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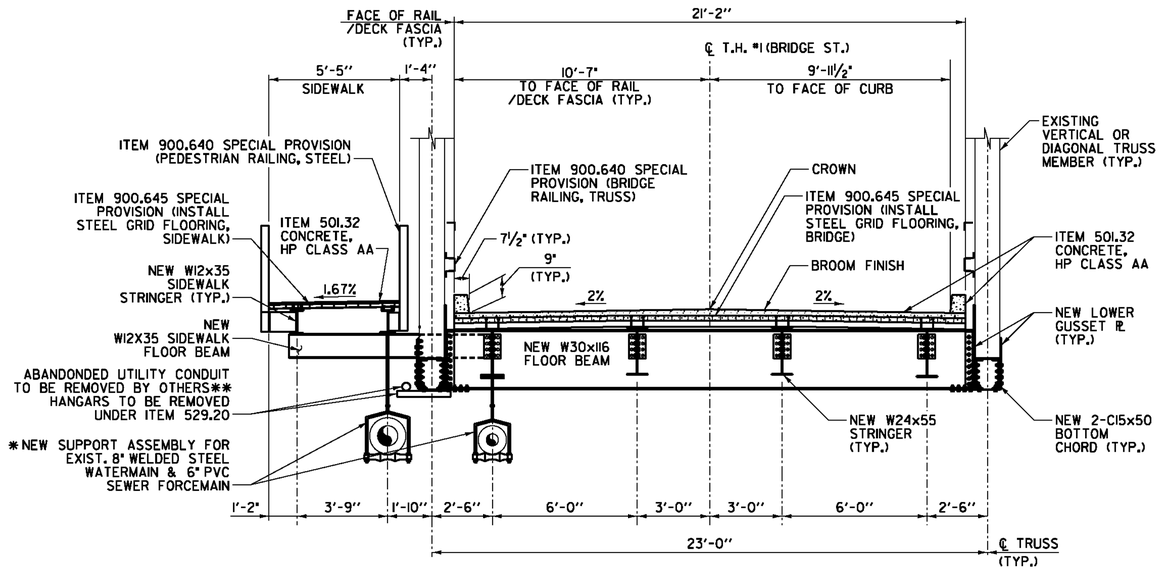
VAOT STANDARDS

C-10	02/11/08
C-2A	10/14/05
E-100	01/02/04
E-100A	01/02/04
E-101	05/30/03
E-102	06/30/03
E-102A	05/01/04
E-106	03/01/04
E-107	06/30/03
E-107A	08/08/95
E-108	08/18/95
E-121	08/08/95
E-154	05/01/04
E-155	05/01/04
E-164	05/20/99
E-191	02/01/99
E-193	08/18/95
G-1b	06/01/94
SB-R6-82	01/06/95



REHABILITATED BRIDGE TYPICAL SECTION

NOT TO SCALE

* NEW UTILITY SUPPORT ASSEMBLIES TO MATCH LOCATION AND TYPE OF EXISTING HANGERS. IN ACCORDANCE WITH ITEM 900.620 SPECIAL PROVISION (UTILITY SUPPORT ASSEMBLY, SEWER) AND ITEM 900.620 SPECIAL PROVISION (UTILITY SUPPORT ASSEMBLY, WATER).

  ASSEMBLY TO BE COOPER B-LINE ADJUSTABLE STEEL YOKE AND PIPE ROLL (PART NO. B3110), COOPER B-LINE W/ 1" DIA. ASTM A 307 THREADED ROD AND STEEL BEAM CLAMP (PART NO. B3055-1) OR EQUIVALENT ASSEMBLY.

  CONTACTOR SHALL TAKE NECESSARY MEASUREMENTS TO ORDER APPROPRIATE HARDWARE.

