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FINAL HYDRAULIC REPORT

HYDROLOGIC DATA

Date: March, 2000

DRAINAGE AREA : 18.62 sq. km

CHARACTER OF TERRAIN : Forested, hilly to mountainous

STREAM CHARACTERISTICS : Small to med., stable, perennial, straight

NATURE OF STREAMBED : Cobbles to large boulders

PEAK FLOW DATA

Q 2.33 = 11 cms

Q 10 = 25 cms

Q 25 = 37 cms

Q 50 = 45 cms

Q 100 = 57 cms

Q 500 = 78 cms

DATE OF FLOOD RECORD : Unknown

ESTIMATED DISCHARGE: Unknown

WATER SURFACE ELEV.: Unknown

NATURAL STREAM VELOCITY : @Q50 = 4.0mps

ICE CONDITIONS : Slight

DEBRIS: Moderate

DOES THE STREAM REACH MAXIMUM HIGHWATER ELEV. RAPIDLY? Yes

IS ORDINARY RISE RAPID? Yes

IS STAGE AFFECTED BY UPSTREAM OR DOWNSTREAM CONDITIONS? No

IF YES, DESCRIBE: N/A

WATERSHED STORAGE: 1%

HEADWATERS: UNIFORM: X

IMMEDIATELY ABOVE SITE:

EXISTING STRUCTURE INFORMATION

STRUCTURE TYPE: Single Span Rolled Beam

YEAR BUILT: 1937

CLEAR SPAN(NORMAL TO STREAM): 16.3m

VERTICAL CLEARANCE ABOVE STREAMBED: 4.6 m

WATERWAY OF FULL OPENING: 50 sq m

DISPOSITION OF STRUCTURE: Remove

TYPE OF MATERIAL UNDER SUBSTRUCTURE: Unknown

WATER SURFACE ELEVATIONS AT:

Q2.33 = 214.7 m

Q10 = 215.3 m

Q25 = 215.6 m

Q50 = 215.8 m

Q100 = 216.2 m

VELOCITY = 2.9 mps

" 4.6 mps

" 4.9 mps

" 5.0 mps

" 3.7 mps*

LONG TERM STREAMBED CHANGES: none

IS THE ROADWAY OVERTOPPED BELOW Q100: No

FREQUENCY: N/A

RELIEF ELEVATION: N/A

DISCHARGE OVER ROAD @Q100: None

UPSTREAM STRUCTURE

TOWN: Duxbury

DISTANCE: 4 km

HIGHWAY #: TH 35

STRUCTURE #: B25

CLEAR SPAN: 2.4 m

CLEAR HEIGHT: 2.4 m

YEAR BUILT: Unknown

FULL WATERWAY: 4.5 sq m

STRUCTURE TYPE: Steel Boiler Tube

DOWNSTREAM STRUCTURE

TOWN: Moretown

DISTANCE: 1.6 km

HIGHWAY #: VT 100B

STRUCTURE #: 1

CLEAR SPAN: 8.2 m

CLEAR HEIGHT: 1.8 m

YEAR BUILT: 1927

FULL WATERWAY: 15.0 sq m

STRUCTURE TYPE: Concrete T-Beam Bridge

LOAD FACTOR		LOAD RATING (TONS)						
LOADING LEVELS	TRUCK							
	H	HS	3S2	6 AXLE	3A. STR.	4A. STR.	SA SEMI	
INVENTORY	33	42						
POSTED	46	59	73		52	54	66	
OPERATING		70	87	106	63	64		
COMMENTS:	0							

TRAFFIC DATA					
YEAR	ADT	DHV	% D	% T	ADTT
2005	3900	460	57	6	270
2025	5200	590	57	9	520

20 year ESAL for flexible pavement from 2005 to 2025 : 1,896,000

40 year ESAL for flexible pavement from 2005 to 2045 : 4,856,000

Design Speed : 80 km/h

PROPOSED STRUCTURE

STRUCTURE TYPE: Single Span Steel Girder w/ Integral Abutments

CLEAR SPAN(NORMAL TO STREAM): 19.4 m

VERTICAL CLEARANCE ABOVE STREAMBED: 4.4 m

WATERWAY OF FULL OPENING: 51 sq m

WATER SURFACE ELEVATIONS AT:

