.5 | |

Pay Quantities:

| | | | | | |
|---------------------------------------|------|------|------------------------|-----------------------|-----|
| 2 1/2 in. Dia. Dry Sample Boring: | 51.0 | Ft.; | | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of: | U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | | Ft. |

Boring Contractor: Walton Corporation
Driller: Jason Truver
Helpers: J. Lafferty

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|--|
| | 6/15/09 | 1 | 0.5' | 6 8 10 | Moist medium dense gray gravel w/some silt, trace of fine to coarse sand. 8" RECOVERY | A-1-a | Topsoil - 6". |
| 3 | | 2 | 2.0' | 13 16 23 26 | Moist dense brown silty fine to coarse sand w/trace of gravel. 19" RECOVERY | A-2-4(0) | |
| | | 3 | 4.0' | 10 12 12 12 | Moist medium dense orangish brown fine to coarse sand w/some silt, trace of gravel. 17" RECOVERY | A-2-4(0) | |
| 6 | | 4 | 6.0' | 8 13 13 16 | Moist medium dense orangish brown coarse to fine sand w/some silt, trace of gravel. 13" RECOVERY | A-1-b | |
| 9 | | 5 | 8.0' | 8 11 13 10 | Moist medium dense orangish brown gravel and fine to coarse sand w/some silt. 12" RECOVERY | A-1-b | |
| | | 6 | 10.0' | 31 30 6 4 | Moist dense orangish brown fine sand and gravel w/some coarse sand, trace of silt. 17" RECOVERY | A-1-b | Fractured pieces of gravel in top 6" of spoon. |
| 12 | | 7 | 12.0' | 5 5 7 10 | Wet medium dense brown fine sand w/some coarse sand and silt, trace of gravel. 19" RECOVERY | A-2-4(0) | |
| | | 8 | 14.0' | 5 5 6 7 | Wet medium dense brown fine sand w/trace of silt, coarse sand and gravel. 20" RECOVERY | A-3 | |
| 15 | | 9 | 16.0' | 6 8 11 14 | Wet medium dense brown fine sand w/some coarse sand and silt, trace of gravel. | A-3 | |

Remarks: Mud Rotary @ 18.0 Ft.

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3-08

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|--|-------------|---------------------|
| 18 | | | 18.0' | | 22" RECOVERY | | |
| | | 10 | 18.0' | 6 7 6 6 | Wet medium dense brown fine sand w/some coarse sand, trace of silt. | A-3 | Mud Rotary @ 18.0'. |
| | | | 20.0' | | 17" RECOVERY | | |
| 21 | | | | | | | |
| | | | | | | | |
| 24 | | | | | | | |
| | | 11 | 24.0' | 4 4 5 6 | Wet loose brown fine sand w/some silt and coarse sand. | A-2-4(0) | |
| | | | 26.0' | | 17" RECOVERY | | |
| 27 | | | | | | | |
| | | | | | | | |
| 30 | | 12 | 29.0' | 3 3 4 4 | Wet loose brown fine sand w/some coarse sand, trace of silt. | A-3 | |
| | | | 31.0' | | 20" RECOVERY | | |
| 33 | | | | | | | |
| | | | | | | | |
| 36 | | 13 | 34.0' | 6 6 7 7 | Wet stiff gray clayey fine sandy silt w/some coarse sand, trace of organic matter. | A-4(0) | |
| | | | 36.0' | | 19" RECOVERY | | |
| 39 | | | | | | | |
| | | | | | | | |
| 42 | | 14 | 39.0' | 7 10 15 17 | Wet very stiff gray fine sandy silt w/trace of coarse sand, organic matter and gravel. | A-4(0) | |
| | | | 41.0' | | 21" RECOVERY | | |
| 45 | | 15 | 44.0' | 5 8 13 17 | Wet very stiff gray fine sandy silt w/some coarse sand, trace of organic matter. | A-4(0) | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3-08

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|--------------------|--|-------------|---------|
| | | | 46.0' | | 22" RECOVERY | | |
| 48 | | | | | | | |
| | | 16 | 49.0' | 5 8 10 13 | Wet very stiff gray fine sandy silt w/trace of coarse sand, organic matter and gravel. | A-4(0) | |
| 51 | | | 51.0' | | 20" RECOVERY | | |
| | | | | | End of Boring | | |
| 54 | | | | | | | |
| 57 | | | | | | | |
| 60 | | | | | | | |
| 63 | | | | | | | |
| 66 | | | | | | | |
| 69 | | | | | | | |
| 72 | | | | | | | |

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AUGUST 2015

KEY TO SYMBOLS

Symbol Description

Strata symbols



Silty gravel



Silty sand



Poorly graded sand
with silt



Poorly graded clayey
silty sand

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AUGUST 2015

Notes:

1. Exploratory borings were drilled on 6/15/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-3-10

Contract: 28-113-01

Boring Location: Sta. 876+66, 10' Lt. C.L.

Boring Surface Elev.: +20.58

Reference:

Wt. of Casing Hammer:
Wt. of Sample Hammer: 140
Type of: D-Sampler: Split Barrel
S-Sampler:
U-Sampler:
Core Bit:

Lbs.
Lbs.
O.D.
O.D.
O.D.
O.D.

Average Fall:
Average Fall: 30
O.D. of Sampler:
O.D. of Samp. Tube:
O.D. of Samp. Tube:
O.D. of Rock Core:

IN.
IN.
IN.
IN.
IN.
IN.

Casing Size: 3 1/4 **Inches**
Hollow Stem Auger:

From Depth of: **To:**
From Depth of: 0.0 **To:** 29.0

| Water Level Readings | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
|----------------------|-----------|------|---------------|-----------------|----------------|----------------|
| | 6/15/2009 | | 14.0 | 12.0 | 11.4 | |

Pay Quantities:

2 1/2 in. Dia. Dry Sample Boring: 51 **Ft.;** **Dia. U-Sample Boring:** **Ft.**
 No. of 2 in. Dia. Shelby Tubes: **Ft.;** **No. of U-Samples:** **Ft.**
 2 1/2 in. Dia. Contin. Sample Boring: **Ft.;** **Core Drilling in Rock:** **Ft.**

Boring Contractor: Walton Corporation
Driller: Gary Truver
Helpers: T. Kane

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|---------------|
| | 6/15/09 | 1 | 0.0' | 11 50/4" | Moist hard brown gravelly coarse sandy silt w/some fine sand and clay. | A-4(0) | Topsoil - 2". |
| | | | 2.0' | | 4" RECOVERY | | |
| 3 | | 2 | 2.0' | 10 12 | Moist very stiff gray clayey silt w/some fine to coarse sand, trace of gravel. | A-4(2) | |
| | | 2A | 3.0' | 14 20 | 8" RECOVERY | A-2-4(0) | |
| | | | 4.0' | | Moist medium dense orange coarse to fine sand w/some silt, trace of gravel. | | |
| | | 3 | 4.0' | 8 12 9 8 | 6" RECOVERY | A-2-4(0) | |
| 6 | | | 6.0' | | Moist medium dense brown fine to coarse sand w/some silt, trace of gravel. | | |
| | | 4 | 6.0' | 9 19 12 8 | 12" RECOVERY | A-2-4(0) | |
| | | | 8.0' | | 8" RECOVERY | | |
| 9 | | 5 | 8.0' | 6 6 9 10 | Moist medium dense brown fine sand w/some coarse sand, trace of silt and gravel. | A-3 | |
| | | | 10.0' | | 14" RECOVERY | | |
| | | 6 | 10.0' | 11 14 16 16 | Wet medium dense brown fine sand w/some coarse sand and silt, trace of gravel. | A-2-4(0) | |
| 12 | | | 12.0' | | 18" RECOVERY | | |
| | | 7 | 12.0' | 3 4 6 6 | Wet loose brown fine sand w/some coarse sand, trace of silt. | A-3 | |
| | | | 14.0' | | 13" RECOVERY | | |
| 15 | | 8 | 14.0' | 4 9 11 12 | Wet medium dense brown fine sand w/some coarse sand, trace of silt. | A-3 | |
| | | | 16.0' | | 19" RECOVERY | | |
| | | 9 | 16.0' | 8 12 13 | Wet medium dense brown fine sand w/some | A-2-4(0) | |

Remarks: Mud Rotary @ 29.0 Ft.

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3-10

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|---------------------|
| 18 | | | 18.0' | 15 | silt, trace of coarse sand. 12" RECOVERY | | |
| | | 10 | 18.0' | 1 3 5 8 | Wet loose brown fine sand w/some coarse sand, trace of silt. 12" RECOVERY | A-3 | |
| 21 | | | 20.0' | | | | |
| 24 | | 11 | 24.0' | 4 6 7 13 | Wet medium dense brown fine sand w/some coarse sand, trace of silt and gravel. 18" RECOVERY | A-3 | |
| 27 | | | 26.0' | | | | |
| 30 | | 12 | 29.0' | 14 27 21 25 | Wet hard grayish brown fine sandy silt w/ some coarse sand, trace of gravel. 21" RECOVERY | A-4(0) | Mud Rotary @ 29.0'. |
| 33 | | | 31.0' | | | | |
| 36 | | 13 | 34.0' | 17 22 27 19 | Wet dense gray fine sand w/some silt, trace of coarse sand and organic matter. 24" RECOVERY | A-2-4(0) | |
| 39 | | | 36.0' | | | | |
| 42 | | 14 | 39.0' | 8 21 19 18 | Wet dense gray clayey fine sand w/some coarse sand, trace of organic matter. 22" RECOVERY | A-2-4(0) | |
| 45 | | | 41.0' | | | | |
| | | 15 | 44.0' | 6 17 13 18 | Wet medium dense gray silty fine sand w/ trace of coarse sand, gravel and organic | A-2-4(0) | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3-10

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|---------|
| | | | 46.0' | | matter. 22" RECOVERY | | |
| 48 | | | | | | | |
| | | 16 | 49.0' | 12 17 25 30 | Wet hard gray clayey fine sandy silt w/trace of coarse sand, organic matter and gravel. | A-4(0) | |
| 51 | | | 51.0' | | 22" RECOVERY | | |
| | | | | | End of Boring | | |
| 54 | | | | | <p style="font-size: 48px; color: orange; margin: 0;">DRAFT</p> <p style="font-size: 72px; color: orange; margin: 0;">NOT FOR BIDDING</p> <p style="font-size: 72px; color: orange; margin: 0;">AUGUST 2015</p> | | |
| 57 | | | | | | | |
| 60 | | | | | | | |
| 63 | | | | | | | |
| 66 | | | | | | | |
| 69 | | | | | | | |
| 72 | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

KEY TO SYMBOLS

Symbol Description

Strata symbols



Poorly graded clayey
silty sand



Silty low plasticity
clay



Silty sand



Poorly graded sand
with silt



Poorly graded sand

DRAFT
NOT FOR BIDDING
AUGUST 2015

Notes:

1. Exploratory borings were drilled on 6/15/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-3-12

Contract: 28-113-01

Boring Location: Sta. 879+66, 10' Lt. C.L.

Boring Surface Elev.: + 18.05

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: | | To: |
| Hollow Stem Auger: | | | From Depth of: | 0.0 | To: 18.0 |

| | | | | | | |
|----------------------|-----------|------|---------------|-----------------|----------------|----------------|
| Water Level Readings | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| | 6/16/2009 | | 14.0 | 12.0 | 11.2 | |

Pay Quantities:

| | | | | | |
|---------------------------------------|------|------|------------------------|--|-----|
| 2 1/2 in. Dia. Dry Sample Boring: | 51.0 | Ft.; | Dia. U-Sample Boring: | | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of U-Samples: | | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | | Ft. |

Boring Contractor: Walton Corporation
Driller: Jason Truver
Helpers: J. Lafferty

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|-------------------|---|-------------|---|
| | 6/16/09 | 1 | 0.5' | 4 5 5 | Moist stiff brown clayey coarse to fine sandy silt w/trace of gravel. | A-4(0) | Topsoil - 4". |
| | | | 2.0' | | 14" RECOVERY | | |
| 3 | | 2 | 2.0' | 3 4 | No Sieve Analysis - Indication of moist firm brown sandy lean clay. | | |
| | | | 3.0' | | 5" RECOVERY | | |
| | | 2A | 3.0' | 3 3 | Moist loose orangish brown coarse to fine sand and gravel w/some silt. | A-1-b | |
| | | | 4.0' | | 5" RECOVERY | | |
| | | 3 | 4.0' | 3 4 3 4 | Moist loose orangish brown coarse to fine sand w/some silt and gravel. | A-1-b | |
| 6 | | | 6.0' | | 16" RECOVERY | | |
| | | 4 | 6.0' | 7 11 9 9 | Moist medium dense orangish brown gravel w/some fine to coarse sand, trace of silt. | A-1-a | Pieces of gravel stuck in tip of spoon. |
| | | | 8.0' | | 4" RECOVERY | | |
| 9 | | 5 | 8.0' | 4 4 4 4 | Wet loose orangish brown fine sand w/some silt and coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 10.0' | | 16" RECOVERY | | |
| | | 6 | 10.0' | 3 4 4 5 | Wet loose brown fine sand w/some coarse sand, trace of silt and gravel. | A-3 | |
| 12 | | | 12.0' | | 20" RECOVERY | | |
| | | 7 | 12.0' | 4 6 4 3 | Wet loose brown fine sand w/some coarse sand, trace of silt and gravel. | A-3 | |
| | | | 14.0' | | 16" RECOVERY | | |
| 15 | | 8 | 14.0' | 2 3 3 3 | Wet loose orangish brown fine sand w/some coarse sand, trace of silt and gravel. | A-3 | |
| | | | 16.0' | | 21" RECOVERY | | |
| | | 9 | 16.0' | 2 3 3 4 | Wet loose orangish brown fine sand w/some gravel, coarse sand and silt. | A-2-4(0) | Piece of gravel |

Remarks: Mud Rotary @ 16.0 Ft.

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3-12

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|--------------------|--|-------------|---|
| 18 | | | 18.0' | | 7" RECOVERY | | stuck in tip of spoon. Mud Rotary @ 18.0'. |
| | | 10 | 18.0' | 3 4 5 | Wet loose orangish brown fine sand w/some coarse sand, trace of silt and gravel. | A-3 | |
| | | | 20.0' | | 23" RECOVERY | | |
| 21 | | | | | | | |
| 24 | | | | | | | |
| | | 11 | 24.0' | 1 2 3 | Wet soft brown fine sandy silt w/some coarse sand. | A-4(0) | |
| | | | 26.0' | | 20" RECOVERY | | |
| 27 | | | | | | | |
| | | 12 | 29.0' | 5 5 10 16 | Wet medium dense brownish orange and gray fine sand w/some coarse sand, trace of silt. | A-3 | |
| 30 | | | 31.0' | | 22" RECOVERY | | |
| | | | | | | | |
| 33 | | | | | | | |
| | | 13 | 34.0' | 3 4 4 3 | Wet loose gray clayey fine sand w/some coarse sand, trace of organic matter. | A-2-4(0) | |
| 36 | | | 36.0' | | 21" RECOVERY | | |
| | | | | | | | |
| 39 | | | | | | | |
| | | 14 | 39.0' | 2 3 3 5 | Wet loose gray fine sandy silt w/some clay, trace of coarse sand and organic matter. | A-4(0) | |
| | | | 41.0' | | 23" RECOVERY | | |
| 42 | | | | | | | |
| | | 15 | 44.0' | 5 7 8 8 | Wet stiff gray fine sandy silt w/trace of coarse sand, organic matter and gravel. | A-4(0) | |
| 45 | | | | | | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-3-12

Contract: 28-113-01

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|------------------|---|-------------|---------|
| | | | 46.0' | | 23" RECOVERY | | |
| 48 | | | | | | | |
| | | 16 | 49.0' | 5 6 8 9 | Wet stiff gray fine sandy silt w/trace of coarse sand and organic matter. | A-4(0) | |
| 51 | | | 51.0' | | 20" RECOVERY | | |
| | | | | | End of Boring | | |
| 54 | | | | | | | |
| 57 | | | | | | | |
| 60 | | | | | | | |
| 63 | | | | | | | |
| 66 | | | | | | | |
| 69 | | | | | | | |
| 72 | | | | | | | |

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KEY TO SYMBOLS

Symbol Description

Strata symbols



Poorly graded clayey
silty sand



Silty sand



Poorly graded sand
with silt



Poorly graded gravel
with silt



Poorly graded sand

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Notes:

1. Exploratory borings were drilled on 6/16/2009 using a 3 1/4- inch diameter hollow stem auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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 Blows are un corrected.

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-3-13

Contract: 28-113-01

Boring Location: Sta. 865+00 15' Lt C.L.