** REFER TO SPECIAL PROVISIONS.

FINAL HYDRAULICS REPORT

HYDROLOGIC DATA

DRAINAGE AREA= 946.0 square miles
CHARACTER OF TERRAIN= Hilly to mountainous drainage basin
CHARACTER & TYPE OF STREAM= Sinuous with sharp bends upstream

NATURE OF STREAMBED= Silt, sand, gravel, cobbles, and some ledge

Q2.33= 17,600 cfs Q50= 46,900 cfs
Q10= 32,100 cfs Q100= 54,300 cfs
Q25= 40,000 cfs Q500= 75,000 cfs

DATE OF FLOOD OF RECORD= November 1927
WATER SURFACE ELEV.= 311.9' ESTIMATED DISCHARGE= Unknown
NATURAL STREAM VELOCITY @ Q25 = 6.0 fps
ICE CONDITIONS= Moderate to heavy DEBRIS= Moderate
DOES THE STREAM REACH MAXIMUM HIGHWATER ELEVATION RAPIDLY? No
IS ORDINARY RISE RAPID? No
IS STAGE AFFECTED BY UPSTREAM OR DOWNSTREAM CONDITIONS? No
IF YES, DESCRIBE.

WATERSHED STORAGE 1.0% HEADWATERS ____ UNIFORM THROUGHOUT WATERSHED X
IMMEDIATELY ABOVE SITE ____

EXISTING STRUCTURE

STRUCTURE TYPE= Single span steel truss bridge
YEAR BUILT= 1928, rehabilitated in 1977
CLEAR SPAN (NORMAL TO STREAM)= 225' (185' effective from old abutment)
VERTICAL CLEARANCE ABOVE STREAMBED= 37' maximum
WATERWAY OF FULL OPENING= 5,200 sq. ft
DISPOSITION OF STRUCTURE= Rehabilitate
TYPE OF MATERIAL UNDER SUBSTRUCTURE= Ledge South, unknown North

WATER SURFACE ELEV. @ Q2.33= 298.0 ft VELOCITY= 7.9 fps
Q10= 306.0 ft " 7.0 fps
Q25= 307.3 ft " 7.8 fps
Q50= 308.6 ft " 8.3 fps
Q100= 309.9 ft " 8.8 fps

LONG TERM STREAM BED CHANGES= None noted

IS THE ROADWAY OVERTOPPED BELOW THE Q100? Yes FREQUENCY= Below Q10
RELIEF ELEVATION= 303.9 ft DISCHARGE OVER ROAD @ Q100= 2115 cfs

UPSTREAM STRUCTURE= TOWN= Richmond DISTANCE= 18,300 ft
HIGHWAY NO.= T.H. 3 STRUCTURE NO.= 10
STRUCTURE TYPE= 2 span steel girder bridge
CLEAR SPAN= 236 ft CLEAR HEIGHT= 27.5 ft
YEAR BUILT= 2003 FULL WATERWAY= 5,570 sq. ft

DOWNSTREAM STRUCTURE= TOWN= Richmond DISTANCE= 13,400 ft
HIGHWAY NO.= 189 STRUCTURE NO.= 58 S
STRUCTURE TYPE= 3 span steel girder bridge
CLEAR SPAN= 541 ft CLEAR HEIGHT= 65 ft
YEAR BUILT= 1962 FULL WATERWAY= 20,700 sq. ft

PROPOSED STRUCTURE

STRUCTURE TYPE= Rehabilitate existing truss bridge

CLEAR SPAN (NORMAL TO STREAM)= 225 ft (185 ft effective from old abut.)
VERTICAL CLEARANCE ABOVE STREAMBED= 37' maximum
WATERWAY OF FULL OPENING= 5,200 sq. ft

WATER SURFACE ELEV. @ Q2.33= 298.0 ft VELOCITY= 7.9 fps
Q10= 306.0 ft " 7.0 fps
Q25= 307.3 ft " 7.8 fps
Q50= 308.6 ft " 8.3 fps
Q100= 309.9 ft " 8.8 fps

IS THE ROADWAY OVERTOPPED BELOW THE Q100? Yes FREQUENCY= Below Q10
RELIEF ELEVATION= 303.9' DISCHARGE OVER ROAD @ Q100= 2115 cfs

AVERAGE LOW ELEVATION OF SUPERSTRUCTURE= 312.0 ft
VERTICAL CLEARANCE= @ Q25 = 4.7 ft average (3.7 ft minimum)

SCOUR= Bridge is stable for scour. South abutment is on ledge. North abutment is behind and protected by an older abutment.