Q2.33 = 214.6 m

Q10 = 215.2 m

Q25 = 215.5 m

Q50 = 215.7 m

Q100 = 216.1 m

VELOCITY= 3.2 mps

" 3.5 mps

" 5.0 mps

" 5.3 mps

" 3.6 mps*

IS THE ROADWAY OVERTOPPED BELOW Q100: No

FREQUENCY: N/A

RELIEF ELEVATION: N/A

DISCHARGE OVER ROAD @Q100: None

AVERAGE LOW ELEVATION OF SUPERSTRUCTURE: 217.5 m ave

VERTICAL CLEARANCE: @Q100 1.4 m ave

SCOUR: 0.3 m contraction scour @ Q500

REQUIRED CHANNEL PROTECTION: Type IV Stone

PERMIT INFORMATION

AVERAGE DAILY FLOW: 0.4cms

ORDINARY LOW WATER: 0.2cms

ORDINARY HIGH WATER: 4.9cms

DEPTH OR ELEVATION: 0.1m

0.5m

TEMPORARY BRIDGE REQUIREMENTS

STRUCTURE TYPE: Two-Way Single Span

CLEAR SPAN (NORMAL TO STREAM): 11.2 m (minimum)

VERTICAL CLEARANCE ABOVE STREAMBED: 2.0 m (minimum)

WATERWAY AREA OF FULL OPENING: 20.0 sq m (minimum)

ADDITIONAL INFORMATION

* Velocities for both existing and proposed structures were reported from the downstream fascia of the bridges. The Q100 velocities through the bridges drop off as there is no longer a hydraulic jump induced; as is the case with all other flow regimes.

DESIGN CRITERIA

1. DESIGN LIVE LOAD AASHTO MS-22.5

2. DESIGN SPAN 20.44 m

3. ALLOWABLE LOAD FOR SPREAD FOOTINGS ON SOIL ON LEDGE

4. ALLOWABLE LOAD FOR PILING 623 kN

TYPE HP 310 X 125 AASHTO M223 GRADE 345

ESTIMATED LENGTH

5. STRUCTURAL STEEL AASHTO GRADE M270 M270 GRADE 345 W

6. REINFORCING STEEL GRADE 420

7. CONCRETE, HIGH PERFORMANCE CLASS A f'c : 30 Mpa

CONCRETE, HIGH PERFORMANCE CLASS B f'c : 25 Mpa

8. SOIL UNIT WEIGHT 140 kcm

9. DESIGN LOAD FOR SPREAD FOOTINGS ON SOIL

TRAFFIC MAINTENANCE

1. IS TRAFFIC TO BE MAINTAINED? YES

IF YES, ON EXISTING STRUCTURE OR ON TEMPORARY BRIDGE TEMPORARY BRIDGE

2. TEMPORARY BRIDGE REQUIREMENTS: ONE OF TWO WAY TWO-WAY

TRAFFIC CONTROL SIGNALS REQUIRED NO

MINIMUM CLEAR SPAN (NORMAL TO STREAM):

WATERWAY OF FULL OPENING:

VERTICAL CLEARANCE ABOVE STREAMBED:

ARE SIDEWALKS REQUIRED? NO

IF SO, ON WHAT SIDE?

STRUCTURE TYPE:

PROJECT NAME: DUXBURY

PROJECT NUMBER: STP 013-4(24)

FILE NAME: /str5/86e059/se059PI.xls

PROJECT LEADER: T. SUMNER

DESIGNED BY: T. SUMNER

PRELIMINARY INFORMATION SHEET #1

PLOT DATE: 9/20/2005

DRAWN BY: G. SHAN GRAW

CHECKED BY: G. SHAN GRAW

SHEET 2 OF 62