Boring Surface Elev.: +27.07

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: | | To: | |
| Hollow Stem Auger: | | From Depth of: 0.0 | | To: 19.0 | |

| | | | | | | |
|-----------------------------|-------------|-------------|----------------------|------------------------|-----------------------|-----------------------|
| Water Level Readings | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| | 7/19/10 | | 14.0 | 14.0 | 11.7 | |

Pay Quantities:

| | | | | |
|---------------------------------------|------|-------------|-------------------------------|------------|
| 2 1/2 in. Dia. Dry Sample Boring: | 60.0 | Ft.; | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | Ft. |

Boring Contractor: Walton Corporation
Driller: Bill Holden
Helpers: T. Kane

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|-------------------|--|-------------|---------------|
| | 7/19/10 | 1 | 0.5' | 3 3 4 | Moist loose brown clayey coarse to fine sand w/some silt, trace fine gravel. 15" RECOVERY | A-2-4(0) | Topsoil - 5". |
| 3 | | 2 | 2.0' | 5 4 4 4 | Moist firm brownish gray coarse to fine sandy silt w/some clay, trace fine gravel. 16" RECOVERY | A-4(0) | |
| | | 3 | 4.0' | 5 6 8 7 | Moist stiff brownish gray clayey coarse to fine sandy silt w/trace fine gravel. 18" RECOVERY | A-4(0) | |
| 6 | | 4 | 6.0' | 7 8 8 10 | Moist very stiff brownish gray clayey coarse to fine sandy silt w/trace fine gravel. 21" RECOVERY | A-4(0) | |
| 9 | | 5 | 8.0' | 5 6 6 6 | Moist medium dense brown silty fine to coarse sand and fine gravel. 8" RECOVERY | A-1-b | |
| | | 6 | 10.0' | 6 3 3 6 | Wet loose brown fine to coarse sand w/some silt, trace fine gravel. 16" RECOVERY | A-2-4(0) | |
| 12 | | 7 | 12.0' | 2 3 5 7 | Wet loose brown fine to coarse sand w/some silt. 18" RECOVERY | A-2-4(0) | |
| | | 8 | 14.0' | 3 3 3 4 | Wet loose brown fine sand w/some coarse sand and silt, trace fine gravel. 16" RECOVERY | A-2-4(0) | |
| 15 | | 9 | 16.0' | 8 7 7 9 | Wet medium dense brown fine sand w/some coarse sand, trace silt and fine gravel. | A-3 | |

Remarks:

Reviewed By: Hany Fekry

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3-13

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----------|---|-------------------|---|-------------|--------------------|
| 18 | 7/20/10 | 10 | 18.0' | 5 6 9 | 16" RECOVERY | A-2-4(0) | |
| | | | 18.0' | | Wet medium dense brown fine sand w/some coarse sand and silt. | | |
| | | | 20.0' | | 15" RECOVERY | | |
| 21 | | | | | | | |
| 24 | | 11 | 24.0' | 4 5 6 8 | Saturated medium dense brown fine sand w/ some coarse sand, trace silt. | A-3 | Mud Rotary @ 19.0' |
| | 26.0' | | 16" RECOVERY | | | | |
| 27 | | | | | | | |
| 30 | | 12 | 29.0' | 5 6 7 7 | Saturated medium dense brown fine sand w/ some coarse sand, trace silt. | A-3 | |
| | 31.0' | | 18" RECOVERY | | | | |
| 33 | | | | | | | |
| 36 | | 13 | 34.0' | 4 5 5 5 | Saturated loose brown fine sand w/some coarse sand and silt. | A-2-4(0) | |
| | 36.0' | | 20" RECOVERY | | | | |
| 39 | | 14 14A | 39.0' | 5 6 8 12 | Saturated medium dense brown silty fine sand w/some coarse sand. | A-2-4(0) | |
| | 39.5' | | 6" RECOVERY | | | | |
| | 39.5' | | Saturated medium dense gray silty fine sand w/some coarse sand. | | A-2-4(0) | | |
| 42 | | | 41.0' | | 18" RECOVERY | | |
| 45 | | 15 | 44.0' | 7 9 8 9 | Saturated medium dense gray silty fine sand w/some coarse sand, trace fine gravel and organic matter. | A-2-4(0) | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-3-13

Contract: 28-113-01

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|------------------|--|-------------|---------|
| | | | 46.0' | | 24" RECOVERY | | |
| 48 | | | | | | | |
| | | 16 | 49.0' | 7 9 7 9 | Saturated medium dense gray silty fine sand w/trace coarse sand and fine gravel. | A-2-4(0) | |
| 51 | | | 51.0' | | 23" RECOVERY | | |
| | | | | | | | |
| 54 | | | | | | | |
| | | 17 | 54.0' | 4 4 7 7 | Saturated medium dense gray clayey fine sand w/some coarse sand and silt. | A-2-4(0) | |
| | | | 56.0' | | 24" RECOVERY | | |
| 57 | | | | | | | |
| | | | | | | | |
| | | 18 | 59.0' | 5 6 6 7 | Saturated stiff gray fine sandy silt w/some clay, trace coarse sand and fine gravel. | A-4(0) | |
| 60 | | | 61.0' | | 24" RECOVERY | | |
| | | | | | End of Boring | | |
| 63 | | | | | | | |
| | | | | | | | |
| 66 | | | | | | | |
| | | | | | | | |
| 69 | | | | | | | |
| | | | | | | | |
| 72 | | | | | | | |

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AUGUST 2015

KEY TO SYMBOLS

Symbol Description

Strata symbols



Poorly graded clayey
silty sand



Silty sand



Poorly graded sand
with silt

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AUGUST 2015

Notes:

1. Exploratory borings were drilled on July 19, 2010 using a 3 1/4-inch diameter continuous flight power auger. Rig is a CME 55 ATV.
2. Groundwater levels recorded at the time of drilling and re-checked to following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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 blows are uncorrected.

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-3R-02

Contract: 28-113-01

Boring Location: Sta. 862+16, 35' Rt. C.L.

Boring Surface Elev.: +22.9

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: | | To: | |
| Hollow Stem Auger: | | From Depth of: 0.0 | | To: 18.0 | |

| | | | | | | |
|-----------------------------|-------------|-------------|----------------------|------------------------|-----------------------|-----------------------|
| Water Level Readings | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| | 6/22/2009 | | 12.0 | 12.0 | 10.9 | |

Pay Quantities:

| | | | | |
|---------------------------------------|----|-------------|-------------------------------|------------|
| 2 1/2 in. Dia. Dry Sample Boring: | 50 | Ft.; | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | | Core Drilling in Rock: | Ft. |

Boring Contractor: Walton Corporation
Driller: Jason Truver
Helpers: D. Zmijewski

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|--------------------------------------|
| | 6/22/09 | 1 | 0.0' | | | | 12" of Asphalt and 12" of Stone Base |
| | | | 2.0' | | 24" RECOVERY | | |
| 3 | | 2 | 2.0' | 12 13 20 20 | Moist dense brownish orange silty gravel and fine to coarse sand. | A-1-b | |
| | | | 4.0' | | 21" RECOVERY | | |
| 6 | | 3 | 4.0' | 6 7 6 6 | Moist medium dense orange fine to coarse sand w/some silt, trace of gravel. | A-2-4(0) | |
| | | | 6.0' | | 14" RECOVERY | | |
| | | 4 | 6.0' | 5 5 8 9 | Moist medium dense orange fine sand w/some coarse sand, gravel and silt. | A-2-4(0) | |
| | | | 8.0' | | 19" RECOVERY | | |
| 9 | | 5 | 8.0' | 6 8 3 1 | Moist medium dense orange gravel w/some fine to coarse sand and silt. | A-1-b | |
| | | | 10.0' | | 7" RECOVERY | | |
| | | 6 | 10.0' | 5 4 5 5 | Wet loose brown fine to coarse sand and gravel w/trace of silt. | A-1-b | |
| 12 | | | 12.0' | | 7" RECOVERY | | |
| | | 7 | 12.0' | 1 3 5 6 | Wet loose brown fine sand w/some silt and coarse sand. | A-2-4(0) | |
| | | | 14.0' | | 24" RECOVERY | | |
| 15 | | 8 | 14.0' | 3 5 7 8 | Wet medium dense brown fine sand w/some coarse sand, trace of silt. | A-3 | |
| | | | 16.0' | | 19" RECOVERY | | |
| | | 9 | 16.0' | 5 8 11 | Wet medium dense brown fine sand w/some | A-2-4(0) | |

Remarks: Mud Rotary @ 18.0 Ft.

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3R-02

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|-------------------|--|-------------|----------------------------------|
| | | | | 16 | silt and coarse sand. | | |
| 18 | | | 18.0' | | 15" RECOVERY | | |
| | | 10 | 18.0' | 6 8 9 | Wet medium dense brown fine sand w/some silt and coarse sand. | A-2-4(0) | Switched to Mud Rotary at 18.0'. |
| | | | 20.0' | | 18" RECOVERY | | |
| 21 | | | | | | | |
| | | | | | | | |
| 24 | | 11 | 23.0' | 5 6 6 13 | Wet medium dense brown fine sand w/some silt, trace of coarse sand. | A-2-4(0) | |
| | | | 25.0' | | 12" RECOVERY | | |
| 27 | | | | | | | |
| | | | | | | | |
| 30 | | 12 | 28.0' | 6 8 8 6 | Wet medium dense brown fine sand w/some silt, trace of coarse sand. | A-2-4(0) | |
| | | | 30.0' | | 18" RECOVERY | | |
| 33 | | | | | | | |
| | | | | | | | |
| 36 | | 13 | 33.0' | 1 3 1 5 | Wet very loose brown fine sand w/some silt and coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 35.0' | | 22" RECOVERY | | |
| 39 | | 14 | 38.0' | 7 8 7 6 | Wet medium dense tan silty fine sand w/some coarse and, trace of gravel. | A-2-4(0) | |
| | | | 40.0' | | 24" RECOVERY | | |
| 42 | | | | | | | |
| | | | | | | | |
| 45 | | 15 | 43.0' | 6 7 8 8 | Wet medium dense gray fine sand w/trace of clay, coarse sand and gravel. | A-2-4(0) | |
| | | | 45.0' | | 24" RECOVERY | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3R-02

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|--------------------|--|-------------|---------|
| 48 | | | | | | | |
| | | 16 | 48.0' | 6 8 13 15 | Wet very stiff gray clayey fine sandy silt w/ some coarse sand. | A-4(0) | |
| | | | 50.0' | | 24" RECOVERY | | |
| 51 | | | | | End of Boring. | | |
| 54 | | | | | | | |
| 57 | | | | | | | |
| 60 | | | | | | | |
| 63 | | | | | | | |
| 66 | | | | | | | |
| 69 | | | | | | | |
| 72 | | | | | | | |

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KEY TO SYMBOLS

Symbol Description

Strata symbols



Silty sand



Silty gravel



Poorly graded sand
with silt



Poorly graded clayey
silty sand

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AUGUST 2015

Notes:

1. Exploratory borings were drilled on 6/22/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-3R-04

Contract: 28-113-01

Boring Location: Sta. 871+16, 35' Rt. C.L.

Boring Surface Elev.: 24.6

Reference:

Wt. of Casing Hammer:
Wt. of Sample Hammer: 140
Type of: D-Sampler: Split Barrel
S-Sampler:
U-Sampler:
Core Bit:

Lbs.
Lbs.
O.D.
O.D.
O.D.
O.D.

Average Fall:
Average Fall: 30
O.D. of Sampler: 2
O.D. of Samp. Tube:
O.D. of Samp. Tube:
O.D. of Rock Core:

IN.
IN.
IN.
IN.
IN.
IN.

Casing Size: 3 1/4
Hollow Stem Auger: Inches

From Depth of:
From Depth of: 0.0
To:
To: 24.0

Water Level Readings

| Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
|-----------|------|---------------|-----------------|----------------|------------------------------|
| 6/22/2009 | | 14.0 | 12.0 | 12.0 | 12.6 24.6 24.6 24.6 |

Pay Quantities:

2 1/2 in. Dia. Dry Sample Boring: 51.0 Ft.;
No. of 2 in. Dia. Shelby Tubes: ;
2 1/2 in. Dia. Contin. Sample Boring: Ft.;
Dia. U-Sample Boring: Ft.
U-Samples:
Core Drilling in Rock: Ft.

Boring Contractor: Walton Corporation

Driller: Gary Truver

Helpers: J. Williams

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|---|
| | 6/22/09 | 1 | 0.0' | | Indication of moist brown silty fine to coarse sand w/trace of gravel. | A-2-4(0) | Asphalt - 12". Stone - 12". Sample from Auger Cuttings. |
| | | | 2.0' | | 0" RECOVERY | | |
| 3 | | 2 | 2.0' | 14 27 13 12 | Moist hard brown fine to coarse sandy silt w/ some clay, trace of gravel. | A-4(0) | |
| | | | 4.0' | | 18" RECOVERY | | |
| | | 3 | 4.0' | 4 3 5 5 | Moist stiff brown fine sandy silt w/some clay and coarse sand. | A-4(0) | |
| 6 | | | 6.0' | | 17" RECOVERY | | |
| | | 4 | 6.0' | 6 6 7 6 | Moist stiff brown clayey silt w/some fine sand, trace of coarse sand and gravel. | A-4(3) | |
| | | | 8.0' | | 21" RECOVERY | | |
| 9 | | 5 | 8.0' | 4 9 15 17 | Moist very stiff brown silt w/some fine to coarse sand, trace of clay and gravel. | A-4(0) | |
| | | | 10.0' | | 13" RECOVERY | | |
| | | 6 | 10.0' | 20 18 20 19 | Moist dense brown silty fine sand and gravel w/some coarse sand. | A-2-4(0) | |
| 12 | | | 12.0' | | 12" RECOVERY | | |
| | | 7 | 12.0' | 8 10 14 13 | Wet medium dense brown fine sand w/some coarse sand and silt. | A-2-4(0) | |
| | | | 14.0' | | 19" RECOVERY | | |
| 15 | | 8 | 14.0' | 6 10 14 17 | Wet medium dense brown silty fine sand w/ some coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 16.0' | | 17" RECOVERY | | |
| | | 9 | 16.0' | 10 8 8 | Wet medium dense brown fine sand w/some | A-3 | |

Remarks: Mud Rotary @ 24.0 Ft.

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3R-04

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|---------------------|
| 18 | | | 18.0' | 18 | coarse sand, trace of silt and gravel. | | |
| | | 10 | 18.0' | W/R 6 16 18 | 23" RECOVERY Wet medium dense brown fine sand w/some silt and coarse sand. | A-2-4(0) | |
| 21 | | | 20.0' | | 24" RECOVERY | | |
| 24 | | 11 | 24.0' | 8 8 9 15 | Wet medium dense brown fine sand w/trace of coarse sand and silt. | A-3 | Mud Rotary @ 24.0'. |
| 27 | | | 26.0' | | 18" RECOVERY | | |
| 30 | | 12 | 29.0' | 7 7 12 16 | Wet medium dense brown fine sand w/some coarse sand and silt. | A-2-4(0) | |
| 33 | | | 31.0' | | 16" RECOVERY | | |
| 36 | | 13 | 34.0' | 8 15 26 30 | wet dense brown fine sand w/some clay and coarse sand, trace of gravel. | A-2-4(0) | |
| 39 | | | 36.0' | | 20" RECOVERY | | |
| 42 | | 14 | 39.0' | 11 15 21 23 | Wet hard gray fine sandy silt w/some clay and coarse sand. | A-4(0) | |
| 45 | | | 41.0' | | 24" RECOVERY | | |
| | | 15 | 44.0' | 9 18 19 30 | Wet dense gray clayey fine sand w/trace of coarse sand. | A-2-4(0) | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3R-04

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|-------------------|--|-------------|---------|
| | | | 46.0' | | 22" RECOVERY | | |
| 48 | | | | | | | |
| | | 16 | 49.0' | 5 6 9 11 | Wet medium dense gray clayey fine sand w/ trace of coarse sand. | A-2-4(0) | |
| 51 | | | 51.0' | | 24" RECOVERY | | |
| | | | | | End of Boring | | |
| 54 | | | | | | | |
| 57 | | | | | | | |
| 60 | | | | | | | |
| 63 | | | | | | | |
| 66 | | | | | | | |
| 69 | | | | | | | |
| 72 | | | | | | | |

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KEY TO SYMBOLS

Symbol Description

Strata symbols



Silty sand



Poorly graded clayey
silty sand



Silty low plasticity
clay



Poorly graded sand



Poorly graded sand
with silt



Clayey sand

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Notes:

1. Exploratory borings were drilled on 6/22/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-3R-06

Contract: 28-113-01

Boring Location: Sta. 874+16, 35' Rt. C.L.

Boring Surface Elev.: +23.2

Reference:

Wt. of Casing Hammer:
Wt. of Sample Hammer: 140
Type of: D-Sampler: Split Barrel
S-Sampler:
U-Sampler:
Core Bit:

Lbs.
Lbs.
O.D.
O.D.
O.D.
O.D.

