APPENDIX D

Drawings and Inspection Reports of Bridges in Area

Armstrong Dam Removal Feasibility Study

List of Inspections and Plans

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
BRIDGE INSPECTION

OLD COLONY LINE
PLYMOUTH BRANCH OVER MONATIQUOT RIVER
BRAINTREE, MA

BRIDGE NO. B-21-041

BIN NO. B45

MILE POINT 11.667

STRUCTURE NO. B21041-B45-MBT-RRO

PREPARED BY:
DIVERSIFIED TECHNOLOGY CONSULTANTS
305 N. Main Street, Suite 202
Andover, MA 01810

CONTRACT NO. B92PS18

DATE OF INSPECTION:
OCTOBER 2014

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
BRIDGE INSPECTION

OLD COLONY LINE
PLYMOUTH BRANCH OVER MONATIQUOT RIVER
BRAINTREE, MA

BRIDGE NO. B-21-041

BIN NO. B45

MILE POINT 11.667

STRUCTURE NO. B21041-B45-MBT-RRO

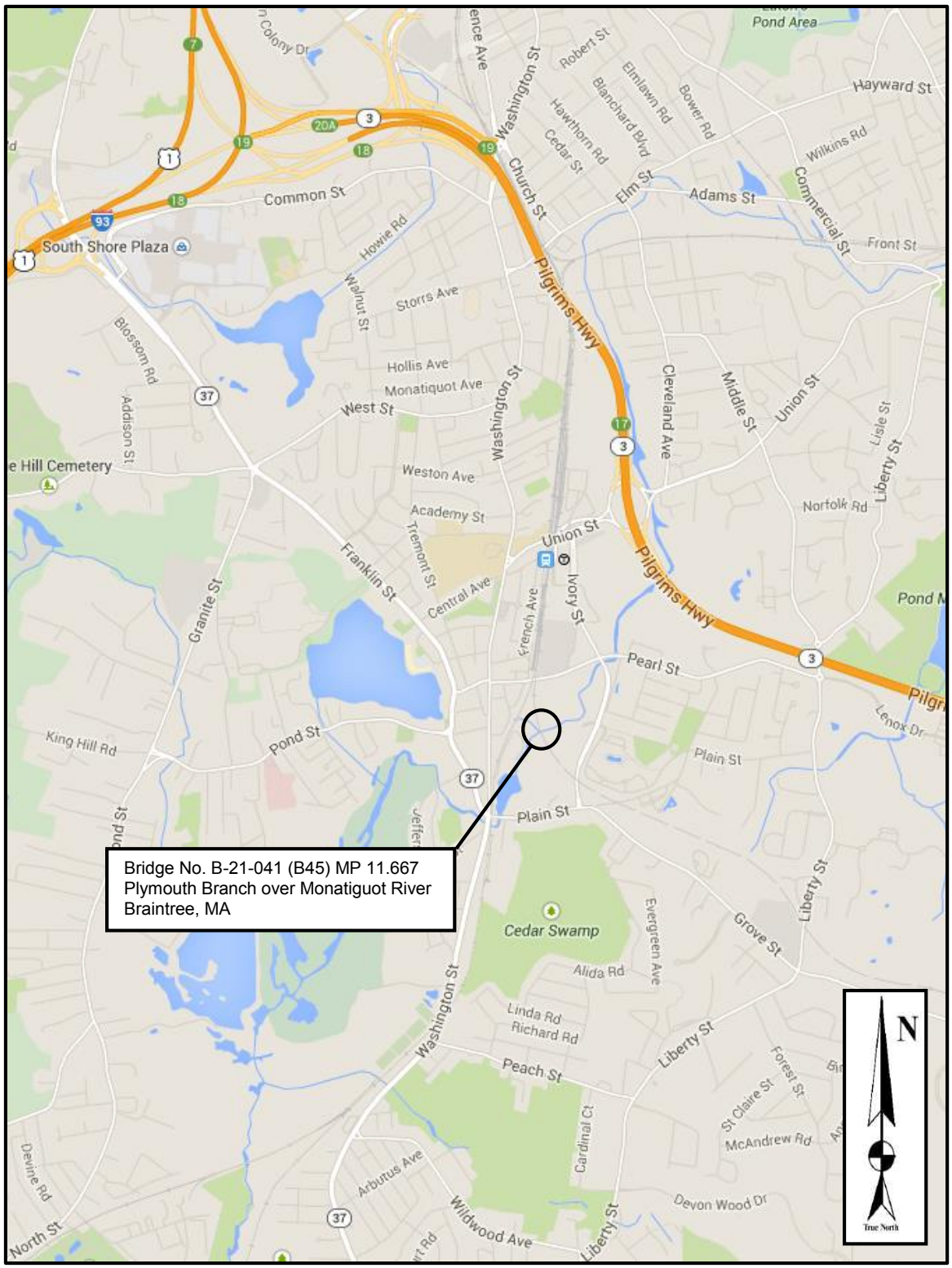
PREPARED BY:
DIVERSIFIED TECHNOLOGY CONSULTANTS
305 N. Main Street, Suite 202
Andover, MA 01810