REQUIRED CHANNEL PROTECTION= Stone Fill, Type IV as needed

PERMIT INFORMATION

AVERAGE DAILY FLOW= 2,000 cfs
ORDINARY LOW WATER= 800 cfs DEPTH= EL. 287'
ORDINARY HIGH WATER= 7,600 cfs DEPTH= EL. 293'

ADDITIONAL INFORMATION

All elevations are based on NAVD88 vertical datum.
Velocities listed are the average velocities for the entire section, channel and floodplain.
Velocities within the channel are higher.
Hydraulics is based on limited project survey and FIS water surface elevations.

DESIGN CRITERIA:
1. DESIGN LIVE LOAD AASHTO HS-20
2. DESIGN SPAN 229' - 10.5"
3. ALLOWABLE LOAD FOR SPREAD FOOTINGS ON SOIL N/A ON LEDGE N/A
4. ALLOWABLE LOAD FOR PILING TYPE ESTIMATED LENGTH
5. STRUCTURAL STEEL AASHTO GRADE SEE PROJECT GENERAL NOTES
6. REINFORCING STEEL GRADE 60
   CONCRETE, HIGH PERFORMANCE CLASS AA f'_c : 4000 PSI f_c=1600 psi
   CONCRETE, HIGH PERFORMANCE CLASS B f'_c : 3500 PSI f_c=1400 psi

TRAFFIC MAINTENANCE:
1. IS TRAFFIC TO BE MAINTAINED? NO IF YES, ON EXISTING STRUCTURE N/A OR ON TEMPORARY BRIDGE
2. TEMPORARY BRIDGE REQUIREMENTS: ONE OR TWO WAY N/A TRAFFIC CONTROL SIGNALS REQUIRED N
   MINIMUM CLEAR SPAN (NORMAL TO STREAM) MINIMUM CLEAR HEIGHT N/A
   MINIMUM WATERWAY AREA
   ARE SIDEWALKS REQUIRED? N/A IF SO, ON WHAT SIDE? N/A
   STRUCTURE TYPE

RICHMOND
BHF 0209(7)

SHEET 6 OF 23
FOR REFERENCE ONLY

WORKING STRESS LOAD RATING (TONS)

LOADING LEVELS (WORKING STRESS)	TRUCK						
	H	HS	3S2	6 AXLE	3A. STR.	4A. STR.	5A. SEMI
INVENTORY 0.55 Fy	17	30					
POSTED 0.67 Fy	26	47	42		28	35	26
OPERATING 0.75 Fy		60	54	84	36	45	34

MEMBER W8 AND W25 ARE THE CONTROLLING MEMBERS.
REFER TO TRUSS ELEVATION FOR MEMBER LOCATIONS.

WORKING STRESS RF= $\frac{F_{ALLOW} - F_{DL}}{F_{LL+I}}$

TRAFFIC DATA

YEAR	AADT	DHV	% D	% T	ADTT
2009	5800	650	66	4.2	270
2029	7100	800	66	7.0	550

20 year ESAL for flexible pavement 2009 to 2029 : 1,752,000
40 year ESAL for flexible pavement 2009 to 2049 : 4,628,000
Design speed: 15 mph

PROJECT NAME: RICHMOND
PROJECT NUMBER: BHF 0209(5)

FILE NAME: ...\drawing\z08J132_pi.dgn PLOT DATE: 8/17/2010
PROJECT LEADER: C. WILLIAMS DRAWN BY: J. SOTER
DESIGNED BY: T. KNIGHT CHECKED BY: G. BOGUE
PRELIMINARY INFORMATION SHEET SHEET 2 OF 50

Stantec