Average Fall:
Average Fall: 30
O.D. of Sampler: 2
O.D. of Samp. Tube:
O.D. of Samp. Tube:
O.D. of Rock Core:

IN.
IN.
IN.
IN.
IN.
IN.

Casing Size: 3 1/4
Hollow Stem Auger:

Inches

From Depth of:
From Depth of: 0.0

To:
To: 16.0

Water Level Readings

| Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
|-----------|------|---------------|-----------------|----------------|----------------|
| 6/22/2009 | | 12.0 | 12.0 | 11.3 | |

Pay Quantities:

| | | | | | |
|---------------------------------------|----|------|------------------------|-----------------------|-----|
| 2 1/2 in. Dia. Dry Sample Boring: | 50 | Ft.; | | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of | U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | | Ft. |

Boring Contractor: Walton Corporation

Driller: Jason Truver

Helpers: D. Zmijewski

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|---|-------------|-----------------------------------|
| | 6/22/09 | 1 | 0.0' | | | | 12" of HMA and 12" of Stone Base. |
| | | | 2.0' | | 24" RECOVERY | | |
| 3 | | 2 | 2.0' | 2 8 8 6 | Moist medium dense orangish brown gravel and coarse sand w/some fine sand and silt. | A-1-b | |
| | | | 4.0' | | 10" RECOVERY | | |
| | | 3 | 4.0' | 4 6 8 8 | Moist medium dense orange fine sand w/some fine sand and silt, trace of gravel. | A-1-b | |
| 6 | | | 6.0' | | 12" RECOVERY | | |
| | | 4 | 6.0' | 11 13 13 8 | Moist medium dense orangish brown gravel and coarse sand w/some fine sand and silt. | A-1-b | |
| | | | 8.0' | | 13" RECOVERY | | |
| 9 | | 5 | 8.0' | 4 6 6 7 | Moist medium dense orange fine sand w/some coarse sand and silt, trace of gravel. | A-2-4(0) | |
| | | | 10.0' | | 19" RECOVERY | | |
| | | 6 | 10.0' | 6 7 6 5 | Wet medium dense orange silty fine sand w/ some coarse sand, trace of gravel. | A-2-4(0) | |
| 12 | | | 12.0' | | 18" RECOVERY | | |
| | | 7 | 12.0' | 3 3 3 4 | Wet loose orange fine sand w/some coarse sand and silt. | A-2-4(0) | |
| | | | 14.0' | | 18" RECOVERY | | |
| 15 | | 8 | 14.0' | WOR 1 2 3 | Wet very loose orange fine sand w/some coarse sand, trace of silt and gravel. | A-3 | |
| | | | 16.0' | | 10" RECOVERY | | |
| | | 9 | 16.0' | 3 2 3 | Wet loose orange fine sand w/some coarse | A-3 | Mud Rotary @ 16.0'. |

Remarks: Mud Rotary @ 16.0 Ft.

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3R-06

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|--|-------------|---------|
| 18 | | | 18.0' | 3 | sand, trace of silt. 24" RECOVERY | | |
| | | 10 | 18.0' | 2 4 5 6 | Wet loose orange fine sand w/some coarse sand, trace of silt. 10" RECOVERY | A-3 | |
| 21 | | | 20.0' | | | | |
| 24 | | 11 | 23.0' | 3 4 6 | Wet loose orange fine sand w/some silt and coarse sand. 19" RECOVERY | A-2-4(0) | |
| | | | 25.0' | | | | |
| 27 | | | | | | | |
| 30 | | 12 | 28.0' | 4 12 14 14 | Wet medium dense orangish brown silty fine sand w/some coarse sand, trace of gravel. 24" RECOVERY | A-2-4(0) | |
| | | | 30.0' | | | | |
| 33 | | | | | | | |
| | | 13 | 33.0' | 5 8 9 13 | wet medium dense gray silty fine sand w/ some coarse sand, trace of organic matter and gravel. 24" RECOVERY | A-2-4(0) | |
| | | | 35.0' | | | | |
| 36 | | | | | | | |
| 39 | | 14 | 38.0' | 4 6 8 10 | Wet medium dense gray silty fine sand w/ trace of coarse sand and organic matter. 24" RECOVERY | A-2-4(0) | |
| | | | 40.0' | | | | |
| 42 | | | | | | | |
| | | 15 | 43.0' | 5 7 8 13 | Wet stiff gray fine sandy silt w/some clay, trace of coarse sand and organic matter. 24" RECOVERY | A-4(0) | |
| 45 | | | 45.0' | | | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-3R-06

Contract: 28-113-01

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|--------------------|---|-------------|---------|
| 48 | | 16 | 48.0' | 5 7 17 18 | Wet medium dense gray fine sand w/some silt, trace of coarse sand, organic matter and gravel. 24" RECOVERY | A-2-4(0) | |
| 51 | | | 50.0' | | End of Boring. | | |
| 54 | | | | | | | |
| 57 | | | | | | | |
| 60 | | | | | | | |
| 63 | | | | | | | |
| 66 | | | | | | | |
| 69 | | | | | | | |
| 72 | | | | | | | |

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KEY TO SYMBOLS

Symbol Description

Strata symbols



Silty sand



Poorly graded sand
with silt



Poorly graded clayey
silty sand

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Notes:

1. Exploratory borings were drilled on 6/22/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-3R-08

Contract: 28-113-01

Boring Location: Sta. 877+16, 35' Rt. C.L.

Boring Surface Elev.: + 14.0

Reference:

Wt. of Casing Hammer:
Wt. of Sample Hammer: 140
Type of: D-Sampler: Split Barrel
S-Sampler:
U-Sampler:
Core Bit:

Lbs.
Lbs.
O.D.
O.D.
O.D.
O.D.

Average Fall:
Average Fall: 30
O.D. of Sampler: 2
O.D. of Samp. Tube:
O.D. of Samp. Tube:
O.D. of Rock Core:

IN.
IN.
IN.
IN.
IN.
IN.

Casing Size: 3 1/4
Hollow Stem Auger:

Inches

From Depth of:
From Depth of: 0.0

To:
To: 18.0

Water Level Readings

| Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
|-----------|------|---------------|-----------------|----------------|----------------|
| 6/19/2009 | | 12.0 | 10.0 | 8.6 | |

Pay Quantities:

| | | | | |
|---------------------------------------|----|------|------------------------|-----|
| 2 1/2 in. Dia. Dry Sample Boring: | 51 | 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 Truver

Helpers: J. Lafferty

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|----------------|
| | 6/19/09 | 1 | 1.0' | 50/2" | No Sample Recovery | | Asphalt - 12". |
| | | | 2.0' | | 0" RECOVERY | | |
| 3 | | 2 | 2.0' | 11 17 15 14 | Moist dense orangish brown coarse to fine sand w/some silt, trace of gravel. | A-1-b | |
| | | | 4.0' | | 14" RECOVERY | | |
| | | 3 | 4.0' | 6 11 8 5 | Moist medium dense orangish brown gravel and fine to coarse sand w/some silt. | A-1-b | |
| 6 | | | 6.0' | | 16" RECOVERY | | |
| | | 4 | 6.0' | 5 6 6 8 | Moist medium dense orangish brown fine sand w/some coarse sand, trace of silt and gravel. | A-3 | |
| | | | 8.0' | | 24" RECOVERY | | |
| 9 | | 5 | 8.0' | 1 2 3 2 | Wet loose orangish brown fine sand w/some coarse sand, trace of silt. | A-3 | |
| | | | 10.0' | | 17" RECOVERY | | |
| | | 6 | 10.0' | 2 2 2 3 | Wet very loose orangish brown fine sand w/ some coarse sand and silt. | A-2-4(0) | |
| 12 | | | 12.0' | | 19" RECOVERY | | |
| | | 7 | 12.0' | 2 3 5 6 | Wet loose orangish brown fine sand w/some silt and coarse sand. | A-2-4(0) | |
| | | | 14.0' | | 10" RECOVERY | | |
| 15 | | 8 | 14.0' | W/H 2 2 3 | Wet very loose orangish brown silty fine sand w/trace of coarse sand. | A-2-4(0) | |
| | | | 16.0' | | 20" RECOVERY | | |
| | | 9 | 16.0' | 3 3 4 6 | Wet loose orangish brown fine sand w/trace of coarse sand and silt. | A-3 | |

Remarks: Mud Rotary @ 18.0 Ft.

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3R-08

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|--------------------|---|-------------|---------------------|
| | | 10 | 18.0' | 2 3 3 2 | 20" RECOVERY | A-2-4(0) | Mud Rotary @ 18.0'. |
| | | | 18.0' | | Wet loose orangish brown fine sand w/some silt and coarse sand. | | |
| 21 | | | 20.0' | | 19" RECOVERY | | |
| 24 | | 11 | 24.0' | 4 1 1 7 | Wet very loose brownish orange and gray fine sand w/some silt and coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 26.0' | | 20" RECOVERY | | |
| 27 | | | | | | | |
| 30 | | 12 | 29.0' | 4 4 7 11 | Wet medium dense gray fine sand w/some clay and coarse sand. | A-2-4(0) | |
| | | | 31.0' | | 16" RECOVERY | | |
| 33 | | | | | | | |
| 36 | | 13 | 34.0' | 3 6 11 10 | Wet very stiff gray clayey fine sandy silt w/ trace of coarse sand. | A-4(0) | |
| | | | 36.0' | | 19" RECOVERY | | |
| 39 | | | | | | | |
| 42 | | 14 | 39.0' | 4 6 7 10 | Wet stiff gray clayey fine sandy silt w/trace of coarse sand. | A-4(0) | |
| | | | 41.0' | | 21" RECOVERY | | |
| 45 | | 15 | 44.0' | 4 5 7 8 | Wet stiff gray clayey fine sandy silt w/trace of coarse sand. | A-4(0) | |
| | | | 46.0' | | 21" RECOVERY | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3R-08

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|---------|
| 48 | | | | | | | |
| | | 16 | 49.0' | 11 13 17 21 | Wet medium dense gray silty fine sand w/ trace of coarse sand and gravel. | A-2-4(0) | |
| 51 | | | 51.0' | | 20" RECOVERY | | |
| | | | | | End of Boring | | |
| 54 | | | | | | | |
| 57 | | | | | | | |
| 60 | | | | | | | |
| 63 | | | | | | | |
| 66 | | | | | | | |
| 69 | | | | | | | |
| 72 | | | | | | | |

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AUGUST 2015

KEY TO SYMBOLS

Symbol Description

Strata symbols



Silty sand



Poorly graded sand
with silt



Poorly graded sand



Poorly graded clayey
silty sand

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Notes:

1. Exploratory borings were drilled on 6/19/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-3R-10

Contract: 28-113-01

Boring Location: Sta. 880+06, 35' Rt. C.L.

Boring Surface Elev.: +13.2

Reference:

Wt. of Casing Hammer:
Wt. of Sample Hammer: 140
Type of: D-Sampler: Split Barrel
S-Sampler:
U-Sampler:
Core Bit:

Lbs.
Lbs.
O.D.
O.D.
O.D.
O.D.

Average Fall:
Average Fall: 30
O.D. of Sampler: 2
O.D. of Samp. Tube:
O.D. of Samp. Tube:
O.D. of Rock Core:

IN.
IN.
IN.
IN.
IN.

Casing Size: 3 1/4
Hollow Stem Auger:

Inches

From Depth of:
From Depth of: 0.0

To:
To: 18.0

Water Level Readings

| Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
|-----------|------|---------------|-----------------|----------------|----------------|
| 6/19/2009 | | 10. | 8.0 | 5.9 | |

Pay Quantities:

| | | | | |
|---------------------------------------|----|------|------------------------|-----|
| 2 1/2 in. Dia. Dry Sample Boring: | 51 | Ft.; | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | Ft. |

Boring Contractor: Walton Corporation

Driller: Jason Truver

Helpers: J. Lafferty

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|----------------------------------|
| 3 | 6/19/09 | 1 | 1.0' | 50/2" | Moist gray silty gravel w/trace of fine to coarse sand. | A-2-4(0) | 12" of HMA and 12" of Stone Base |
| | | 2 | 2.0' | 10 20 | 2" RECOVERY | A-1-b | |
| 6 | 6/19/09 | 2A | 3.0' | 50/3" | Moist very dense brown coarse to fine sand w/some gravel, trace of silt. | A-1-a | |
| | | 3 | 4.0' | 10 14 10 9 | Moist very dense grayish black gravel w/trace of coarse to fine sand and silt. | A-4(0) | |
| | | 4 | 6.0' | 13 15 14 11 | Moist very stiff brown fine to coarse sandy silt w/some clay and gravel. | A-2-4(0) | |
| 9 | 6/19/09 | 5 | 8.0' | 4 3 3 4 | Moist medium dense orangish brown fine sand w/some silt and coarse sand, trace of gravel. | A-2-4(0) | |
| | | 6 | 10.0' | 2 3 3 2 | 14" RECOVERY | A-2-4(0) | |
| 12 | 6/19/09 | 7 | 12.0' | WOR 1 2 | 16" RECOVERY | A-3 | |
| | | 8 | 14.0' | WOR 1 2 2 | Wet loose orangish brown fine sand w/some coarse sand, trace of silt. | A-2-4(0) | |
| 15 | 6/19/09 | 9 | 16.0' | 2 1 2 | 23" RECOVERY | A-2-4(0) | |
| | | 9 | 16.0' | 2 1 2 | Wet very loose orangish brown fine sand w/some coarse sand and silt. | A-2-4(0) | |

Remarks: Mud Rotary @ 18.0 Ft.

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3R-10

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|-------------------|---|-------------|---------|
| | | 10 | 18.0' | 2 3 4 6 | 20" RECOVERY | A-2-4(0) | |
| | | | 18.0' | | Wet loose brownish red silty fine sand w/ some coarse sand, trace of gravel. | | |
| 21 | | | 20.0' | | 18" RECOVERY | | |
| 24 | | 11 | 24.0' | 5 5 5 6 | Wet stiff gray fine sandy silt w/some coarse sand, trace of organic matter and gravel. | A-4(0) | |
| | | | 26.0' | | 22" RECOVERY | | |
| 27 | | | | | | | |
| 30 | | 12 | 29.0' | 2 3 3 5 | Wet loose gray clayey fine sand w/trace of coarse sand and organic matter. | A-2-4(0) | |
| | | | 31.0' | | 22" RECOVERY | | |
| 33 | | | | | | | |
| 36 | | 13 | 34.0' | 2 3 3 5 | Wet firm gray fine sandy silt w/some clay, trace of coarse sand and organic matter. | A-4(0) | |
| | | | 36.0' | | 24" RECOVERY | | |
| 39 | | | | | | | |
| 42 | | 14 | 39.0' | 1 2 2 3 | Wet very loose gray silty fine sand w/trace of coarse sand, gravel and organic matter. | A-2-4(0) | |
| | | | 41.0' | | 20" RECOVERY | | |
| 45 | | 15 | 44.0' | 5 7 8 11 | Wet stiff gray fine sandy silt w/trace of organic matter and coarse sand. | A-4(0) | |
| | | | 46.0' | | 22" RECOVERY | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3R-10

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|-------------------|---|-------------|---------|
| 48 | | | | | | | |
| | | 16 | 49.0' | 4 6 8 10 | Wet stiff grayish black clayey fine sandy silt w/some organic matter. | A-4(0) | |
| 51 | | | 51.0' | | 22" RECOVERY | | |
| | | | | | End of Boring. | | |
| 54 | | | | | | | |
| 57 | | | | | | | |
| 60 | | | | | | | |
| 63 | | | | | | | |
| 66 | | | | | | | |
| 69 | | | | | | | |
| 72 | | | | | | | |

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KEY TO SYMBOLS

Symbol Description

Strata symbols



Silty gravel



Poorly graded sand
with silt



Poorly graded gravel
with silt



Poorly graded clayey
silty sand



Silty sand

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Notes:

1. Exploratory borings were drilled on 6/19/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-3R-11

Contract: 28-113-01

Boring Location: Sta. 147+80 55' LT C.L.

