BORING LOG

Nobis Engineering a Sustainable Future	Project: Water St, Plymouth Location: Plymouth, MA Nobis Project No.: 85680.00	Boring No.: BB-1 Boring Location: N: 884131.16 E: 2810163.35 Checked by: A. Panwalkar Date Start: March 5, 2012 Date Finish: March 5, 2012
Contractor: New Hampshire Boring, Inc. Driller: M. D'Ambrosia Nobis Rep.: J. Kalafatis	Rig Type / Model: Truck / Acker AD2 Hammer Type: Safety Hammer Hammer Hoist: Wire Winch	Ground Surface Elev.: (+/-) 10 Datum: H: NAD 83; V: NAVD 88

	Drilling Method	Sampler
Type	Casing	Split-Spoon
Size ID (in.)	4	1-3/8
Advancement	Drive and Wash	140-lb Hammer

Groundwater Observations					
Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time
∇ 03/05/12	12:10	8.2	30	32	20 min

Depth (ft.)	Type & No.	Rec. (in.)	Depth (ft.)	Blows/ 6 in.	Ground Water	Stratum Elev. / Depth (ft.)	SAMPLE DESCRIPTION AND REMARKS (Classification System: Modified Burmister)	NOTES
0						ASPHALT 9.5 / 0.5	6 " ASPHALT.	
1	S-1	10	1-3	14 5 4 4		FILL	S-1: Loose, brown, fine to coarse SAND, little Asphalt, trace Silt. wet. (FILL).	
5	S-2	12	5-7	4 1 1 3			S-2: Very loose, red-brown, fine to coarse SAND and Gravel, trace Silt. wet. (FILL).	
8					∇			
10	S-3	3	10-12	11 7 5 5		-5.0 / 15.0	S-3: Medium dense, brown, GRAVEL, some medium to coarse Sand, trace Silt, wood fragments in tip of spoon. wet. (FILL).	
15	S-4	14	15-17	6 3 1 1		ORGANIC SAND & SILT -8.0 / 18.0	S-4: Very loose, brown, fine to medium SAND, some Silt, significant root structure and organic fibers. wet.	
18							Drive and wash becomes more difficult.	
20	S-5	24	20-22	6 4 5 3		SAND	S-5A (12"): Loose, brown, fine SAND, trace Gravel, trace Silt. wet. S-5B (2"): Loose, brown, fine SAND, some Silt & Clay. wet. S-5C (10"): Loose, brown, fine SAND, trace Gravel, trace Silt. wet.	
25	S-6	20	25-27	76 60 68 36		SAND -20.0 / 30.0	S-6: Very dense, brown, fine to coarse SAND, trace Gravel, trace Silt. wet.	
30	S-7	22	30-32	11 11 11 12		SANDY SILT -22.0 / 32.0	S-7: Medium dense, brown, fine Sandy SILT. wet.	
32							Boring terminated at 32 feet.	

Soil	Percentage	Non-Soil
trace	5 - 10	very few
little	10 - 20	few
some	20 - 35	several
and	35 - 50	numerous

NOTES:

Soil descriptions are based on visual classifications and should be considered approximate. Stratification lines are approximate boundaries between stratums; transitions may be gradual.

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BOREHOLE LOG - NOBIS GINT DATA TEMPLATE OCT 7 2011.GDT - 3/16/12 09:15 - O:\ACTIVE\85680.00 WATER ST. PLYMOUTH MA\EXPLORATION\85680 BORING LOGS.GPJ

BOTTOM OF FOOTING
ELEV. −3.33

BORING LOG

Nobis Engineering a Sustainable Future	Project: Water St, Plymouth Location: Plymouth, MA Nobis Project No.: 85680.00	Boring No.: BB-2 Boring Location: N: 884160.19 E: 2810141.57 Checked by: A. Panwalkar Date Start: March 5, 2012 Date Finish: March 5, 2012
Contractor: New Hampshire Boring, Inc. Driller: M. D'Ambrosia Nobis Rep.: J. Kalafatis	Rig Type / Model: Truck / Acker AD2 Hammer Type: Safety Hammer Hammer Hoist: Wire Winch	Ground Surface Elev.: (+/-) 10 Datum: H: NAD 83; V: NAVD 88