CONTRACT NO. B92PS18

DATE OF INSPECTION:
OCTOBER 2014

TABLE OF CONTENTS

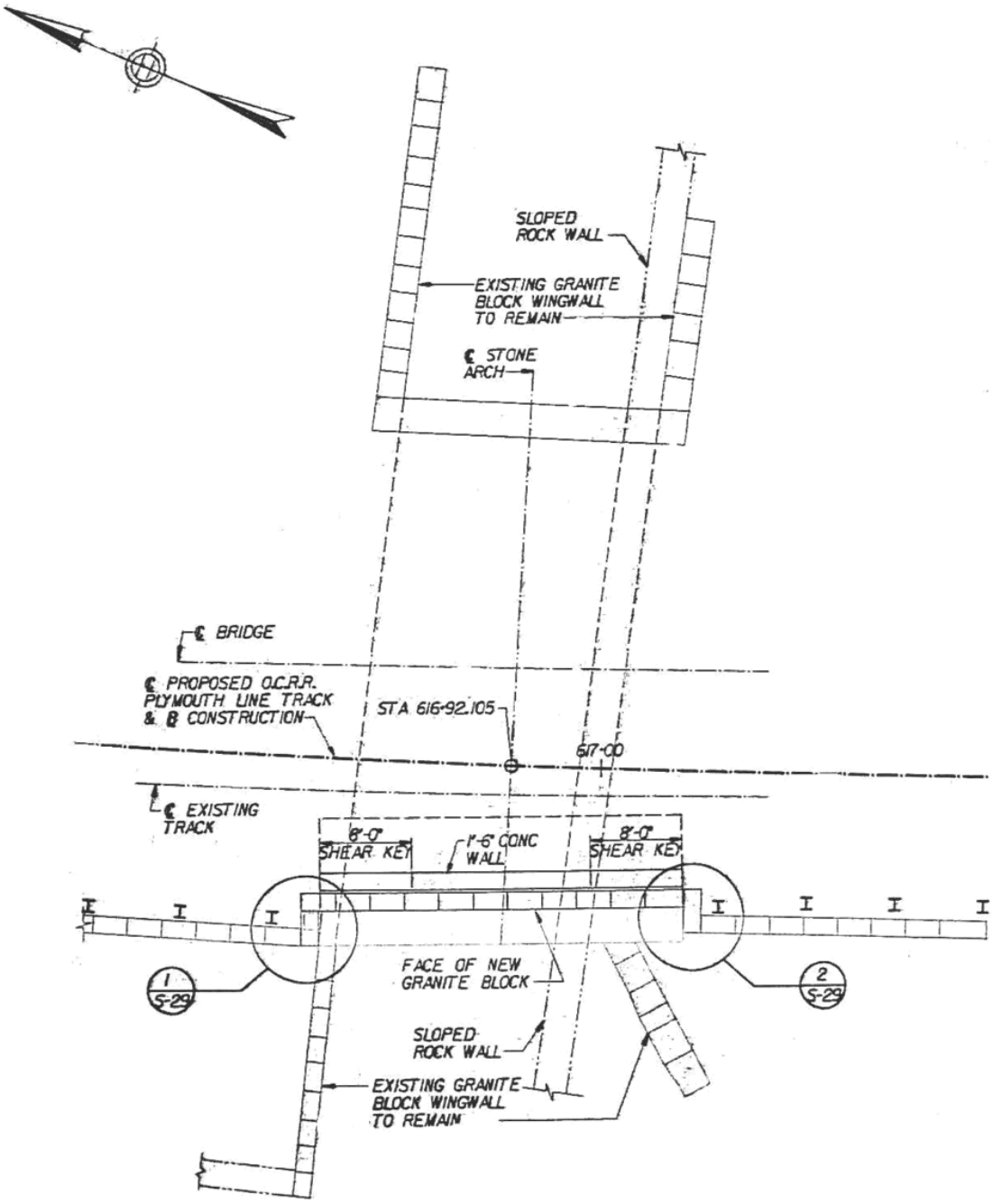
LOCATION MAP



DESCRIPTION OF BRIDGE

Date of Construction:	1900 (Assumed)
Original Design Loading:	Unknown
Bridge Type:	Stone Masonry Arch Culvert
Skew:	0°
Spans:	One (1) span; 21'-6" clear distance at spring lines
Width of Bridge Deck:	44'-0" out-to-out
Track Surface:	One (1) track (without guard rails); timber ties and ballasted deck
Curbs:	None
Sidewalk/Walkway/Median:	None
Bridge Railing:	Steel pedestrian handrail on west side of the bridge only
Protective Screen:	None
Approach Railing:	None
Superstructure:	Stone masonry closed spandrel deck arch
Modifications to Original Superstructure:	Arch was widened approximately 15'-0" on the east side at an earlier date. A reinforced concrete retaining wall with granite facing and cap was also added above the west fascia of the arch in approx. 1994
Utilities:	None
Substructure:	Stone masonry breastwalls, spandrel walls, and wingwalls. A sloped and exposed ledge footing supports the south.
Modifications to Original Substructure:	Arch was widened approximately 15'-0" on the east side