Boring Surface Elev.: + 24.27

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: | | To: | |
| Hollow Stem Auger: | | From Depth of: 0.0 | | To: 14.0 | |

| | | | | | | |
|-----------------------------|-------------|-------------|----------------------|------------------------|-----------------------|-----------------------|
| Water Level Readings | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| | 7/21/10 | | 8.0 | 8.0 | 5.1 | |

Pay Quantities:

| | | | | |
|---------------------------------------|------|-------------|-------------------------------|------------|
| 2 1/2 in. Dia. Dry Sample Boring: | 61.0 | Ft.; | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | Ft. |

Boring Contractor: Walton Corporation
Driller: Bill Holden
Helpers: T. Kane

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|-------------------|---|-------------|--------------------|
| | 7/21/10 | 1 | 0.5' | 4 8 12 | Moist medium dense brown coarse to fine sand w/some silt and fine gravel. 14" RECOVERY | A-1-b | Topsoil - 4" |
| 3 | | 2 | 2.0' | 8 7 5 5 | Moist medium dense brown coarse to fine sand w/some silt, trace fine gravel. 16" RECOVERY | A-1-b | |
| | | 3 | 4.0' | 7 2 3 4 | Wet loose coarse to fine sand w/trace silt and fine gravel. 11" RECOVERY | A-1-b | |
| 6 | | 4 | 6.0' | 2 2 2 3 | Wet very loose brown coarse to fine sand w/some fine gravel, trace silt. 20" RECOVERY | A-1-b | |
| 9 | | 5 | 8.0' | 2 2 2 2 | Wet very loose orange silty fine sand w/some coarse sand. 14" RECOVERY | A-2-4(0) | |
| | | 6 | 10.0' | 3 2 3 7 | Wet loose orange fine to coarse sand w/some silt, trace fine gravel. 14" RECOVERY | A-2-4(0) | |
| 12 | | 7 | 12.0' | 5 7 5 5 | No Sieve Analysis - Indication of wet medium dense orange silty sand w/some fine gravel. 6" RECOVERY | | |
| 15 | | 8 | 14.0' | 10 4 5 7 | Wet loose brown fine sand w/some coarse sand, trace silt and fine gravel. 15" RECOVERY | A-3 | Mud Rotary @ 14.0' |
| | | 9 | 16.0' | 8 13 9 8 | Wet medium dense brown fine sand w/some coarse sand and silt, trace fine gravel. | A-2-4(0) | |

Remarks:

Reviewed By: Haney Fekry

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3R-11

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|---------|
| 18 | | | 18.0' | | 19" RECOVERY | | |
| | | 10 | 18.0' | 8 9 10 12 | Saturated medium dense brown fine sand w/ some coarse sand, trace silt. | A-3 | |
| | | | 20.0' | | 18" RECOVERY | | |
| 21 | | | | | | | |
| | | | | | | | |
| 24 | | | | | | | |
| | | 11 | 24.0' | 5 6 3 5 | Saturated loose brown fine sand w/some coarse sand, trace silt and fine gravel. | A-3 | |
| | | | 26.0' | | 16" RECOVERY | | |
| 27 | | | | | | | |
| | | | | | | | |
| 30 | | 12 | 29.0' | 10 9 8 10 | Saturated medium dense brown fine sand w/ some coarse sand, trace silt. | A-3 | |
| | | | 31.0' | | 20" RECOVERY | | |
| 33 | | | | | | | |
| | | | | | | | |
| 36 | | 13 | 34.0' | 7 6 6 7 | Saturated medium dense brown silty fine sand w/trace coarse sand. | A-2-4(0) | |
| | | | 36.0' | | 17" RECOVERY | | |
| 39 | | | | | | | |
| | | | | | | | |
| 42 | | 14 | 39.0' | 10 15 18 17 | Saturated dense brown coarse to fine sand w/ trace silt. | A-1-b | |
| | | | 41.0' | | 19" RECOVERY | | |
| 45 | | 15 | 44.0' | 12 15 15 14 | Saturated medium dense gray silty fine sand w/some coarse sand. | A-2-4(0) | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-3R-11

Contract: 28-113-01

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|---|-------------|---------|
| | | | 46.0' | | 23" RECOVERY | | |
| 48 | | | | | | | |
| | | 16 | 49.0' | 11 8 11 13 | Saturated medium dense gray silty fine sand w/some coarse sand. | A-2-4(0) | |
| 51 | | | 51.0' | | 24" RECOVERY | | |
| | | | | | | | |
| 54 | | | | | | | |
| | | 17 | 54.0' | 5 8 11 14 | Saturated medium dense gray silty fine sand w/some clay, trace coarse sand. | A-2-4(0) | |
| | | | 56.0' | | 24" RECOVERY | | |
| 57 | | | | | | | |
| | | | | | | | |
| 60 | | 18 | 59.0' | 7 12 20 17 | Saturated dense gray silty fine sand w/some coarse sand, trace clay. | A-2-4(0) | |
| | | | 61.0' | | 12" RECOVERY | | |
| | | | | | End of Boring | | |
| 63 | | | | | | | |
| | | | | | | | |
| 66 | | | | | | | |
| | | | | | | | |
| 69 | | | | | | | |
| | | | | | | | |
| 72 | | | | | | | |

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NOT FOR BIDDING
AUGUST 2015

KEY TO SYMBOLS

Symbol Description

Strata symbols



Silty sand



Well graded sand
with silt



Poorly graded sand
with silt



Poorly graded sand



Poorly graded clayey
silty sand

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NOT FOR BIDDING
AUGUST 2015

Notes:

1. Exploratory borings were drilled on July 21, 2010 using a 3 1/4-inch diameter continuous flight power auger. Rig is a CME 55 ATV.
2. Groundwater levels recorded at the time of drilling and re-checked to following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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 blows are uncorrected.

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-3R-12

Contract: 28-113-01

Boring Location: Sta. 149+30 55' LT C.L.

Boring Surface Elev.: + 23.29

Reference:

Wt. of Casing Hammer:
Wt. of Sample Hammer: 140
Type of: D-Sampler: Split Barrel
S-Sampler:
U-Sampler:
Core Bit:

Lbs.
Lbs.
O.D.
O.D.
O.D.
O.D.

Average Fall:
Average Fall: 30
O.D. of Sampler: 2
O.D. of Samp. Tube:
O.D. of Samp. Tube:
O.D. of Rock Core:

IN.
IN.
IN.
IN.
IN.
IN.

Casing Size: 3 1/4
Hollow Stem Auger:

Inches

From Depth of:
From Depth of: 0.0

To:
To: 14.0

Water Level Readings

Date
7/22/10

Time

Depth of Hole
8.0

Depth of Casing
8.0

Depth of Water
5.6

Elev. of Water

Pay Quantities:

2 1/2 in. Dia. Dry Sample Boring: 60.0
No. of 2 in. Dia. Shelby Tubes:
2 1/2 in. Dia. Contin. Sample Boring:

Ft.;
Ft.;

No. of:
Core Drilling in Rock:

Dia. U-Sample Boring:
U-Samples:

Ft.
Ft.

Boring Contractor: Walton Corporation

Driller: Bill Holden

Helpers: T. Kane

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|-------------------|---|-------------|-------------------|
| | 7/22/10 | 1 | 0.5' | 3 5 6 | Moist loose brown silty coarse to fine sand w/ some fine gravel. 14" RECOVERY | A-2-4(0) | Topsoil - 6". |
| 3 | | 2 | 2.0' | 5 6 3 3 | Wet loose brown coarse to fine sand w/some silt, trace fine gravel. 17" RECOVERY | A-2-4(0) | |
| | | 3 | 4.0' | 3 2 1 1 | Wet very loose brown fine to coarse sand w/ some silt, trace fine gravel. 15" RECOVERY | A-2-4(0) | |
| 6 | | 4 | 6.0' | 1 2 1 3 | Wet very loose brown fine to coarse sand w/ some silt, trace fine gravel. 18" RECOVERY | A-2-4(0) | |
| 9 | | 5 | 8.0' | 1 2 1 2 | Wet very loose brown fine to coarse sand w/ trace silt and fine gravel. 10" RECOVERY | A-3 | |
| | | 6 | 10.0' | 2 5 5 7 | Wet loose brown fine gravelly fine to coarse sand w/trace silt. 3" RECOVERY | A-1-b | |
| 12 | | 7 | 12.0' | 5 8 4 10 | Wet medium dense brown coarse to fine sand w/trace fine gravel and silt. 18" RECOVERY | A-1-b | |
| | | 8 | 14.0' | 3 3 4 5 | Wet loose brown fine sand w/some coarse sand, trace silt and fine gravel. 23" RECOVERY | A-3 | Mud Rotary @ 14.0 |
| 15 | | 9 | 16.0' | 5 4 5 6 | Wet loose brown fine sand w/some coarse sand and silt, trace fine gravel. | A-2-4(0) | |

Remarks:

Reviewed By: Hany Fekry

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3R-12

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|---------|
| 18 | | | 18.0' | | 4" RECOVERY | | |
| | | 10 | 18.0' | 5 5 7 9 | Wet medium dense orange fine sand w/some coarse sand, trace silt. | A-3 | |
| | | | 20.0' | | 18" RECOVERY | | |
| 21 | | | | | | | |
| | | | | | | | |
| 24 | | | | | | | |
| | | 11 | 24.0' | 7 8 12 10 | Wet medium dense orange fine sand w/some coarse sand, trace silt. | A-3 | |
| | | | 26.0' | | 18" RECOVERY | | |
| 27 | | | | | | | |
| | | | | | | | |
| 30 | | 12 | 29.0' | 6 10 10 13 | Wet medium dense brown fine sand w/some coarse sand, trace silt and fine gravel. | A-3 | |
| | | | 31.0' | | 19" RECOVERY | | |
| 33 | | | | | | | |
| | | | | | | | |
| 36 | | 13 | 34.0' | 3 3 5 5 | Wet loose brown fine sand w/trace coarse sand and silt. | A-3 | |
| | | | 36.0' | | 20" RECOVERY | | |
| 39 | | | | | | | |
| | | | | | | | |
| 42 | | 14 | 39.0' | 10 14 19 22 | Wet dense brown silty fine sand w/trace coarse sand and fine gravel. | A-2-4(0) | |
| | | | 41.0' | | 24" RECOVERY | | |
| 45 | | 15 | 44.0' | 9 8 8 9 | Wet medium dense gray silty fine sand w/ some coarse sand, trace fine gravel. | A-2-4(0) | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3R-12

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|--|-------------|---------|
| | | | 46.0' | | 22" RECOVERY | | |
| 48 | | | | | | | |
| | | 16 | 49.0' | 6 6 9 10 | Wet medium dense gray silty fine sand w/ trace coarse sand and fine gravel. | A-2-4(0) | |
| 51 | | | 51.0' | | 24" RECOVERY | | |
| | | | | | | | |
| 54 | | | | | | | |
| | | 17 | 54.0' | 9 12 13 17 | Wet very stiff gray fine sandy silt w/trace fine gravel. | A-4(0) | |
| | | | 56.0' | | 23" RECOVERY | | |
| 57 | | | | | | | |
| | | 18 | 58.0' | 6 8 10 14 | Wet medium dense gray silty fine sand w/ some coarse sand. | A-2-4(0) | |
| 60 | | | 60.0' | | 20" RECOVERY | | |
| | | | | | End of Boring | | |
| 63 | | | | | | | |
| | | | | | | | |
| 66 | | | | | | | |
| | | | | | | | |
| 69 | | | | | | | |
| | | | | | | | |
| 72 | | | | | | | |

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AUGUST 2015

KEY TO SYMBOLS

Symbol Description

Strata symbols



Silty sand



Poorly graded sand
with silt



Well graded sand
with silt

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AUGUST 2015

Notes:

1. Exploratory borings were drilled on July 22, 2010 using a 3 1/4-inch diameter continuous flight power auger. Rig is a CME 55 ATV.
2. Groundwater levels recorded at the time of drilling and re-checked to following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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 blows are uncorrected.

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-3R-13

Contract: 28-113-01

Boring Location: Sta. 150+80 55' LT C.L.

Boring Surface Elev.: +22.45

Reference:

Wt. of Casing Hammer:
Wt. of Sample Hammer: 140
Type of: D-Sampler: Split Barrel
S-Sampler:
U-Sampler:
Core Bit:

Lbs.
Lbs.
O.D.
O.D.
O.D.
O.D.

Average Fall:
Average Fall: 30
O.D. of Sampler: 2
O.D. of Samp. Tube:
O.D. of Samp. Tube:
O.D. of Rock Core:

IN.
IN.
IN.
IN.
IN.
IN.

Casing Size: 3 1/4
Hollow Stem Auger:

Inches

From Depth of:
From Depth of: 0.0

To:
To: 18.0

Water Level Readings

| Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
|---------|------|---------------|-----------------|----------------|----------------|
| 7/26/10 | | 8.0 | 8.0 | 5.8 | |

Pay Quantities:

| | | | | |
|---------------------------------------|------|------|------------------------|-----|
| 2 1/2 in. Dia. Dry Sample Boring: | 60.0 | Ft.; | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | Ft. |

Boring Contractor: Walton Corporation

Driller: Jason Truver

Helpers: M. Derr

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|----------------|
| | 7/26/10 | 1 | 1.0' | 11 13 | Moist medium dense brown coarse to fine sand w/some silt and fine gravel. | A-1-b | Asphalt - 12". |
| | | 2 | 2.0' | 13 9 9 7 | 12" RECOVERY Moist medium dense brownish orange coarse to fine sand w/some fine gravel and silt. | A-1-b | |
| 3 | | 3 | 4.0' | 5 1 2 6 | 14" RECOVERY Wet soft gray silt w/some fine to coarse sand. | A-4(0) | |
| 6 | | 4 | 6.0' | 2 3 6 6 | 12" RECOVERY Wet loose gray silty coarse to fine sand w/some fine gravel. | A-2-4(0) | |
| 9 | | 5 | 8.0' | 12 18 20 28 | 18" RECOVERY Wet dense brown fine gravel and coarse sand w/some fine sand, trace silt. | A-1-b | |
| 12 | | 6 | 10.0' | 18 13 14 12 | 15" RECOVERY Wet medium dense orangish brown fine gravelly fine to coarse sand w/trace silt. | A-1-b | |
| 15 | | 7 | 12.0' | 4 4 7 9 | 20" RECOVERY Wet medium dense orangish brown fine sand w/some coarse sand and silt, trace fine gravel. | A-2-4(0) | |
| | | 8 | 14.0' | 4 4 8 9 | 18" RECOVERY Wet medium dense orangish brown fine sand w/some silt and coarse sand, trace fine gravel. | A-2-4(0) | |
| | | 9 | 16.0' | 6 9 12 15 | 24" RECOVERY Wet medium dense orangish brown fine sand w/some coarse sand and silt, trace fine gravel. | A-2-4(0) | |

Remarks:

Reviewed By: Hany Fekry

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3R-13

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|--------------------|---|-------------|--------------------|
| | | 10 | 18.0' | 5 5 11 9 | 24" RECOVERY | A-2-4(0) | Mud Rotary @ 18.0' |
| | | | 18.0' | | Wet medium dense orange fine sand w/some coarse sand and silt. | | |
| 21 | | | 20.0' | | 18" RECOVERY | | |
| | | 11 | 23.0' | 6 8 11 12 | Wet medium dense orange fine sand w/some coarse sand and silt. | A-2-4(0) | |
| 24 | | | 25.0' | | 18" RECOVERY | | |
| 27 | | | | | | | |
| | | 12 | 28.0' | 5 5 5 5 | Wet loose orange fine sand w/trace coarse sand and silt. | A-3 | |
| 30 | | | 30.0' | | 15" RECOVERY | | |
| 33 | | | | | | | |
| | | 13 | 33.0' | 12 4 6 14 | Wet loose brown fine sand w/some silt, trace coarse sand and fine gravel. | A-2-4(0) | |
| 36 | | | 35.0' | | 22" RECOVERY | | |
| 39 | | 14 | 38.0' | 5 5 5 7 | Wet loose gray silty fine sand w/some coarse sand, trace fine gravel. | A-2-4(0) | |
| 42 | | | 40.0' | | 24" RECOVERY | | |
| 45 | | 15 | 43.0' | 8 7 7 10 | Wet medium dense gray silty fine sand w/ some coarse sand. | A-2-4(0) | |
| | | | 45.0' | | 24" RECOVERY | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3R-13

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|---|-------------|---------|
| 48 | | | | | | | |
| | | 16 | 48.0' | 3 5 10 15 | Wet medium dense gray silty fine sand w/ trace coarse sand. | A-2-4(0) | |
| | | | 50.0' | | 24" RECOVERY | | |
| 51 | | | | | | | |
| | | | | | | | |
| 54 | | 17 | 53.0' | 7 6 7 11 | Wet medium dense gray silty fine sand w/ some coarse sand. | A-2-4(0) | |
| | | | 55.0' | | 24" RECOVERY | | |
| 57 | | | | | | | |
| | | | | | | | |
| | | 18 | 58.0' | 8 12 13 16 | Wet medium dense gray silty fine gravelly fine sand w/trace coarse sand. | A-2-4(0) | |
| 60 | | | 60.0' | | 24" RECOVERY | | |
| | | | | | End of Boring | | |
| 63 | | | | | | | |
| | | | | | | | |
| 66 | | | | | | | |
| | | | | | | | |
| 69 | | | | | | | |
| | | | | | | | |
| 72 | | | | | | | |
| | | | | | | | |

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NOT FOR BIDDING
AUGUST 2015

KEY TO SYMBOLS

Symbol Description

Strata symbols



Silty sand



Silt



Well graded sand
with silt



Poorly graded sand
with silt

DRAFT
NOT FOR BIDDING
AUGUST 2015

Notes:

1. Exploratory borings were drilled on July 26, 2010 using a 3 1/4-inch diameter continuous flight power auger. Rig is a CME 55 ATV.
2. Groundwater levels recorded at the time of drilling and re-checked to following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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 blows are uncorrected.