	Drilling Method	Sampler
Type	Casing	Split-Spoon
Size ID (in.)	4	1-3/8
Advancement	Drive and Wash	140-lb Hammer

Groundwater Observations					
Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time
∇ 03/05/12	15:40	8.6	35	37	20 min

Depth (ft.)	Type & No.	Rec. (in.)	Depth (ft.)	Blows/ 6 in.	Ground Water	Stratum Elev. / Depth (ft.)	SAMPLE DESCRIPTION AND REMARKS (Classification System: Modified Burmister)	NOTES
0						ASPHALT 9.5 / 0.5	6" ASPHALT.	
1	S-1	12	1-3	15 8 5 4		FILL	S-1: Medium dense, dark brown, fine to coarse SAND, trace Gravel, trace Silt. moist. (FILL).	
5	S-2	5	5-7	5 3 4 2			S-2: Loose, dark brown, fine to coarse SAND, trace Silt. wet. (FILL).	
9					∇			
10	S-3	10	10-12	7 5 15 16			S-3: Medium dense, gray, fine to coarse SAND, some Gravel, little Wood, trace Silt, trace Brick. wet. (FILL).	
15	S-4	15	15-17	6 2 3 3		-10.0 / 20.0	S-4: Loose, brown, fine to coarse SAND, trace Silt. wet. (FILL).	
20	S-5	24	20-22	2 1 2 3		SAND & SILT with Organics SILTY SAND -13.0 / 23.0 CLAY & SILT	S-5A (4"): Soft, gray, CLAY & SILT, little Organic Fibers, trace Gravel. wet. S-5B (20"): Very loose, gray, fine SAND, some Cohesive Silt. wet.	
25	S-6	18	25-27	22 12 18 21		CLAY & SILT -15.8 / 25.8	S-6A (10"): Very stiff, gray, CLAY & SILT. wet. S-6B (8"): Medium dense, orangish brown, fine to coarse SAND, some Gravel, little Silt. wet.	
30	S-7	24	30-32	10 8 9 9		SANDY SILT -25.0 / 35.0	S-7: Medium dense, light brown, fine Sandy SILT. wet.	
35	S-8	18	35-37	7 9 9 11		SAND -27.0 / 37.0	S-8: Medium dense, dark brown, fine to medium SAND, trace Silt. wet.	
37							Boring terminated at 37 feet.	

Soil	Percentage	Non-Soil
trace	5 - 10	very few
little	10 - 20	few
some	20 - 35	several
and	35 - 50	numerous

NOTES:

Soil descriptions are based on visual classifications and should be considered approximate. Stratification lines are approximate boundaries between stratums; transitions may be gradual.

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BOREHOLE LOG - NOBIS GINT DATA TEMPLATE OCT 7 2011.GDT - 3/16/12 09:15 - O:\ACTIVE\85680.00 WATER ST. PLYMOUTH MA\EXPLORATION\85680 BORING LOGS.GPJ

BORING NOTES

1. LOCATION OF BORINGS SHOWN ON THE PLANS THUS:
2. BORINGS ARE TAKEN FOR PURPOSE OF DESIGN AND SHOW CONDITIONS AT BORING POINTS ONLY, BUT DO NOT NECESSARILY SHOW THE NATURE OF THE MATERIALS TO BE ENCOUNTERED DURING CONSTRUCTION.
3. WATER LEVELS SHOWN ON THE BORING LOGS WERE OBSERVED AT THE TIME OF TAKING BORINGS AND DO NOT NECESSARILY SHOW THE TRUE GROUND WATER LEVEL.
4. FIGURES IN COLUMNS INDICATE NUMBER OF BLOWS REQUIRED TO DRIVE A 1 ⅜" SPLIT SPOON SAMPLER 6" USING A 140 POUND WEIGHT FALLING 30".
5. ALL BORINGS WERE MADE ON MARCH 5, 2012.
6. BORINGS WERE MADE BY NEW HAMPSHIRE BORING, INC. OF DERRY, NEW HAMPSHIRE.