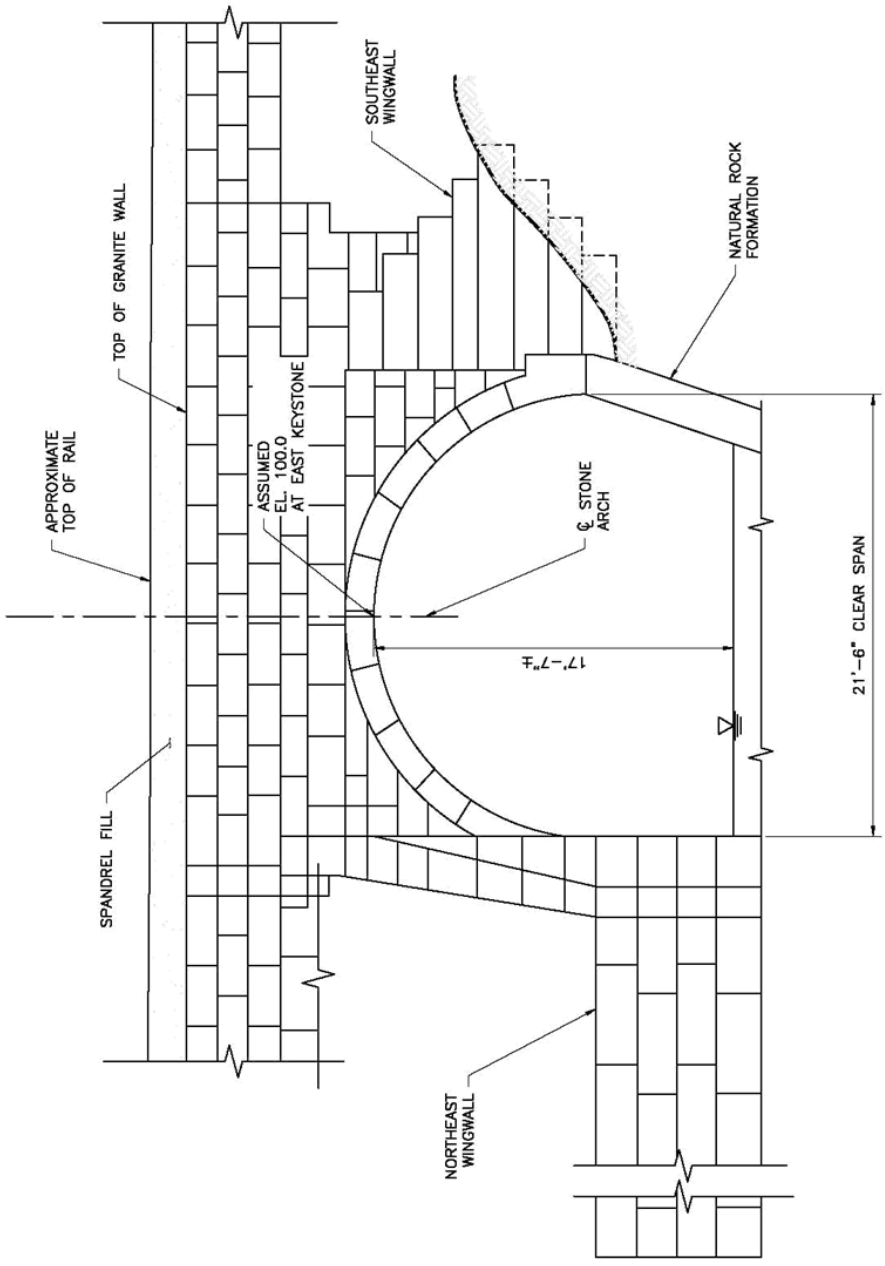
BRIDGE PLAN



BRIDGE PLAN
NOT TO SCALE