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-3R-14

Contract: 28-113-01

Boring Location: Sta. 152+30 55' LT C.L.

Boring Surface Elev.: + 21.81

Reference:

Wt. of Casing Hammer:
Wt. of Sample Hammer: 140
Type of: D-Sampler: Split Barrel
S-Sampler:
U-Sampler:
Core Bit:

Lbs.
Lbs.
O.D.
O.D.
O.D.
O.D.

Average Fall:
Average Fall: 30
O.D. of Sampler: 2
O.D. of Samp. Tube:
O.D. of Samp. Tube:
O.D. of Rock Core:

IN.
IN.
IN.
IN.
IN.
IN.

Casing Size: 3 1/4
Hollow Stem Auger: Inches

From Depth of:
From Depth of: 0.0
To:
To: 20.0

Water Level Readings

| Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
|---------|------|---------------|-----------------|----------------|----------------|
| 7/26/10 | | 14.0 | 14.0 | 8.8 | |

Pay Quantities:

| | | | | |
|---------------------------------------|------|------|------------------------|-----|
| 2 1/2 in. Dia. Dry Sample Boring: | 60.0 | Ft.; | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | Ft. |

Boring Contractor: Walton Corporation

Driller: G. Truver

Helpers: J. Lafferty

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|---|-------------|----------------|
| | 7/26/10 | 1 | 1.0' | 10 15 | Not enough sample for testing. | | Asphalt - 12". |
| | | | 2.0' | | 4" RECOVERY | | |
| 3 | | 2 | 2.0' | 10 14 12 8 | Moist medium dense brown coarse to fine sand w/some silt, trace fine gravel. | A-1-b | |
| | | | 4.0' | | 22" RECOVERY | | |
| | | 3 | 4.0' | 2 2 2 2 | Wet soft gray silt w/some clay, trace coarse to fine sand. | A-4(1) | |
| | | | 6.0' | | 18" RECOVERY | | |
| 6 | | 4 | 6.0' | 2 2 | Wet soft gray silt w/some coarse to fine sand and clay. | A-4(1) | |
| | | | 7.0' | | 9" RECOVERY | | |
| | | 4A | 7.0' | 11 13 | Wet medium dense gray coarse sandy fine gravel w/some fine sand and silt. | A-1-b | |
| | | | 8.0' | | 10" RECOVERY | | |
| 9 | | 5 | 8.0' | 15 11 7 7 | No Sieve Analysis - Indication of wet medium dense gray silty sand w/trace fine gravel. | | |
| | | | 10.0' | | 2" RECOVERY | | |
| | | 6 | 10.0' | 4 5 5 11 | Wet loose orange fine sand w/some silt, trace coarse sand and fine gravel. | A-2-4(0) | |
| | | | 12.0' | | 20" RECOVERY | | |
| 12 | | 7 | 12.0' | 5 5 6 6 | Wet medium dense orange fine sand w/some fine gravel and coarse sand, trace silt. | A-3 | |
| | | | 14.0' | | 21" RECOVERY | | |
| 15 | | 8 | 14.0' | 2 3 4 6 | Wet loose orange fine sand w/some coarse sand and silt. | A-2-4(0) | |
| | | | 16.0' | | 19" RECOVERY | | |
| | | 9 | 16.0' | 4 6 9 10 | Wet medium dense brown fine sand w/some coarse sand and silt, trace fine gravel. | A-2-4(0) | |

Remarks:

Reviewed By: Hany Fekry

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3R-14

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|--|-------------|--------------------|
| | | 10 | 18.0' | | 22" RECOVERY | A-3 | Mud Rotary @ 20.0' |
| | | | 18.0' | 3 4 6 | Wet loose brown fine sand w/some coarse sand, trace silt. | | |
| 21 | | | 20.0' | | 17" RECOVERY | | |
| 24 | | 11 | 24.0' | 4 5 6 | Wet loose brown fine sand w/some coarse sand and silt. | A-2-4(0) | |
| | | | 26.0' | | 18" RECOVERY | | |
| 27 | | | | | | | |
| 30 | | 12 | 29.0' | 3 3 4 | Wet loose brown fine sand w/trace coarse sand, silt and fine gravel. | A-3 | |
| | | | 31.0' | | 18" RECOVERY | | |
| 33 | | | | | | | |
| 36 | | 13 | 34.0' | 6 10 12 12 | Wet medium dense brown fine sand w/some silt and coarse sand, trace fine gravel. | A-2-4(0) | |
| | | | 36.0' | | 19" RECOVERY | | |
| 39 | | | | | | | |
| 42 | | 14 | 39.0' | 5 7 11 11 | Wet medium dense gray silty fine sand w/ some coarse sand. | A-2-4(0) | |
| | | | 41.0' | | 18" RECOVERY | | |
| 45 | | 15 | 44.0' | 5 8 9 14 | Wet medium dense gray silty fine sand w/ some coarse sand. | A-2-4(0) | |
| | | | 46.0' | | 20" RECOVERY | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3R-14

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|----------------|--------------------|--|-------------|---------|
| 48 | | | | | | | |
| 51 | | 16 | 49.0' 51.0' | 6 6 7 12 | Wet medium dense gray silty fine sand w/ trace coarse sand. 22" RECOVERY | A-2-4(0) | |
| 54 | | 17 | 54.0' 56.0' | 6 7 9 13 | Wet medium dense gray silty fine sand w/ some coarse sand. 22" RECOVERY | A-2-4(0) | |
| 57 | | 18 | 58.0' 60.0' | 6 8 10 16 | Wet very stiff gray fine sandy silt w/trace coarse sand and clay. 22" RECOVERY | A-4(0) | |
| 60 | | | | | End of Boring | | |
| 63 | | | | | | | |
| 66 | | | | | | | |
| 69 | | | | | | | |
| 72 | | | | | | | |

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KEY TO SYMBOLS

Symbol Description

Strata symbols



Silty sand



Silt



Silty low plasticity
clay



Poorly graded sand
with silt

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Notes:

1. Exploratory borings were drilled on July 26, 2010 using a 3 1/4-inch diameter continuous flight power auger. Rig is a CME 55 ATV.
2. Groundwater levels recorded at the time of drilling and re-checked to following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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 blows are uncorrected.

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-3R-15

Contract: 28-113-01

Boring Location: Sta. 153+80 55' LT C.L.

Boring Surface Elev.: + 21.64

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: | | To: | |
| Hollow Stem Auger: | | From Depth of: 0.0 | | To: 19.0 | |

| | | | | | | |
|-----------------------------|-------------|-------------|----------------------|------------------------|-----------------------|-----------------------|
| Water Level Readings | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| | 7/26/10 | | 8.0 | 8.0 | 4.8 | |

Pay Quantities:

| | | | | |
|---------------------------------------|------|-------------|-------------------------------|------------|
| 2 1/2 in. Dia. Dry Sample Boring: | 61.0 | Ft.; | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | Ft. |

Boring Contractor: Walton Corporation
Driller: Dave Burt
Helpers: T. Kane

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks | |
|-------------|----------------|-----|--------------|----------|---|---|----------------|--|
| | 7/26/10 | 1 | 0.0' | | | | Asphalt - 15". | |
| | | | 2.0' | | 0" RECOVERY | | | |
| 3 | | 2 | 2.0' | 5 | Moist loose gray fine gravel w/some silt and coarse sand, trace fine sand and clay. | A-1-b | | |
| | | 2A | 3.0' | 5 | | 8" RECOVERY | A-1-b | |
| | | | 3.0' | 10 | Moist medium dense orange coarse to fine sand w/some fine gravel and silt. | A-1-b | | |
| | | | 4.0' | 8 | | 6" RECOVERY | A-1-b | |
| | | 3 | 4.0' | 4 | Moist loose orange coarse to fine sand w/some fine gravel and silt. | A-1-b | | |
| | | | | 4 | | 7" RECOVERY | | |
| 6 | | 4 | 6.0' | 2 | | Wet loose brown silty fine sand w/some coarse sand. | A-2-4(0) | |
| | | | | 3 | | | | |
| | | | | 4 | | | | |
| | | | | 4 | | | | |
| | | | 8.0' | | 10" RECOVERY | | | |
| 9 | | 5 | 8.0' | 2 | Wet very loose brown fine sand w/some silt and coarse sand, trace fine gravel. | A-2-4(0) | | |
| | | | | 2 | | | | |
| | | | | 2 | | | | |
| | | | 10.0' | | 14" RECOVERY | | | |
| | | 6 | 10.0' | 5 | Wet medium dense brown fine to coarse sand w/some silt, trace fine gravel. | A-2-4(0) | | |
| | | | | 5 | | | | |
| | | | | 9 | | | | |
| | | | | 26 | | | | |
| 12 | | | 12.0' | | 16" RECOVERY | | | |
| | | 7 | 12.0' | 4 | Wet medium dense brown fine sand w/some coarse sand, trace silt. | A-3 | | |
| | | | | 6 | | | | |
| | | | | 6 | | | | |
| | | | | 9 | | | | |
| | | | 14.0' | | 16" RECOVERY | | | |
| | | 8 | 14.0' | 5 | Wet medium dense brown fine sand w/some coarse sand and silt. | A-2-4(0) | | |
| 15 | | | | 6 | | | | |
| | | | | 6 | | | | |
| | | | | 14 | | | | |
| | | | 16.0' | | 16" RECOVERY | | | |
| | | 9 | 16.0' | 11 | Wet medium dense brown fine sand w/some | A-2-4(0) | | |
| | | | | 8 | | | | |
| | | | | 12 | | | | |

Remarks:

Reviewed By: Hany Fekry

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3R-15

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|--|-------------|---------------------|
| 18 | | | 18.0' | 12 | coarse sand and silt. 18" RECOVERY | | |
| | | 10 | 18.0' | 6 5 6 10 | Wet medium dense brown fine sand w/some coarse sand and silt. 17" RECOVERY | A-2-4(0) | Mud Rotary @ 19.0'. |
| 21 | | | 20.0' | | | | |
| 24 | | | | | | | |
| | | 11 | 24.0' | 6 10 11 12 | Wet medium dense brown fine sand w/some coarse sand and silt. 17" RECOVERY | A-2-4(0) | |
| | | | 26.0' | | | | |
| 27 | | | | | | | |
| | | 12 | 29.0' | 2 4 4 | Saturated loose brown fine sand w/some coarse sand and silt, trace fine gravel. 20" RECOVERY | A-2-4(0) | |
| 30 | | | 31.0' | | | | |
| 33 | | | | | | | |
| | | 13 | 34.0' | 9 11 14 15 | Saturated medium dense gray silty fine sand w/trace coarse sand and fine gravel. 22" RECOVERY | A-2-4(0) | |
| 36 | | | 36.0' | | | | |
| 39 | | | | | | | |
| | | 14 | 39.0' | 4 5 8 9 | Saturated medium dense gray silty fine sand w/some coarse sand. 22" RECOVERY | A-2-4(0) | |
| | | | 41.0' | | | | |
| 42 | | | | | | | |
| | | 15 | 44.0' | 8 12 19 23 | Saturated dense gray silty fine sand w/trace coarse sand and clay. | A-2-4(0) | |
| 45 | | | | | | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3R-15

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|--|-------------|---------|
| | | | 46.0' | | 24" RECOVERY | | |
| 48 | | | | | | | |
| | | 16 | 49.0' | 7 7 10 11 | Saturated medium dense gray silty fine sand w/some coarse sand. | A-2-4(0) | |
| 51 | | | 51.0' | | 24" RECOVERY | | |
| | | | | | | | |
| 54 | | | | | | | |
| | | 17 | 54.0' | 7 12 11 13 | Saturated medium dense gray silty fine sand w/trace coarse sand. | A-2-4(0) | |
| | | | 56.0' | | 24" RECOVERY | | |
| 57 | | | | | | | |
| | | | | | | | |
| 60 | | 18 | 59.0' | 5 6 7 11 | Saturated stiff gray fine sandy silt w/trace coarse sand. | A-4(0) | |
| | | | 61.0' | | 24" RECOVERY | | |
| | | | | | End of Boring | | |
| 63 | | | | | | | |
| | | | | | | | |
| 66 | | | | | | | |
| | | | | | | | |
| 69 | | | | | | | |
| | | | | | | | |
| 72 | | | | | | | |

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AUGUST 2015

KEY TO SYMBOLS

Symbol Description

Strata symbols



Silty gravel



Silty sand



Poorly graded sand
with silt

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AUGUST 2015

Notes:

1. Exploratory borings were drilled on July 26, 2010 using a 3 1/4-inch diameter continuous flight power auger. Rig is a CME 55 ATV.
2. Groundwater levels recorded at the time of drilling and re-checked to following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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 blows are uncorrected.

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-3SR-01

Contract: 28-113-01

Boring Location: Sta. 855+05, 35' Rt. C.L.

Boring Surface Elev.: + 30.2

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: | | To: | |
| Hollow Stem Auger: | | From Depth of: 0.0 | | To: 16.0 | |

| | | | | | | |
|-----------------------------|-------------|-------------|----------------------|------------------------|-----------------------|-----------------------|
| Water Level Readings | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| | 6/28/2009 | | 10.0 | 8.0 | 8.0 | |

Pay Quantities:

| | | | | |
|---------------------------------------|----|-------------|-------------------------------|------------|
| 2 1/2 in. Dia. Dry Sample Boring: | 51 | Ft.; | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | Ft. |

Boring Contractor: Walton Corporation
Driller: Jason Truver
Helpers: J. Williams

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|-------------------|---|-------------|--|
| | 7/23/09 | 1 | 0.5' | 3 4 5 | Moist firm brown coarse sandy silt w/some fine sand and clay, trace of gravel. 13" RECOVERY | A-4(0) | Topsoil - 7". |
| 3 | | 2 | 2.0' | 6 5 6 | Moist medium dense tan and yellow coarse to fine sand w/some silt, trace of gravel. 21" RECOVERY | A-1-b | |
| | | 3 | 4.0' | 3 3 4 5 | Moist loose tan coarse to fine sand w/some silt, trace of gravel. 12" RECOVERY | A-1-b | |
| 6 | | 4 | 6.0' | 4 5 4 4 | Moist loose tan coarse to fine sand w/some silt, trace of gravel. 18" RECOVERY | A-1-b | |
| | | 5 | 8.0' | 3 3 4 5 | Moist loose tan fine to coarse sand w/some silt, trace of gravel. 15" RECOVERY | A-2-4(0) | |
| | | 6 | 10.0' | 2 3 4 3 | Wet loose tan coarse to fine sand w/some silt, trace of gravel. 23" RECOVERY | A-1-b | |
| 12 | | 7 | 12.0' | 3 3 8 16 | Wet medium dense orange coarse to fine sand and gravel w/some silt. 14" RECOVERY | A-1-b | |
| | | 8 | 14.0' | 5 5 2 5 | Wet loose orange fine to coarse sand w/some gravel, trace of silt. 20" RECOVERY | A-3 | Cemented sands. |
| 15 | | 9 | 16.0' | 3 4 5 3 | Wet loose orange silty fine to coarse sand w/some gravel. | A-2-4(0) | Mud Rotary @ 16.0'. Cemented sands. |

Remarks: Mud Rotary @ 16.0 Ft.

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3SR-01

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|-----------------|
| 18 | | | 18.0' | | 16" RECOVERY | | |
| | | 10 | 18.0' | 6 9 12 16 | Wet medium dense orange fine sand w/some coarse sand, trace of gravel and silt. | A-3 | Cemented sands. |
| | | | 20.0' | | 16" RECOVERY | | |
| 21 | | | | | | | |
| | | | | | | | |
| 24 | | | | | | | |
| | | 11 | 24.0' | 14 20 20 14 | Wet dense orange fine sand w/some silt and coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 26.0' | | 19" RECOVERY | | |
| 27 | | | | | | | |
| | | | | | | | |
| | | 12 | 29.0' | 14 15 15 13 | Wet medium dense orange fine sand w/some coarse sand, trace of silt. | A-3 | |
| 30 | | | 31.0' | | 22" RECOVERY | | |
| | | | | | | | |
| 33 | | | | | | | |
| | | 13 | 34.0' | 11 13 16 19 | Wet medium dense orange fine sand w/some coarse sand and silt. | A-2-4(0) | |
| | | | 36.0' | | 22" RECOVERY | | |
| 36 | | | | | | | |
| | | | | | | | |
| 39 | | | | | | | |
| | | 14 | 39.0' | 7 9 13 16 | Wet medium dense orange fine sand w/some coarse sand, trace of silt. | A-3 | |
| | | | 41.0' | | 19" RECOVERY | | |
| 42 | | | | | | | |
| | | | | | | | |
| 45 | | 15 | 44.0' | 10 14 20 28 | Wet dense brown and tan fine sand w/some silt and coarse sand. | A-2-4(0) | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3SR-01

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|---|-------------|---------|
| | | | 46.0' | | 20" RECOVERY | | |
| 48 | | | | | | | |
| | | 16 | 49.0' | 9 16 25 32 | Wet dense gray silty fine sand w/some coarse sand, trace of gravel. | A-2-4(0) | |
| 51 | | | 51.0' | | 21" RECOVERY | | |
| | | | | | End of Boring | | |
| 54 | | | | | | | |
| 57 | | | | | | | |
| 60 | | | | | | | |
| 63 | | | | | | | |
| 66 | | | | | | | |
| 69 | | | | | | | |
| 72 | | | | | | | |

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AUGUST 2015

KEY TO SYMBOLS

Symbol Description

Strata symbols



Silt



Silty sand



Poorly graded sand
with silt



Poorly graded sand

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AUGUST 2015

Notes:

1. Exploratory borings were drilled on 6/23/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-3SR-03

Contract: 28-113-01

Boring Location: Sta. 853+16, 35' Rt. C.L.

