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FINAL HYDRAULIC REPORT

PLAN SHEETS

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STANDARDS LIST

| | | |
|--------|--|------------|
| C-10 | CURBING | 02-11-2008 |
| E-100 | CONSTRUCTION APPROACH SIGNS | 01-02-2004 |
| E-100A | SIDE ROAD CONSTRUCTION - APPROACH SIGNS | 01-02-2004 |
| E-101 | CONSTRUCTION SIGN DETAILS | 05-30-2003 |
| E-102 | CONSTRUCTION SIGN DETAILS | 06-30-2003 |
| E-102A | CONSTRUCTION SIGN DETAILS | 05-01-2004 |
| E-106 | TRAFFIC CONTROL- MISCELLANEOUS DETAILS | 03-01-2004 |
| E-107 | DELINEATION, BARRICADES AND DETOURS FOR CONSTRUCTION AREAS | 06-30-2003 |
| E-107A | BREAKAWAY BARRICADE DETAILS | 06-08-2009 |
| E-108 | CONSTRUCTION ZONE LONGITUDINAL DROP OFFS | 06-08-2009 |
| E-108A | CONSTRUCTION ZONE LONGITUDINAL DROP OFFS FOR PAVING | 06-08-2009 |
| E-110 | MAJOR MAINTENANCE OPERATION LANE CLOSURE | 08-08-1995 |
| E-121 | STANDARD SIGN PLACEMENT - CONVENTIONAL ROAD | 08-08-1995 |
| E-134 | BRIDGE NUMBER PLAQUE | 08-08-1995 |
| E-138 | MILE MARKER DETAILS - STATE & TOWN HIGHWAYS | 05-30-2003 |
| E-140 | REGULATORY SIGN DETAILS | 08-30-1996 |
| E-164 | SQUARE STEEL SIGN POST | 06-08-2009 |
| G-1 | STEEL BEAM GUARDRAIL DETAILS (POST, DELINEATOR, TYPICALS) | 01-03-2000 |
| G-4 | PLANK RAIL, GUIDE POSTS, MARKER POSTS | 06-01-1994 |
| G-19 | GENERIC GRADING PLANS FOR GUARDRAIL END TERMINALS | 11-15-2002 |
| S-360A | BRIDGE RAILING, GALVANIZED 2 RAIL BOX BEAM | 04-23-2012 |
| S-360B | GUARDRAIL APPROACH SECTION, GALVANIZED 2 RAIL BOX BEAM | 04-23-2012 |
| S-363 | THREE BEAM TO STANDARD STEEL BEAM TRANSITION SECTION | 04-23-2012 |

- REVISED 4/8/2014
- REVISED 4/25/2014
- REVISED 4/29/2014
- REVISED 5/2/2014
- REVISED 5/6/2014
- REVISED 5/7/2014
- REVISED 5/8/2014

REPLACES SHEET 2 IN CONTRACT PLANS

STRUCTURES DETAILS

| | | |
|-----------|---|------------|
| SD-501.00 | CONCRETE DETAILS AND NOTES | 04-07-2010 |
| SD-502.00 | CONCRETE DETAILS AND NOTES | 05-04-2010 |
| SD-516.10 | BRIDGE JOINT ASPHALTIC PLUG | 04-07-2010 |
| SD-601.00 | STRUCTURAL STEEL DETAILS & NOTES | 05-04-2010 |
| SD-602.00 | STRUCTURAL STEEL PLATE GIRDER DETAILS AND NOTES | 04-02-2011 |

| LEVEL I | LEVEL II | LEVEL III |
|---------|----------|-----------|
| TYPE: | TYPE: | TYPE: |
| GRADE: | GRADE: | GRADE: |

HYDROLOGIC DATA

Date: August 2013

DRAINAGE AREA : 3.3 sq. mi.
 CHARACTER OF TERRAIN : Mostly forested, rural, mountainous, ponds
 STREAM CHARACTERISTICS : Sinuous
 NATURE OF STREAMBED : Gravel and cobbles

PEAK FLOW DATA

| | | | |
|----------|---------|---------|---------|
| Q 2.33 = | 190 cfs | Q 50 = | 590 cfs |
| Q 10 = | 370 cfs | Q 100 = | 680 cfs |
| Q 25 = | 485 cfs | Q 500 = | 880 cfs |