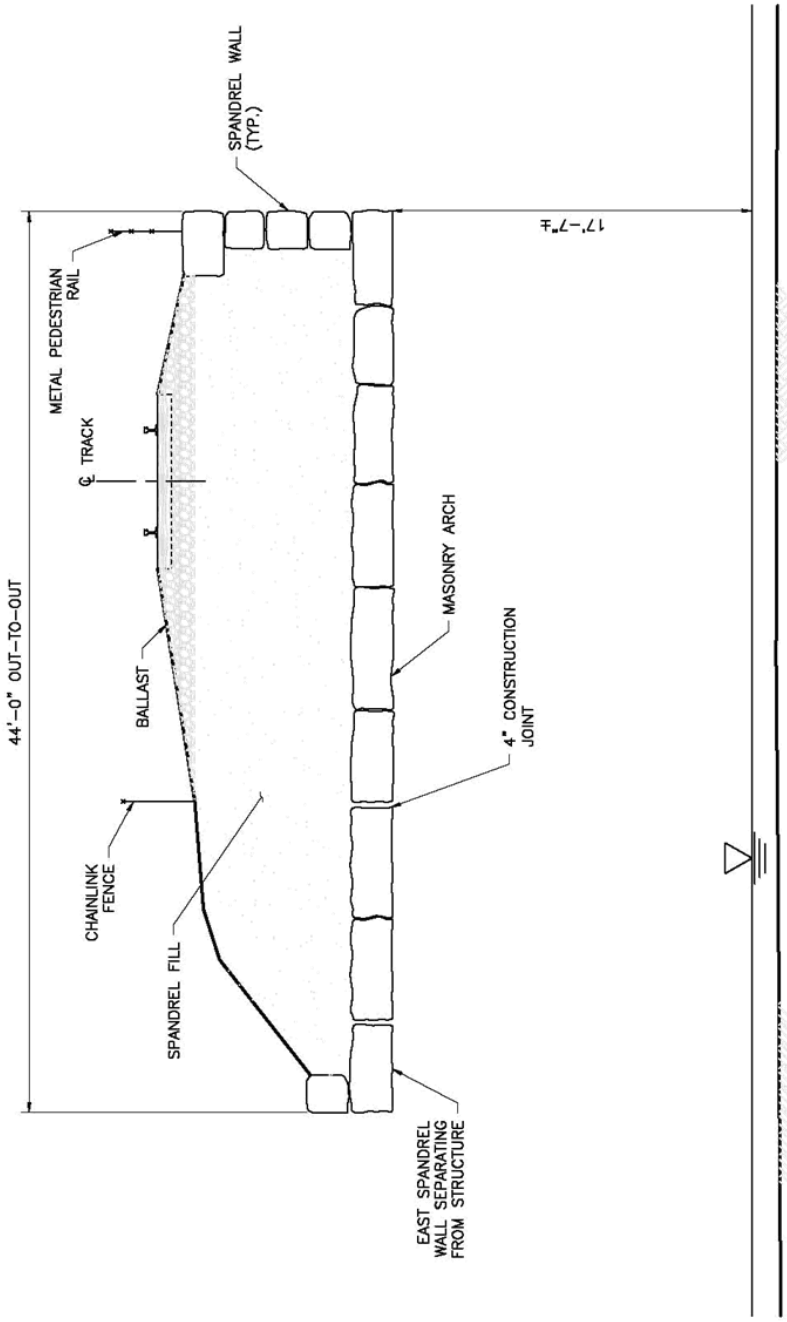
NOTE: SKETCH IS FROM PRIOR INSPECTION REPORT AND HAS BEEN UPDATED AS NECESSARY.