Boring Surface Elev.: +46.18

Reference:

Wt. of Casing Hammer:
Wt. of Sample Hammer: 140
Type of: D-Sampler: Split Barrel
S-Sampler:
U-Sampler:
Core Bit:

Lbs.
Lbs.
O.D.
O.D.
O.D.
O.D.

Average Fall:
Average Fall: 30
O.D. of Sampler: 2
O.D. of Samp. Tube:
O.D. of Samp. Tube:
O.D. of Rock Core:

IN.
IN.
IN.
IN.
IN.
IN.

Casing Size: 3 1/4
Hollow Stem Auger:

Inches

From Depth of:
From Depth of: 0.0

To:
To: 51.0

Water Level Readings

| Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
|-----------|------|---------------|-----------------|----------------|----------------|
| 6-23-2009 | | 26.0 | 24.0 | 23.5 | |

Pay Quantities:

| | | | | |
|---------------------------------------|----|------|------------------------|-----|
| 2 1/2 in. Dia. Dry Sample Boring: | 51 | Ft.; | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | Ft. |

Boring Contractor: Walton Corporation

Driller: Gary Truver

Helpers: J. Lafferty

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|------------------|--|-------------|---------------|
| | 6/23/09 | 1 | 0.5' | 3 4 4 | Moist firm brown clay w/trace of fine to coarse sand and gravel. 11" RECOVERY | A-6(11) | Topsoil - 8". |
| 3 | | 2 | 2.0' | 6 5 6 7 | Moist stiff brown silt w/some clay and fine to coarse sand, trace of gravel. 22" RECOVERY | A-4(2) | |
| | | 3 | 4.0' | 2 7 | Moist hard brown clayey silt w/some coarse to fine sand, trace of gravel. 10" RECOVERY | A-4(4) | |
| 6 | | 3A | 5.5' | | Moist very dense coarse to fine sand and gravel w/some silt. 50/3" RECOVERY | A-1-b | |
| | | 4 | 6.0' | 3 6 6 7 | Moist medium dense brown coarse to fine sand w/some silt, trace of gravel. 14" RECOVERY | A-2-4(0) | |
| 9 | | 5 | 8.0' | 3 5 5 6 | Moist loose brown coarse to fine sand w/some silt, trace of gravel. 16" RECOVERY | A-2-4(0) | |
| | | 6 | 10.0' | 3 4 5 4 | Moist loose brown coarse sand w/some fine sand and silt, trace of gravel. 18" RECOVERY | A-1-b | |
| 12 | | 7 | 12.0' | 3 4 5 7 | Moist loose brown coarse sand w/some fine sand and silt, trace of gravel. 19" RECOVERY | A-1-b | |
| | | 8 | 14.0' | 4 4 5 5 | Moist loose brown coarse sand w/some gravel, trace of silt and fine sand. 18" RECOVERY | A-1-b | |
| 15 | | 9 | 16.0' | 5 5 6 5 | Moist medium dense brown coarse sand w/ some fine sand, trace of silt and gravel. | A-1-b | |

Remarks:

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3SR-03

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|---------|
| 18 | | | 18.0' | | 18" RECOVERY | | |
| | | 10 | 18.0' | 4 4 4 4 | Moist loose brown coarse to fine sand w/some silt, trace of gravel. | A-2-4(0) | |
| | | | 20.0' | | 20" RECOVERY | | |
| 21 | | | | | | | |
| | | | | | | | |
| 24 | | | | | | | |
| | | 11 | 24.0' | 3 4 5 5 | Moist loose orangish brown coarse sand w/ some gravel and fine sand, trace of silt. | A-1-b | |
| | | | 26.0' | | 21" RECOVERY | | |
| 27 | | | | | | | |
| | | | | | | | |
| 30 | | 12 | 29.0' | 16 18 18 11 | Moist dense orangish brown coarse sand and gravel w/some fine sand, trace of silt. | A-1-b | |
| | | | 31.0' | | 21" RECOVERY | | |
| 33 | | | | | | | |
| | | | | | | | |
| 36 | | 13 | 34.0' | 9 15 15 13 | Wet medium dense orangish brown fine sand w/some coarse sand and silt, trace of gravel. | A-2-4(0) | |
| | | | 36.0' | | 18" RECOVERY | | |
| 39 | | | | | | | |
| | | 14 | 39.0' | 52 50/3" | Wet very dense orangish brown fine to coarse sand w/some silt and gravel. | A-2-4(0) | |
| | | | 41.0' | | 6" RECOVERY | | |
| 42 | | | | | | | |
| | | | | | | | |
| 45 | | 15 | 44.0' | 11 16 15 19 | Wet dense orangish brown fine sand w/some coarse sand and silt. | A-2-4(0) | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-3SR-03

Contract: 28-113-01

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|---------|
| | | | 46.0' | | 19" RECOVERY | | |
| 48 | | | | | | | |
| | | 16 | 49.0' | 10 12 21 23 | Wet dense orangish brown fine sand w/some coarse sand, trace of silt and gravel. | A-3 | |
| 51 | | | 51.0' | | 23" RECOVERY | | |
| | | | | | End of Boring | | |
| 54 | | | | | | | |
| 57 | | | | | | | |
| 60 | | | | | | | |
| 63 | | | | | | | |
| 66 | | | | | | | |
| 69 | | | | | | | |
| 72 | | | | | | | |

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KEY TO SYMBOLS

Symbol Description

Strata symbols



Low plasticity
clay



Silty low plasticity
clay



Silty sand



Poorly graded sand
with silt



Well graded sand
with silt

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Notes:

1. Exploratory borings were drilled on 6/23/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301 Maryland State Line to SR-1

Boring No.: SSI-3

Contract: 25-113-01

Boring Location: STA. 1807+15.0' C.L.

Boring Surface Elev.: +20.50

Reference:

Wt. of Casing Hammer:
Wt. of Sample Hammer: 140
Type of: D-Sampler: Split Barrel
S-Sampler:
U-Sampler:
Core Bit:

Lbs.
Lbs.
O.D.
O.D.
O.D.
O.D.

Average Fall:
Average Fall: 30
O.D. of Sampler: 2
O.D. of Samp. Tube:
O.D. of Samp. Tube:
O.D. of Rock Core:

IN.
IN.
IN.
IN.
IN.
IN.

Casing Size: 3 1/4
Hollow Stem Auger:

Inches

From Depth of:
From Depth of: 0.0 **To:** 18.0

Water Level Readings

| Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
|---------|------|---------------|-----------------|----------------|----------------|
| 2/10/11 | | 12.0 | 12.0 | 9.9 | |

Pay Quantities:

| | | | | | |
|---------------------------------------|------|------|------------------------|-----------------------|-----|
| 2 1/2 in. Dia. Dry Sample Boring: | 60.0 | Ft.; | | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of | U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | | Ft. |

Boring Contractor: Walton Corporation

Driller: Bill Holden

Helpers: J. Lafferty

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|---------------------|
| | 2/10/11 | 1 | 0.5' | 5 4 5 | Moist loose brown fine to coarse sand w/some silt, trace of fine gravel. 15" RECOVERY | A-2-4(0) | Topsoil - 7". |
| 3.5 | | 2 | 2.0' | 6 6 9 8 | Moist medium dense brown coarse to fine sand w/some silt, clay and fine gravel. 14" RECOVERY | A-2-4(0) | |
| | | 3 | 4.0' | 5 8 9 6 | Moist medium dense brownish orange coarse to fine sand w/some fine gravel and silt. 4" RECOVERY | A-1-b | |
| 7 | | 4 | 6.0' | 2 9 18 16 | Moist medium dense brownish orange coarse to fine sand w/some silt and fine gravel. 15" RECOVERY | A-1-b | |
| | | 5 | 8.0' | 10 37 36 30 | Wet very dense brownish orange fine sand w/some silt, trace of coarse sand and fine gravel. 16" RECOVERY | A-2-4(0) | |
| 10.5 | | 6 | 10.0' | 22 18 14 13 | Wet dense brownish orange fine to coarse sand w/some silt, trace of fine gravel. 18" RECOVERY | A-2-4(0) | |
| | | 7 | 12.0' | 4 3 4 6 | Wet loose brownish green fine sand w/some coarse silt and silt, trace of fine gravel. 16" RECOVERY | A-2-4(0) | |
| 14 | | 8 | 14.0' | 4 4 4 6 | Wet loose brownish orange fine sand w/some coarse sand, trace of silt. 16" RECOVERY | A-3 | |
| | | 9 | 16.0' | 2 3 6 5 | Wet loose orangish brown fine sand w/some coarse sand, trace of silt and fine gravel. 20" RECOVERY | A-3 | |
| 17.5 | | 10 | 18.0' | 4 4 4 5 | Wet loose orange fine sand w/some coarse sand and silt. 18" RECOVERY | A-3 | Mud Rotary @ 18.0'. |
| | | | 20.0' | | | | |

Remarks:

Reviewed By: Hany Fekry

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301 Maryland State Line to SR-1
Contract: 25-113-01

Boring No.: SS1-3

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|--------------------|--|-------------|---------|
| 21 | | | | | | | |
| 24.5 | | 11 | 24.0' | 2 2 3 2 | Saturated loose orange fine sand w/some coarse sand and silt. | A-2-4(0) | |
| | | | 26.0' | | 21" RECOVERY | | |
| 28 | | | | | | | |
| | | 12 | 29.0' | 2 6 9 11 | Saturated medium dense orange silty fine sand w/some coarse sand, trace of fine gravel. | A-2-4(0) | |
| | | | 31.0' | | 22" RECOVERY | | |
| 31.5 | | | | | | | |
| | | 13 | 34.0' | 4 7 16 18 | Saturated medium dense brown silty fine sand w/some coarse sand. | A-2-4(0) | |
| 35 | | | 36.0' | | 22" RECOVERY | | |
| | | | | | | | |
| 38.5 | | | | | | | |
| | | 14 | 39.0' | 7 7 8 9 | Saturated medium dense gray clayey fine sand w/trace of coarse sand, fine gravel and silt. | A-2-4(0) | |
| | | | 41.0' | | 21" RECOVERY | | |
| 42 | | | | | | | |
| | | 15 | 44.0' | 6 7 11 12 | Saturated very stiff gray clayey fine sandy silt w/trace of coarse sand and fine gravel. | A-4(0) | |
| 45.5 | | | 46.0' | | 22" RECOVERY | | |
| | | | | | | | |
| 49 | | | | | | | |
| | | 16 | 49.0' | 6 7 11 8 | Saturated medium dense gray silty fine sand w/trace of coarse sand. | A-2-4(0) | |
| | | | 51.0' | | 20" RECOVERY | | |
| 52.5 | | | | | | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301 Maryland State Line to SR-1
Contract: 25-113-01

Boring No.: SS1-3

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|---------|
| | | | | | | | |
| | | 17 | 54.0' | 7 9 11 12 | Saturated very stiff gray clayey fine sandy silt w/trace of coarse sand. 22" RECOVERY | A-4(1) | |
| 56 | | | 56.0' | | | | |
| | | 18 | 58.0' | 12 10 15 16 | Saturated medium dense gray clayey fine sand w/some fine gravel, trace of silt, coarse sand and shell fragments. 22" RECOVERY | A-2-4(0) | |
| 59.5 | | | 60.0' | | | | |
| | | | | | End of Boring | | |
| 63 | | | | | | | |
| 66.5 | | | | | | | |
| 70 | | | | | | | |
| 73.5 | | | | | | | |
| 77 | | | | | | | |
| 80.5 | | | | | | | |
| 84 | | | | | | | |

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KEY TO SYMBOLS

Symbol Description

Strata symbols



Silty sand



Poorly graded clayey
silty sand



Poorly graded sand
with silt



Clayey sand

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AUGUST 2015

Notes:

1. Exploratory borings were drilled on February 10, 2011 using 3 1/4 inch continuous flight power auger. Rig is a truck mounted CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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 blows are uncorrected.

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301 Maryland State Line to SR-1
Contract: 25-113-01

Boring No.: SS1-4

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|---------|
| 21 | | | | | | | |
| 24.5 | | 11 | 24.0' | 2 4 4 6 | Saturated loose brown fine sand w/some silt and coarse sand. | A-2-4(0) | |
| | | | 26.0' | | 20" RECOVERY | | |
| 28 | | | | | | | |
| | | 12 | 29.0' | 5 7 9 14 | Saturated medium dense brown silty fine sand w/some coarse sand, trace of fine gravel. | A-2-4(0) | |
| | | | 31.0' | | 23" RECOVERY | | |
| 31.5 | | | | | | | |
| | | 13 | 34.0' | 9 11 16 | Saturated medium dense brown clayey fine sand w/some silt and coarse sand. | A-2-4(0) | |
| | | | 35.5' | | 18" RECOVERY | | |
| 35 | | 13A | 35.5' | 13 | Saturated medium dense gray clayey fine sand w/some coarse sand and silt. | A-2-4(0) | |
| | | | 36.0' | | 6" RECOVERY | | |
| 38.5 | | | | | | | |
| | | 14 | 39.0' | 5 8 11 11 | Saturated very stiff gray clayey fine sandy silt w/some coarse sand. | A-4(0) | |
| | | | 41.0' | | 24" RECOVERY | | |
| 42 | | | | | | | |
| | | 15 | 44.0' | 5 7 7 10 | Saturated medium dense gray silty fine sand w/trace of coarse sand. | A-2-4(0) | |
| 45.5 | | | 46.0' | | 24" RECOVERY | | |
| 49 | | | | | | | |
| | | 16 | 49.0' | 10 12 12 18 | Saturated medium dense gray silty coarse to fine sand. | A-2-4(0) | |
| | | | 51.0' | | 22" RECOVERY | | |
| 52.5 | | | | | | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301 Maryland State Line to SR-1
Contract: 25-113-01

Boring No.: SS1-4

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|--|-------------|---------|
| | | | | | | | |
| | | 17 | 54.0' | 5 11 16 17 | Saturated very stiff gray fine sandy silt w/ trace of coarse sand. 24" RECOVERY | A-4(0) | |
| 56 | | | 56.0' | | | | |
| | | 18 | 58.0' | 9 12 19 23 | Saturated hard gray fine sandy silt w/some clay, trace of coarse sand, fine gravel and organic matter. 24" RECOVERY | A-4(0) | |
| 59.5 | | | 60.0' | | | | |
| | | | | | End of Boring | | |
| 63 | | | | | | | |
| 66.5 | | | | | | | |
| 70 | | | | | | | |
| 73.5 | | | | | | | |
| 77 | | | | | | | |
| 80.5 | | | | | | | |
| 84 | | | | | | | |

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NOT FOR BIDDING
AUGUST 2015

KEY TO SYMBOLS

Symbol Description

Strata symbols



Poorly graded sand
with silt



Silty sand



Poorly graded clayey
silty sand

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NOT FOR BIDDING
AUGUST 2015

Notes:

1. Exploratory borings were drilled on February 7, 2011 using 3 1/4 inch continuous flight power auger. Rig is an ATV mounted CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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 blows are uncorrected.

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301 Maryland State Line to SR-1

Boring No.: SSI-5

Contract: 25-113-01

Boring Location: STA. 1820+50.0' C.L.

Boring Surface Elev.: +25.70

Reference:

Wt. of Casing Hammer:
Wt. of Sample Hammer: 140
Type of: D-Sampler: Split Barrel
S-Sampler:
U-Sampler:
Core Bit:

Lbs.
Lbs.
O.D.
O.D.
O.D.
O.D.

Average Fall:
Average Fall: 30
O.D. of Sampler: 2
O.D. of Samp. Tube:
O.D. of Samp. Tube:
O.D. of Rock Core:

IN.
IN.
IN.
IN.
IN.
IN.