DATE OF FLOOD OF RECORD : Unknown
 ESTIMATED DISCHARGE : Unknown
 WATER SURFACE ELEV. : Unknown
 NATURAL STREAM VELOCITY : @ Q50 = 9.9 fps
 ICE CONDITIONS : Moderate
 DEBRIS : Moderate
 DOES THE STREAM REACH MAXIMUM HIGHWATER ELEV. RAPIDLY? No
 IS ORDINARY RISE RAPID? No
 IS STAGE AFFECTED BY UPSTREAM OR DOWNSTREAM CONDITIONS? Maybe
 IF YES, DESCRIBE : May be affected by confluence with downstream brook

WATERSHED STORAGE : 2% HEADWATERS :
 UNIFORM : X
 IMMEDIATELY ABOVE SITE :

EXISTING STRUCTURE INFORMATION

STRUCTURE TYPE : Single span rolled beam bridge
 YEAR BUILT : 1940, reconstructed in 1969
 CLEAR SPAN(NORMAL TO STREAM): 36'
 VERTICAL CLEARANCE ABOVE STREAMBED : 7'
 WATERWAY OF FULL OPENING : 170 sq. ft.
 DISPOSITION OF STRUCTURE : Replace
 TYPE OF MATERIAL UNDER SUBSTRUCTURE : Unknown

WATER SURFACE ELEVATIONS AT:

| | | | |
|---------|---------|------------|---------|
| Q2.33 = | 1290.5' | VELOCITY = | 6.2 fps |
| Q10 = | 1291.5' | " | 7.0 fps |
| Q25 = | 1291.9' | " | 7.8 fps |
| Q50 = | 1292.2' | " | 8.6 fps |
| Q100 = | 1292.5' | " | 9.3 fps |

LONG TERM STREAMBED CHANGES : None noted

IS THE ROADWAY OVERTOPPED BELOW Q100: No
 FREQUENCY:
 RELIEF ELEVATION: 1294.0'
 DISCHARGE OVER ROAD @Q100: N/A

UPSTREAM STRUCTURE

TOWN: Marlboro DISTANCE: 5000'
 HIGHWAY #: TH 20 STRUCTURE #: BR 11
 CLEAR SPAN: CLEAR HEIGHT:
 YEAR BUILT: 1945 FULL WATERWAY:
 STRUCTURE TYPE: Timber

DOWNSTREAM STRUCTURE

TOWN: Marlboro DISTANCE: 80'
 HIGHWAY #: STRUCTURE #:
 CLEAR SPAN: CLEAR HEIGHT:
 YEAR BUILT: FULL WATERWAY:
 STRUCTURE TYPE: Confluence with unnamed stream

LRFR LOAD RATING FACTORS

| LOADING LEVELS | TRUCK | | | | | | |
|----------------|-------|-------|------|--------|---------|---------|--------|
| | H-20 | HL-93 | 3S2 | 6 AXLE | 3A STR. | 4A STR. | 5A SEM |
| TONNAGE | 20 | 36 | 36 | 66 | 30 | 34.5 | 38 |
| INVENTORY | 2.96 | 1.43 | | | | | |
| POSTING | | | | | | | |
| OPERATING | 3.84 | 1.85 | 2.92 | 1.91 | 2.69 | 2.4 | 2.54 |
| COMMENTS: | | | | | | | |

PILE DRIVING AND TESTING REQUIREMENTS

- NOMINAL PILE DRIVING CAPACITY f_{nd} : ---
- PILE TEST RESISTANCE FACTOR ϕ : ---
- MAXIMUM PILE TIP ELEVATION ϕ : ---
- ALL PILES WILL BE SET IN PRE-EXCAVATED HOLES INTO BEDROCK. SEE GENERAL NOTES FOR ADDITIONAL INFORMATION.

PROPOSED STRUCTURE

STRUCTURE TYPE: Single span steel beam bridge

CLEAR SPAN(NORMAL TO STREAM): 60'
 VERTICAL CLEARANCE ABOVE STREAMBED: 6.1'
 WATERWAY OF FULL OPENING: 230 sq. ft.

WATER SURFACE ELEVATIONS AT:

| | | | |
|---------|---------|------------|----------|
| Q2.33 = | 1290.1' | VELOCITY = | 5.8 fps |
| Q10 = | 1291.0' | " | 8.0 fps |
| Q25 = | 1291.3' | " | 9.4 fps |
| Q50 = | 1291.6' | " | 10.3 fps |
| Q100 = | 1291.9' | " | 10.8 fps |

IS THE ROADWAY OVERTOPPED BELOW Q100: No
 FREQUENCY:
 RELIEF ELEVATION: 1294.0'
 DISCHARGE OVER ROAD @Q100: N/A

AVERAGE LOW ELEVATION OF SUPERSTRUCTURE: 1293.3'
 VERTICAL CLEARANCE: @Q50 = 1.7'