GENERAL NOTES
PROJECT FILE NO.: CHAPTER 85 SECTION 35
TYPE OF PROJECT: PROPOSED BRIDGE
BRIDGE DESIGN LOADING: HL–93
SURVEY: N/A
ELEVATION REFERENCE: NGVD 1929

TRAFFIC DATA*	ROADWAY OVER	ROADWAY UNDER
DESIGN YEAR	2031	N/A
AVERAGE DAILY TRAFFIC–PEAK SEASON 2011	7700	N/A
AVERAGE DAILY TRAFFIC–PEAK SEASON 2031*	8500	N/A
DESIGN HOURLY VOLUME	800	N/A
DIRECTIONAL DISTRIBUTION	45% SB/55% NB	N/A
TRUCK PERCENTAGE–AVERAGE DAY	4% SB/8% NB	N/A
TRUCK PERCENTAGE–PEAK HOUR	4.8% SB/6% NB	N/A
DESIGN SPEED	30 MPH	N/A
DIRECTIONAL DESIGN HOURLY VOLUME	440	N/A

*BASED ON PEAK SEASON (8/27/11 – 9/4/11) TRAFFIC DATA PROVIDED. DESIGN YEAR ESTIMATE ASSUMES 0.5% PER YEAR ANNUAL GROWTH RATE.

HYDRAULIC DATA	
DRAINAGE AREA:	3.9 SQ. MI. (FEMA FIS)
DESIGN DISCHARGE:	132 CFS
DESIGN FREQUENCY:	10 YEAR
DESIGN FLOOD STAGE:	––
DESIGN VELOCITY:	–––
BASIC FLOOD DATA	
100 YR FLOOD DISCHARGE:	202 CFS
100 FLOOD STAGE:	–
FLOOD OF RECORD	
DISCHARGE:	UNKNOWN
STAGE:	UNKNOWN
DATE:	UNKNOWN

GENERAL NOTES

DESIGN

IN ACCORDANCE WITH THE 2007 AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS WITH INTERIM SPECIFICATIONS THROUGH 2010 FOR HL–93 LOADING.

PROJECT SPECIFICATIONS

MASSACHUSETTS HIGHWAY DEPARTMENT STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES DATED 1988, INCLUDING SUPPLEMENTAL AND AMENDED SPECIFICATIONS THROUGH 2012 AND PROJECT SPECIAL PROVISIONS.

NOTES

1. SEE GEOTECHNICAL REPORT, DATED MARCH 22, 2012.
2. SEISMIC GROUND SHAKING HAZARD
   DESIGN SPECTRA:
   A_s = 0.050,
   S_{Ds} = 0.117, and
   S_{D1} = 0.061.
3. SEE HYDRAULIC REPORT, DATED FEBRUARY 2012.
4. NATIONAL AMERICAN VERTICAL DATUM (NGVD) 1929 IS USED THROUGHOUT.

FOUNDATIONS

FOUNDATIONS MAY BE ALTERED, IF NECESSARY TO SUIT CONDITIONS ENCOUNTERED DURING CONSTRUCTION, WITH APPROVAL BY THE ENGINEER.

UNSUITABLE MATERIAL

UNSUITABLE MATERIAL SHALL BE REMOVED WITHIN THE LIMITS OF THE FOUNDATIONS OF THE STRUCTURE AS DIRECTED BY THE ENGINEER.