Casing Size: 3 1/4
Hollow Stem Auger: Inches

From Depth of:
From Depth of: 0.0
To:
To: 16.0

Water Level Readings

| Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
|---------|------|---------------|-----------------|----------------|----------------|
| 2/11/11 | | 14.0 | 14.0 | 12.2 | |

Pay Quantities:

| | | | | |
|---------------------------------------|------|------|------------------------|-----|
| 2 1/2 in. Dia. Dry Sample Boring: | 60.0 | Ft.; | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | Ft. |

Boring Contractor: Walton Corporation

Driller: Bill Holden

Helpers: J. Lafferty

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|---------------------|
| | 2/11/11 | 1 | 0.5' | 11 16 15 | Moist medium dense gray coarse sandy fine gravel w/some silt, trace of fine sand. 16" RECOVERY | A-1-a | Topsoil - 6". |
| | | 2 | 2.0' | 12 19 22 17 | Moist dense brownish orange fine to coarse sand w/some silt, trace of fine gravel. 20" RECOVERY | A-2-4(0) | |
| 3.5 | | 3 | 4.0' | 8 8 10 10 | Moist medium dense brownish orange silty coarse to fine sand w/trace of fine gravel. 17" RECOVERY | A-1-b | |
| | | 4 | 6.0' | 12 22 16 19 | Moist dense brown coarse sand w/some fine sand, fine gravel and silt. 19" RECOVERY | A-1-b | |
| 7 | | 5 | 8.0' | 8 10 14 23 | Moist very stiff tan silt w/some coarse to fine sand, fine gravel and clay. 16" RECOVERY | A-4(0) | |
| | | 6 | 10.0' | 19 16 12 9 | Wet medium dense brownish orange fine to coarse sand w/some silt and fine gravel. 18" RECOVERY | A-2-4(0) | |
| 10.5 | | 7 | 12.0' | 9 5 6 7 | Wet medium dense brownish orange silty fine sand w/some coarse sand. 20" RECOVERY | A-2-4(0) | |
| 14 | | 8 | 14.0' | 4 4 4 5 | Wet loose brownish orange fine sand w/some coarse sand and silt. 20" RECOVERY | A-2-4(0) | |
| | | 9 | 16.0' | 3 3 3 2 | Wet loose brownish orange fine sand w/some coarse sand and silt. 22" RECOVERY | A-2-4(0) | Mud Rotary @ 16.0'. |
| 17.5 | | 10 | 18.0' | 4 4 5 8 | Wet loose brownish orange silty fine sand w/some coarse sand. 20" RECOVERY | A-2-4(0) | |
| | | | 20.0' | | 20" RECOVERY | | |

Remarks:

Reviewed By: Hany Fekry

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301 Maryland State Line to SR-1
Contract: 25-113-01

Boring No.: SS1-5



| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|----------------|------------------|---|-------------|---------|
| 21 | | | | | | | |
| 24.5 | | 11 | 24.0' 26.0' | 3 4 5 7 | Wet stiff gray clayey fine sandy silt w/trace of coarse sand and fine gravel. 23" RECOVERY | A-4(0) | |
| 28 | | | | | | | |
| 31.5 | | 12 | 29.0' 31.0' | 4 5 4 7 | Wet stiff gray fine sandy silt w/some clay, trace of coarse sand. 22" RECOVERY | A-4(0) | |
| 35 | | 13 | 34.0' 36.0' | 4 6 6 8 | Wet stiff gray fine sandy silt w/some clay, trace of coarse sand and fine gravel. 21" RECOVERY | A-4(0) | |
| 38.5 | | | | | | | |
| 42 | | 14 | 39.0' 41.0' | 5 5 7 9 | Wet medium dense gray silty fine sand w/ trace of coarse sand. 22" RECOVERY | A-2-4(0) | |
| 45.5 | | 15 | 44.0' 46.0' | 5 7 8 9 | Wet medium dense gray silty fine sand w/ some coarse sand. 22" RECOVERY | A-2-4(0) | |
| 49 | | 16 | 49.0' 51.0' | 4 5 5 6 | Wet stiff gray fine sandy silt w/some clay, trace of coarse sand and shell fragments. 20" RECOVERY | A-4(0) | |
| 52.5 | | | | | | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301 Maryland State Line to SR-1
Contract: 25-113-01

Boring No.: SS1-5

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|--|-------------|---------|
| 56 | | 17 | 54.0' | 4 6 9 10 |  Wet stiff gray fine sandy clay w/some silt, trace of coarse sand, fine gravel and shell fragments. 22" RECOVERY | A-6(2) | |
| | | | 56.0' | | | | |
| 59.5 | | 18 | 58.0' | 10 19 24 30 |  Wet hard green fine sandy silt w/some clay, trace of coarse sand. 20" RECOVERY | A-4(0) | |
| | | | 60.0' | | | | |
| | | | | | End of Boring | | |
| 63 | | | | | <div style="font-size: 4em; color: orange; opacity: 0.5;"> DRAFT NOT FOR BIDDING AUGUST 2015 </div> | | |
| 66.5 | | | | | | | |
| 70 | | | | | | | |
| 73.5 | | | | | | | |
| 77 | | | | | | | |
| 80.5 | | | | | | | |
| 84 | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

KEY TO SYMBOLS

Symbol Description

Strata symbols



Poorly graded sand
with silt



Silty sand



Poorly graded clayey
silty sand



Clayey sand

DRAFT
NOT FOR BIDDING
AUGUST 2015

Notes:

1. Exploratory borings were drilled on February 11, 2011 using 3 1/4 inch continuous flight power auger. Rig is a truck mounted CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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 blows are uncorrected.

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301 Maryland State Line to SR-1

Boring No.: SSI-6

Contract: 25-113-01

Boring Location: STA. 1820+50 85' Lt. C.L.

Boring Surface Elev.: + 23.40

Reference:

Wt. of Casing Hammer:
Wt. of Sample Hammer: 140
Type of: D-Sampler: Split Barrel
S-Sampler:
U-Sampler:
Core Bit:

Lbs.
Lbs.
O.D.
O.D.
O.D.
O.D.

Average Fall:
Average Fall: 30
O.D. of Sampler: 2
O.D. of Samp. Tube:
O.D. of Samp. Tube:
O.D. of Rock Core:

IN.
IN.
IN.
IN.
IN.
IN.

Casing Size: 3 1/4
Hollow Stem Auger: Inches

From Depth of:
From Depth of: 0.0
To:
To: 60.0

| Water Level Readings | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
|----------------------|--------|------|---------------|-----------------|----------------|----------------|
| | 2/4/11 | | 12.0 | 12.0 | 11.5 | |

Pay Quantities:
2 1/2 in. Dia. Dry Sample Boring: 60.0 Ft.;
No. of 2 in. Dia. Shelby Tubes: ;
2 1/2 in. Dia. Contin. Sample Boring: Ft.;
Dia. U-Sample Boring: Ft.
U-Samples:
Core Drilling in Rock: Ft.

Boring Contractor: Walton Corporation
Driller: Bill Holden
Helpers: T. Kane

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|---|-------------|---------------|
| | 2/4/11 | 1 | 0.5' | 4 5 8 | Moist loose brown silty fine gravel and coarse sand w/some fine sand and clay. 8" RECOVERY | A-2-4(0) | Topsoil - 6". |
| | | 2 | 2.0' | 5 8 8 6 | Moist very stiff brown coarse to fine sandy silt w/some clay, trace of fine gravel. 15" RECOVERY | A-4(0) | |
| 3.5 | | 3 | 4.0' | 6 9 9 7 | Moist medium dense brown silty coarse to fine sand w/trace of fine gravel. 16" RECOVERY | A-1-b | |
| | | 4 | 6.0' | 5 13 20 23 | Moist dense brown silty coarse sand w/some fine sand and fine gravel. 18" RECOVERY | A-1-b | |
| 7 | | 5 | 8.0' | 9 8 7 6 | Moist medium dense brown coarse to fine sand w/some silt, trace of fine gravel. 18" RECOVERY | A-1-b | |
| | | 6 | 10.0' | 6 5 5 6 | Saturated loose brown coarse to fine sand w/some silt, trace of fine gravel. 20" RECOVERY | A-2-4(0) | |
| 10.5 | | 7 | 12.0' | 6 8 7 7 | Saturated medium dense brown fine sand w/some coarse sand and silt. 18" RECOVERY | A-2-4(0) | |
| 14 | | 8 | 14.0' | 4 4 7 8 | Saturated medium dense brown fine sand w/some coarse sand and silt. 16" RECOVERY | A-2-4(0) | |
| | | 9 | 16.0' | 5 6 8 9 | Saturated medium dense brown fine sand w/some coarse sand and silt. 14" RECOVERY | A-2-4(0) | |
| 17.5 | | 10 | 18.0' | 5 7 8 8 | Saturated medium dense brown fine sand w/some coarse sand and silt. 18" RECOVERY | A-2-4(0) | |
| | | | 20.0' | | | | |

Remarks:

Reviewed By: Hany Fekry

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301 Maryland State Line to SR-1
Contract: 25-113-01

Boring No.: SS1-6


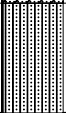
| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|-------------------|---|-------------|---------|
| 21 | | | | | | | |
| 24.5 | | 11 | 24.0' | 4 6 6 5 | Saturated medium dense brown silty fine sand w/some coarse sand. | A-2-4(0) | |
| | | | 26.0' | | 15" RECOVERY | | |
| 28 | | | | | | | |
| | | 12 | 29.0' | 4 6 8 8 | Saturated medium dense gray silty fine sand w/some coarse sand. | A-2-4(0) | |
| | | | 31.0' | | 18" RECOVERY | | |
| 31.5 | | | | | | | |
| | | 13 | 34.0' | 5 6 6 8 | Saturated medium dense gray silty fine sand w/trace of coarse sand. | A-2-4(0) | |
| 35 | | | 36.0' | | 20" RECOVERY | | |
| | | | | | | | |
| 38.5 | | | | | | | |
| | 2/7/11 | 14 | 39.0' | 4 6 7 12 | Saturated medium dense gray silty fine sand w/trace of coarse sand and fine gravel. | A-2-4(0) | |
| | | | 41.0' | | 24" RECOVERY | | |
| 42 | | | | | | | |
| | | 15 | 44.0' | 4 7 8 11 | Saturated medium dense gray silty fine sand w/trace of coarse sand. | A-2-4(0) | |
| 45.5 | | | 46.0' | | 22" RECOVERY | | |
| | | | | | | | |
| 49 | | | | | | | |
| | | 16 | 49.0' | 6 6 9 10 | Saturated medium dense gray silty fine sand w/trace of coarse sand. | A-2-4(0) | |
| | | | 51.0' | | 23" RECOVERY | | |
| 52.5 | | | | | | | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301 Maryland State Line to SR-1
Contract: 25-113-01

Boring No.: SS1-6

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|---|-------------|---------|
| | | | | | | | |
| | | 17 | 54.0' | 6 10 9 14 |  Saturated very stiff gray clayey fine sandy silt w/trace of coarse sand and organic matter. 24" RECOVERY | A-4(1) | |
| 56 | | | 56.0' | | | | |
| | | 18 | 58.0' | 6 12 16 18 |  Saturated medium dense gray silty fine sand w/trace of coarse sand and organic matter. 24" RECOVERY | A-2-4(0) | |
| 59.5 | | | 60.0' | | | | |
| | | | | | End of Boring | | |
| 63 | | | | | | | |
| 66.5 | | | | | | | |
| 70 | | | | | | | |
| 73.5 | | | | | | | |
| 77 | | | | | | | |
| 80.5 | | | | | | | |
| 84 | | | | | | | |

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KEY TO SYMBOLS

Symbol Description

Strata symbols



Poorly graded clayey
silty sand



Silty sand



Clayey sand

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Notes:

1. Exploratory borings were drilled on February 4, 2011 using 3 1/4 inch continuous flight power auger. Rig is an ATV mounted CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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 blows are uncorrected.

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-3SL-01

Contract: 28-113-01

Boring Location: Sta. 854+16, 15' Lt. C.L.

Boring Surface Elev.: + 45.4

Reference:

Wt. of Casing Hammer:
Wt. of Sample Hammer: 140
Type of: D-Sampler: Split Barrel
S-Sampler:
U-Sampler:
Core Bit:

Lbs.
Lbs.
O.D.
O.D.
O.D.
O.D.

Average Fall:
Average Fall: 30
O.D. of Sampler: 2
O.D. of Samp. Tube:
O.D. of Samp. Tube:
O.D. of Rock Core:

IN.
IN.
IN.
IN.
IN.
IN.

Casing Size: 3 1/4
Hollow Stem Auger: Inches

From Depth of:
From Depth of: 0.0
To:
To: 51.0

Water Level Readings

| Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
|-----------|------|---------------|-----------------|----------------|----------------|
| 6/24/2009 | | 26.0 | 24.0 | 21.0 | |

Pay Quantities:

| | | | | |
|---------------------------------------|----|------|------------------------|-----|
| 2 1/2 in. Dia. Dry Sample Boring: | 51 | Ft.; | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | Ft. |

Boring Contractor: Walton Corporation

Driller: Gary Truver

Helpers: J. Lafferty/J. Williams

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------------------|---|-------------|---------------|
| | 6/23/09 | 1 | 0.5' | 3 4 5 | Moist stiff brown clay w/trace of coarse to fine sand and gravel. 15" RECOVERY | A-6(11) | Topsoil - 5". |
| 3 | | 2 | 2.0' | 7 10 12 12 | Moist very stiff tan and gray silt w/some clay and fine to coarse sand, trace of gravel. 19" RECOVERY | A-4(2) | |
| | | 3 | 4.0' | 7 7 | Moist very stiff tan and gray clayey silt w/ some fine sand, trace of coarse sand. 12" RECOVERY | A-4(3) | |
| 6 | | 3A | 5.0' | 13 14 | Moist medium dense brown silty coarse to fine sand w/trace of gravel. 8" RECOVERY | A-2-4(0) | |
| | | 4 | 6.0' | 14 13 12 12 | Moist medium dense brown coarse to fine sand w/some silt, trace of gravel. 18" RECOVERY | A-1-b | |
| 9 | | 5 | 8.0' | 3 8 8 7 | Moist medium dense tan and orange coarse sand w/some fine sand and silt, trace of gravel. 19" RECOVERY | A-1-b | |
| | | 6 | 10.0' | 7 7 9 8 | Moist medium dense tan and orange coarse to fine sand w/some silt, trace of gravel. 18" RECOVERY | A-1-b | |
| 12 | | 7 | 12.0' | 5 6 7 8 | Moist medium dense tan and orange coarse sand w/some fine sand and silt, trace of gravel. 20" RECOVERY | A-1-b | |
| | | 8 | 14.0' | 4 6 6 7 | Moist medium dense tan and orange coarse sand w/trace of silt, fine sand and gravel. 21" RECOVERY | A-1-b | |
| 15 | | 9 | 16.0' | 5 6 7 7 | Moist medium dense tan and orange coarse to fine sand w/some silt, trace of gravel. | A-1-b | |

Remarks:

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3SL-01

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|---|-------------|---------|
| 18 | | | 18.0' | | 20" RECOVERY | | |
| | | 10 | 18.0' | 4 5 6 5 | Moist medium dense tan and orange coarse to fine sand w/some silt, trace of gravel. | A-1-b | |
| | | | 20.0' | | 20" RECOVERY | | |
| 21 | | | | | | | |
| | | | | | | | |
| 24 | | | | | | | |
| | | 11 | 24.0' | 4 5 7 14 | Wet medium dense brown coarse to fine sand w/some gravel, trace of silt. | A-1-b | |
| | | | 26.0' | | 21" RECOVERY | | |
| 27 | | | | | | | |
| | | | | | | | |
| 30 | 6/24/09 | 12 | 29.0' | 10 8 6 12 | No Sample Recovery | | |
| | | | 31.0' | | 0" RECOVERY | | |
| 33 | | | | | | | |
| | | 13 | 34.0' | 7 12 16 22 | Wet medium dense brown fine sand w/some coarse sand and silt, trace of gravel. | A-2-4(0) | |
| | | | 36.0' | | 21" RECOVERY | | |
| 36 | | | | | | | |
| | | | | | | | |
| 39 | | | | | | | |
| | | 14 | 39.0' | 12 32 56 | Wet very dense brown fine sand w/some silt and coarse sand, trace of gravel. | A-2-4(0) | |
| | | | 41.0' | | 17" RECOVERY | | |
| 42 | | | | | | | |
| | | | | | | | |
| 45 | | 15 | 44.0' | 7 11 15 21 | Wet medium dense brown fine sand w/some coarse sand and silt. | A-2-4(0) | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-3SL-01

Contract: 28-113-01

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|--|-------------|---------|
| | | | 46.0' | | 18" RECOVERY | | |
| 48 | | | | | | | |
| | | 16 | 49.0' | 3 12 15 18 | Wet medium dense brown fine sand w/some coarse sand, trace of silt and gravel. | A-3 | |
| 51 | | | 51.0' | | 17" RECOVERY | | |
| | | | | | End of Boring | | |
| 54 | | | | | | | |
| 57 | | | | | | | |
| 60 | | | | | | | |
| 63 | | | | | | | |
| 66 | | | | | | | |
| 69 | | | | | | | |
| 72 | | | | | | | |

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KEY TO SYMBOLS

Symbol Description

Strata symbols



Low plasticity
clay



Silty low plasticity
clay



Silty sand



Poorly graded sand
with silt

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AUGUST 2015

Notes:

1. Exploratory borings were drilled on 6/23/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to S.R. 1

Boring No.: RW1-3SR-02

Contract: 28-113-01

Boring Location: Sta. 854+6, 35' Rt. C.L.