GENERAL ELEVATION



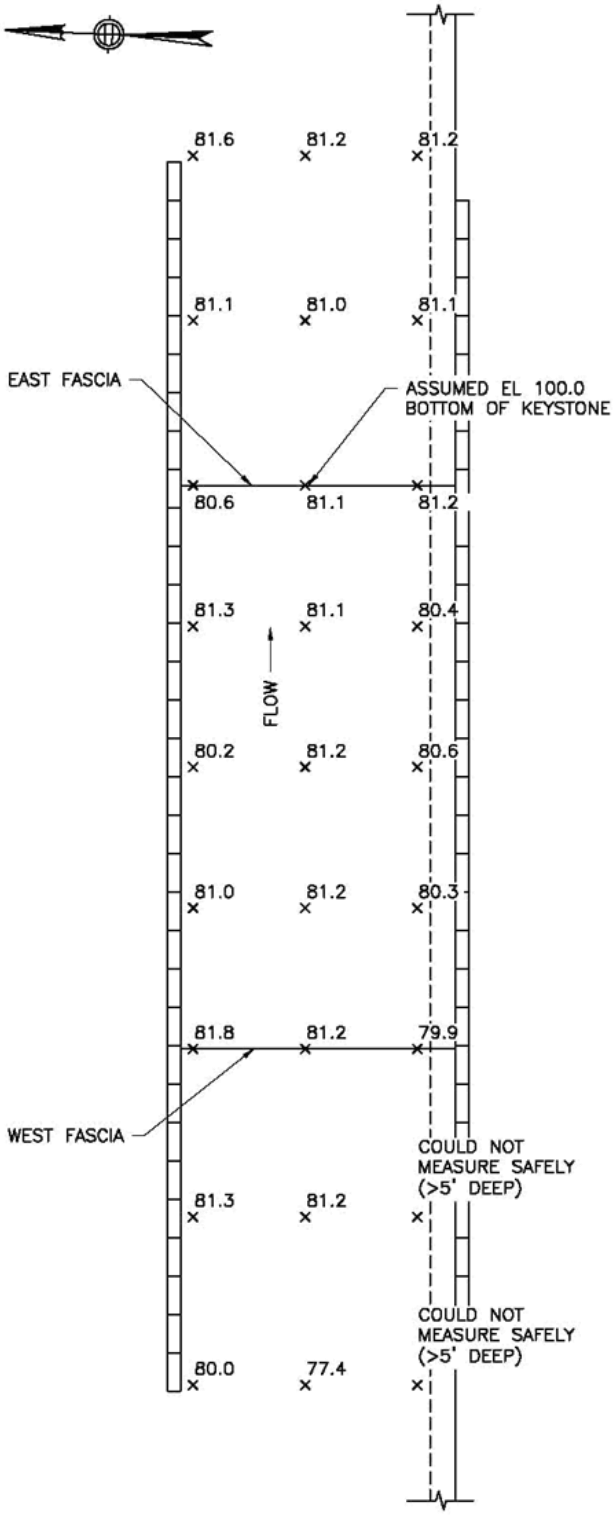
TYPICAL BRIDGE ELEVATION
NOT TO SCALE

TYPICAL BRIDGE CROSS SECTION