SCOUR: Contraction scour @Q100 = 1.0' and @Q500 = 1.5'

REQUIRED CHANNEL PROTECTION: Stone Fill, Type III

PERMIT INFORMATION

AVERAGE DAILY FLOW: 7 cfs DEPTH OR ELEVATION:
 ORDINARY LOW WATER: 3 cfs 0.5'
 ORDINARY HIGH WATER: 80 cfs 1.5'

TEMPORARY BRIDGE REQUIREMENTS

STRUCTURE TYPE: None
 CLEAR SPAN (NORMAL TO STREAM):
 VERTICAL CLEARANCE ABOVE STREAMBED:
 WATERWAY AREA OF FULL OPENING:

ADDITIONAL INFORMATION

Confluence with unnamed stream 80' downstream of bridge

TRAFFIC MAINTENANCE NOTES

- MAINTAIN ONE-WAY TRAFFIC ON THE EXISTING STRUCTURE.
- INSTALL AND MAINTAIN TRAFFIC SIGNALS.
- SIDEWALKS ARE NOT NECESSARY

DESIGN VALUES

| | |
|--|---|
| 1. DESIGN LIVE LOAD | HL-93 |
| 2. FUTURE PAVEMENT | d_p : 1.5 INCH |
| 3. DESIGN SPAN | L : 80.00 FT |
| 4. MIN. MID-SPAN POS. CAMBER @ RELEASE (PRESTRESSED UNITS) | Δ : --- |
| 5. PRESTRESSING STRAND | f_y : --- |
| 6. PRESTRESSED CONCRETE STRENGTH | f'_c : --- |
| 7. PRESTRESSED CONCRETE RELEASE STRENGTH | f'_{ci} : --- |
| 8. CONCRETE, HIGH PERFORMANCE CLASS AA | f'_c : --- |
| 9. CONCRETE, HIGH PERFORMANCE CLASS A | f'_c : 4.0 KSI |
| 10. CONCRETE, HIGH PERFORMANCE CLASS B | f'_c : 3.5 KSI |
| 11. CONCRETE, CLASS C | f'_c : --- |
| 12. REINFORCING STEEL | f_y : 60 KSI |
| 13. STRUCTURAL STEEL AASHTO M270 (WEATHERING) | f_y : 50 KSI |
| 14. SOIL UNIT WEIGHT | γ : 0.140 KCF |
| 15. NOMINAL BEARING RESISTANCE OF SOIL | q_n : --- |
| 16. SOIL BEARING RESISTANCE FACTOR (REFER TO AASHTO LRFD) | ϕ : --- |
| 17. NOMINAL BEARING RESISTANCE OF ROCK | q_n : 70.0 KSF |
| 18. ROCK BEARING RESISTANCE FACTOR (REFER TO AASHTO LRFD) | ϕ : 0.45 |
| 19. NOMINAL AXIAL PILE RESISTANCE | q_p : --- |
| 20. PILE YIELD STRENGTH ASTM A572 | f_y : 50 KSI |
| 21. PILE SIZE | HP 10X57 |
| 22. EST. PILE LENGTH (AVERAGE) | L_p : 13 FT |
| 23. PILE RESISTANCE FACTOR | ϕ : --- |
| 24. LATERAL PILE DEFLECTION | Δ : --- |
| 25. BASIC WIND SPEED | V_{3s} : --- |
| 26. MINIMUM GROUND SNOW LOAD | p_g : --- |
| 27. SEISMIC DATA | PGA : --- S_s : --- S_1 : --- |

PROJECT NAME: MARLBORO

PROJECT NUMBER: BRF 010-1(43)

FILE NAME: s10b414pi.dgn PLOT DATE: 5/8/2014
 PROJECT LEADER: K. HIGGINS DRAWN BY: R. KLINFELTER
 DESIGNED BY: R. KLINFELTER CHECKED BY: J. SALVATORI
 PRELIMINARY INFORMATION SHEET SHEET 2 OF 50

TRAFFIC DATA

| YEAR | ADT | DHV | % D | % T | ADTT | 20 year ESAL for flexible pavement from 2014 to 2034 : 3994000 |
|------|------|-----|-----|------|------|--|
| 2014 | 5300 | 730 | 52 | 11.1 | 590 | 40 year ESAL for flexible pavement from 2014 to 2054 : 8745000 |
| 2034 | 5600 | 770 | 52 | 15.5 | 870 | Design Speed : 50 mph |