SUBGRADE PREPARATION

TWO FEET OF SUBGRADE SOILS BELOW THE ABUTMENT AND WINGWALL FOOTINGS SHALL BE OVEREXCAVATED WITHIN THE ZONE OF INFLUENCE OF THE FOOTING AND REPLACED WITH A 2–FOOT THICK LAYER OF COMPACTED PROCESSED GRAVEL FOR SUBBASE THAT MEETS THE REQUIREMENTS FOR MHD ITEM M1.03.1, IN STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES, AS MODIFIED BELOW:

SIEVE SIZE	PERCENT PASSING BY WEIGHT
3–INCH	100
1½–INCH	70–90
1¼–INCH	50–85
No. 4	30–60
No. 200	0–10

IF ORGANICS ARE OBSERVED AT OR WITHIN 2 FEET OF THE BOTTOM OF THE FOOTING, THE TWO FEET OF OVEREXCAVATION AND REPLACEMENT DESCRIBED ABOVE SHOULD BE INCREASED TO 3 FEET AND THE GEOTECHNICAL ENGINEER SHOULD BE NOTIFIED. THE ZONE OF INFLUENCE IS DEFINED AS THAT AREA WITHIN A LINE PROJECTING OUTWARD AND DOWNWARD FROM THE OUTSIDE EDGES OF THE FOOTINGS AT A ONE HORIZONTAL TO ONE VERTICAL (1H:1V) SLOPE. BACKFILL CAN BE PLACED IN ONE 24–INCH THICK LIFT FOLLOWED BY COMPACTION WITH 6 PASSES OF A SELF–PROPELLED VIBRATORY ROLLER IMMEDIATELY PRIOR TO FOOTING CONSTRUCTION.

REINFORCEMENT

ALL REINFORCEMENT SHALL BE ASTM A615 GRADE 60.

UTILITIES

THE CONTRACTOR SHALL LOCATE AND PROTECT FROM DAMAGE ALL EXISTING UTILITIES.

CONCRETE

CONCRETE DESIGN BASED ON f'c = 4,000 PSI FOR CAST–IN–PLACE AND f'c = 5,000 PSI FOR PRECAST.

THE USE OF REMAIN–IN–PLACE FORMS ON THIS STRUCTURE IS NOT ALLOWED.

EXPOSED EDGES OF CONCRETE SHALL BE BEVELED 1" X 1" UNLESS DIMENSIONED OTHERWISE.

ALL REINFORCEMENT SHALL HAVE 3" COVER AT BOTTOM OF FOOTINGS AND 2" COVER ELSEWHERE UNLESS DIMENSIONED OTHERWISE.

CONSTRUCTION JOINTS, OTHER THAN THOSE SHOWN ON THE PLANS, WILL NOT BE PERMITTED WITHOUT THE PRIOR APPROVAL OF THE ENGINEER.

THE CONTRACTOR SHALL DESIGN, MANUFACTURE AND CONSTRUCT THREE SIDED PRECAST CONCRETE CULVERT PER THE INSIDE DIMENSIONS, LENGTH AND DETAILS SHOWN ON THESE PLANS.

BRIDGE MANUFACTURER SHALL SUBMIT SHOP DRAWINGS AND DESIGN CALCULATIONS FOR APPROVAL. DRAWINGS SHALL BE STAMPED BY A MASSACHUSETTS–LICENSED PROFESSIONAL ENGINEER. MATERIAL CERTIFICATIONS AND CERTIFICATION OF COMPLIANCE WITH SPECIFICATIONS SHALL BE PROVIDED.

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Cheshire, Connecticut 06410
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DESCRIPTION	DATE	BY

FOR CONSTRUCTION

BRIDGE NO. P-13-009 (9KL) - BORINGS AND GENERAL NOTES

WATER STREET BRIDGE REPLACEMENT
TOWN BROOK RESTORATION

WATER STREET OVER TOWN BROOK
PLYMOUTH, MASSACHUSETTS

DESIGNED	DRAWN	CHECKED
GDJ	TEB	GDJ

SCALE: AS NOTED

DATE: JANUARY 31, 2014

PROJECT NO.: 1982-04

SHEET NAME: STR-2