Boring Surface Elev.: +44.8

Reference:

Wt. of Casing Hammer:
Wt. of Sample Hammer: 140
Type of: D-Sampler: Split Barrel
S-Sampler:
U-Sampler:
Core Bit:

Lbs.
Lbs.
O.D.
O.D.
O.D.
O.D.

Average Fall:
Average Fall: 30
O.D. of Sampler: 2
O.D. of Samp. Tube:
O.D. of Samp. Tube:
O.D. of Rock Core:

IN.
IN.
IN.
IN.
IN.
IN.

Casing Size: 3 1/4
Hollow Stem Auger: Inches

From Depth of:
From Depth of: 0.0
To:
To: 49.0

Water Level Readings

| Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
|-----------|------|---------------|-----------------|----------------|----------------|
| 6-24-2009 | | 26.0 | 24.0 | 22.8 | |

Pay Quantities:

| | | | | |
|---------------------------------------|----|------|------------------------|-----|
| 2 1/2 in. Dia. Dry Sample Boring: | 51 | Ft.; | Dia. U-Sample Boring: | Ft. |
| No. of 2 in. Dia. Shelby Tubes: | | Ft.; | No. of U-Samples: | Ft. |
| 2 1/2 in. Dia. Contin. Sample Boring: | | Ft.; | Core Drilling in Rock: | Ft. |

Boring Contractor: Walton Corporation

Driller: Gary Truver

Helpers: J. Williams

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|--------------------|---|-------------|-----------------------|
| | 7/24/09 | 1 | 0.5' | 2 3 3 | Moist firm brown coarse sandy silt w/some fine sand, trace of gravel. 12" RECOVERY | A-4(0) | Cultivated Soil - 5". |
| 3 | | 2 | 2.0' | 4 3 3 5 | Moist loose brown silty coarse to fine sand w/ trace of gravel. 13" RECOVERY | A-2-4(0) | |
| | | 3 | 4.0' | 4 8 7 8 | Moist medium dense tan coarse to fine sand w/some silt, trace of gravel. 13" RECOVERY | A-2-4(0) | |
| 6 | | 4 | 6.0' | 4 10 10 8 | Moist medium dense tan coarse to fine sand w/some silt, trace of gravel. 16" RECOVERY | A-2-4(0) | |
| 9 | | 5 | 8.0' | 3 5 3 3 | Moist loose brown and tan fine to coarse sand w/some silt, trace of gravel. 18" RECOVERY | A-2-4(0) | |
| | | 6 | 10.0' | 3 3 4 3 | Moist loose tan coarse to fine sand w/some silt, trace of gravel. 16" RECOVERY | A-1-b | |
| 12 | | 7 | 12.0' | 4 3 2 2 | Moist loose tan coarse sand w/some silt, gravel and fine sand. 17" RECOVERY | A-1-b | |
| | | 8 | 14.0' | 1 2 3 4 | Moist loose tan coarse to fine sand w/some silt, trace of gravel. 18" RECOVERY | A-1-b | |
| 15 | | 9 | 16.0' | 2 3 3 3 | Moist loose tan coarse to fine sand w/some silt, trace of gravel. | A-1-b | |

Remarks:

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3SR-02

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|---|-------------|-----------------|
| 18 | | | 18.0' | | 19" RECOVERY | | |
| | | 10 | 18.0' | 2 4 4 5 | Moist loose tan coarse sand w/some fine sand and silt, trace of gravel. | A-1-b | |
| | | | 20.0' | | 18" RECOVERY | | |
| 21 | | | | | | | |
| | | | | | | | |
| 24 | | | | | | | |
| | | 11 | 24.0' | 3 5 7 5 | Wet medium dense tan and orange coarse to fine sand w/trace of silt and gravel. | A-1-b | |
| | | | 26.0' | | 19" RECOVERY | | |
| 27 | | | | | | | |
| | | | | | | | |
| 30 | | 12 | 29.0' | 5 3 4 5 | Wet loose orange fine sand w/some coarse sand and silt, trace of gravel. | A-2-4(0) | |
| | | | 31.0' | | 20" RECOVERY | | |
| 33 | | | | | | | |
| | | | | | | | |
| 36 | | 13 | 34.0' | 7 16 17 16 | Wet dense brown fine sand w/some silt and coarse sand, trace of gravel. | A-2-4(0) | Cemented sands. |
| | | | 36.0' | | 18" RECOVERY | | |
| 39 | | | | | | | |
| | | | | | | | |
| 42 | | 14 | 39.0' | 5 9 15 18 | Wet medium dense brown fine sand w/some coarse sand and silt, trace of gravel. | A-2-4(0) | |
| | | | 41.0' | | 17" RECOVERY | | |
| 45 | | | | | | | |
| | | 15 | 44.0' | 6 9 12 13 | Wet medium dense brown fine sand w/some coarse sand, trace of silt and gravel. | A-3 | |

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**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 28-113-01

Boring No.: RW1-3SR-02

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|---------------------|--|-------------|---------|
| | | | 46.0' | | 18" RECOVERY | | |
| 48 | | | | | | | |
| | | 16 | 49.0' | 9 16 23 29 | Wet dense brown fine sand w/some silt and coarse sand. | A-2-4(0) | |
| 51 | | | 51.0' | | 21" RECOVERY | | |
| | | | | | End of Boring | | |
| 54 | | | | | | | |
| 57 | | | | | | | |
| 60 | | | | | | | |
| 63 | | | | | | | |
| 66 | | | | | | | |
| 69 | | | | | | | |
| 72 | | | | | | | |

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KEY TO SYMBOLS

Symbol Description

Strata symbols



Silty sand



Poorly graded sand
with silt



Well graded sand
with silt

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Notes:

1. Exploratory borings were drilled on 6/24/2009 using a 3 1/4-inch diameter hollow stem auger. Rig is a Truck CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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: U.S. 301, Maryland State Line to S.R. 1

Boring No.: SWM1-41-1

Contract: 25-113-01

Boring Location: Sta. 713+82, 74.00' Lt. C.L.

Boring Surface Elev.: + 45.0'

Reference:

| | | | | | |
|-----------------------|------------------------|------|---------------------|----|-----|
| Wt. of Casing Hammer: | | Lbs. | Average Fall: | | IN. |
| Wt. of Sample Hammer: | 140 | Lbs. | Average Fall: | 30 | IN. |
| Type of: | D-Sampler: Split Spoon | 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: | | To: |
| Hollow Stem Auger: | | | From Depth of: | 0.0 | To: 14.0 |

| | | | | | | |
|----------------------|--------|------|---------------|-----------------|----------------|----------------|
| Water Level Readings | Date | Time | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| | 2/9/09 | | 16.0 | | Dry | |

Pay Quantities:

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

Boring Contractor: Walton Corporation
Driller: D. Burt
Helpers:

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|----------------|----------------------|--|-------------|----------------------|
| | 2/9/09 | 1 | 1.0' | 1 3 5 | Moist firm brown-gray mottled clayey silt, trace of fine to coarse sand and gravel. | A-4(10) | Cultivated Soil - 9" |
| | | 2 | 2.0' | 12 10 15 14 | 12" RECOVERY Moist very stiff brown-gray mottled silt w/ some coarse sand, trace of fine sand and gravel. | A-4(0) | |
| 3.5 | | 3 | 4.0' 4.0' | 2 8 8 8 | 16" RECOVERY Moist medium dense orange coarse sand w/ some fine sand, gravel, and silt. | A-1-b | |
| | | 4 | 6.0' 6.0' | 8 8 9 9 | 13" RECOVERY Moist medium dense orange coarse sand w/ some fine sand, gravel, and silt. | A-1-b | |
| 7 | | 5 | 8.0' 8.0' | 4 7 8 6 | 20" RECOVERY Moist medium dense orange coarse to fine sand w/ some silt, trace of gravel. | A-2-4(0) | |
| | | 6 | 10.0' 10.0' | 8 9 8 7 | 17" RECOVERY Moist medium dense orange coarse sand w/ some fine sand and silt, trace of gravel. | A-1-b | |
| | | 7 | 12.0' 12.0' | 4 5 5 6 | 24" RECOVERY Moist loose orange coarse sand w/ some fine sand and silt, trace of gravel. | A-1-b | |
| 14 | | 8 | 14.0' 14.0' | 6 7 9 4 | 23" RECOVERY Moist medium dense orange coarse to fine sand w/ some silt, trace of gravel. | A-1-b | |
| | | | 16.0' | | 22" RECOVERY End of Boring | | |
| 17.5 | | | | | | | |

Remarks:

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

KEY TO SYMBOLS

Symbol Description

Strata symbols



Low plasticity
clay



Silt



Poorly graded sand
with silt



Silty sand

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AUGUST 2015

Notes:

1. Exploratory borings were drilled on 2/9/2009 using a 3 1/4- inch diameter hollow stem auger. Rig is a Track CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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 Blows are un corrected.

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1
Contract: 25-113-01
Boring Location: Sta. 717+39, 372.00' Lt. C.L.
Boring Surface Elev.: + 39.0'

Boring No.: SWM1-42-1

| | | | | | |
|--|--|-------------|----------------------------|--|------------|
| Wt. of Casing Hammer: | | Lbs. | Average Fall: | | IN. |
| Wt. of Sample Hammer: 140 | | Lbs. | Average Fall: 30 | | IN. |
| Type of: D-Sampler: Split Spoon | | 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: | | To: | |
| Hollow Stem Auger: | | From Depth of: 0.0 | | To: 14.0 | |

| | | | | | |
|-----------------------------|-------------|----------------------|------------------------|-----------------------|-----------------------|
| Water Level Readings | | Depth of Hole | Depth of Casing | Depth of Water | Elev. of Water |
| Date: 2/9/09 | Time | 16.0 | | Dry | |

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

Boring Contractor: Walton Corporation
Driller: D. Burt
Helpers:

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|----------|--|-------------|----------------------|
| | 2/9/09 | 1 | 1.0' | 9 | Moist medium dense orange coarse sand w/ some fine sand, trace of silt and gravel. | A-1-b | Cultivated Soil - 8" |
| | | 2 | 2.0' | 8 | 12" RECOVERY | A-2-4(0) | |
| 3.5 | | | 4.0' | 8 | Moist medium dense orange fine sand w/ some coarse sand and silt, trace of gravel. | | |
| | | 3 | 4.0' | 7 | 24" RECOVERY | A-2-4(0) | |
| | | | 6.0' | 6 | 19" RECOVERY | | |
| 7 | | 4 | 6.0' | 2 | Moist loose orange fine to coarse sand w/ some silt, trace of gravel. | A-2-4(0) | |
| | | | 8.0' | 3 | 17" RECOVERY | | |
| | | 5 | 8.0' | 2 | Moist very loose orange fine to coarse sand, trace of silt. | A-3 | |
| | | | 10.0' | 1 | 18" RECOVERY | | |
| 10.5 | | 6 | 10.0' | 2 | Moist very loose yellow fine to coarse sand w/ some silt. | A-2-4(0) | |
| | | | 12.0' | 2 | 19" RECOVERY | | |
| | | 7 | 12.0' | 2 | Moist loose yellow coarse to fine sand, trace of silt. | A-1-b | |
| 14 | | | 14.0' | 3 | 20" RECOVERY | | |
| | | 8 | 14.0' | 2 | Moist loose brown coarse to fine sand, trace of silt and gravel. | A-1-b | |
| | | | 16.0' | 3 | 22" RECOVERY | | |
| | | | | 4 | End of Boring | | |
| 17.5 | | | | | | | |

Remarks:

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

KEY TO SYMBOLS

Symbol Description

Strata symbols



Poorly graded sand
with silt



Silty sand



Well graded sand
with silt

DRAFT
NOT FOR BIDDING
AUGUST 2015

Notes:

1. Exploratory borings were drilled on 2/9/2009 using a 3 1/4- inch diameter hollow stem auger. Rig is a Track CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
3. Surveyed boring location and elevation was provided by Century Engineering.
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 Blows are un corrected.

**STATE OF DELAWARE
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

F.A. Project: U.S. 301, Maryland State Line to S.R. 1

Boring No.: SWM1-43-1

Contract: 25-113-01

Boring Location: Sta. 727+00, 432.00' Lt. C.L.

Boring Surface Elev.: + 45.0'

Reference:

Wt. of Casing Hammer:
Wt. of Sample Hammer: 140
Type of: D-Sampler: Split Spoon
S-Sampler:
U-Sampler:
Core Bit:

Lbs.
Lbs.
O.D.
O.D.
O.D.
O.D.

Average Fall:
Average Fall: 30
O.D. of Sampler: 2
O.D. of Samp. Tube:
O.D. of Samp. Tube:
O.D. of Rock Core:

IN.
IN.
IN.
IN.
IN.
IN.

Casing Size: 3 1/4
Hollow Stem Auger:

Inches

From Depth of:
From Depth of: 0.0

To:
To: 14.0

Water Level Readings

Date
2/9/09

Time

Depth of Hole
16.0

Depth of Casing

Depth of Water
Dry

Elev. of Water

Pay Quantities:

2 1/2 in. Dia. Dry Sample Boring:

No. of 2 in. Dia. Shelby Tubes:

2 1/2 in. Dia. Contin. Sample Boring:

Ft.;
Ft.;

No. of:
Core Drilling in Rock:

Dia. U-Sample Boring:
U-Samples:

Ft.
Ft.

Boring Contractor: Walton Corporation

Driller: D. Burt

Helpers:

| Depth (ft.) | Daily Progress | No. | Sample Depth | Blows/6" | Sample Description | Class./G.I. | Remarks |
|-------------|----------------|-----|--------------|------------------|--|-------------|---------------|
| | 2/9/09 | 1 | 0.5' | 3 4 5 | Moist stiff brown clayey silt w/ some coarse sand, trace of fine sand. | A-4(6) | Topsoil - 6". |
| | | | 2.0' | | 12" RECOVERY | | |
| | | 2 | 2.0' | 4 4 4 4 | Moist firm brown fine sandy silt w/ some coarse sand, trace of gravel. | A-4(0) | |
| 3.5 | | | 4.0' | | 18" RECOVERY | | |
| | | 3 | 4.0' | 3 4 6 5 | Moist loose brown silty coarse to fine sand w/ some gravel. | A-2-4(0) | |
| | | | 6.0' | | 16" RECOVERY | | |
| | | 4 | 6.0' | 7 3 5 7 | Moist loose orange coarse sand w/ some fine sand and silt, trace of gravel. | A-1-b | |
| 7 | | | 8.0' | | 20" RECOVERY | | |
| | | 5 | 8.0' | 1 4 4 5 | Moist loose yellow coarse to fine sand w/ some silt, trace of gravel. | A-1-b | |
| | | | 10.0' | | 13" RECOVERY | | |
| | | 6 | 10.0' | 6 6 6 6 | Moist medium dense yellow coarse to fine sand w/ some silt, trace of gravel. | A-1-b | |
| 10.5 | | | 12.0' | | 20" RECOVERY | | |
| | | 7 | 12.0' | 3 4 5 6 | Moist loose orange-yellow coarse to fine sand w/ some silt, trace of gravel. | A-2-4(0) | |
| 14 | | | 14.0' | | 16" RECOVERY | | |
| | | 8 | 14.0' | 6 6 6 6 | Moist medium dense orange fine to coarse sand w/ some silt, trace of gravel. | A-2-4(0) | |
| | | | 16.0' | | 18" RECOVERY | | |
| | | | | | End of Boring | | |
| 17.5 | | | | | | | |

Remarks:

Reviewed By: Maureen Kelley

Soils Supervisor: Randy Ferguson

KEY TO SYMBOLS

Symbol Description

Strata symbols



Low plasticity
clay



Silt



Silty sand



Poorly graded sand
with silt

DRAFT
NOT FOR BIDDING
AUGUST 2015

Notes:

1. Exploratory borings were drilled on 2/9/2009 using a 3 1/4- inch diameter hollow stem auger. Rig is a Track CME 55.
2. Groundwater levels recorded at the time of drilling and re-checked the following day.
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