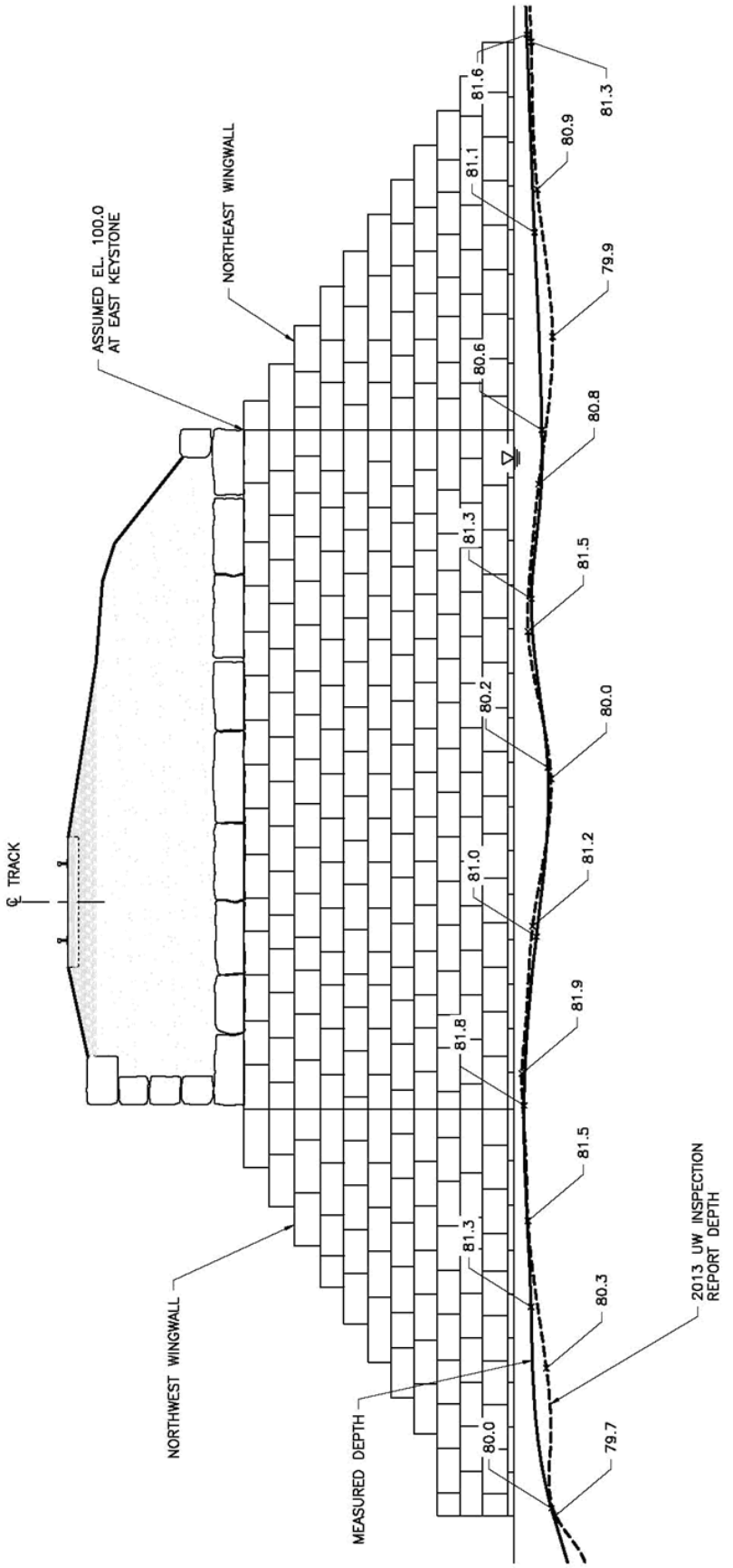
TYPICAL BRIDGE CROSS SECTION (LOOKING SOUTH)
NOT TO SCALE

SOUNDING PLAN



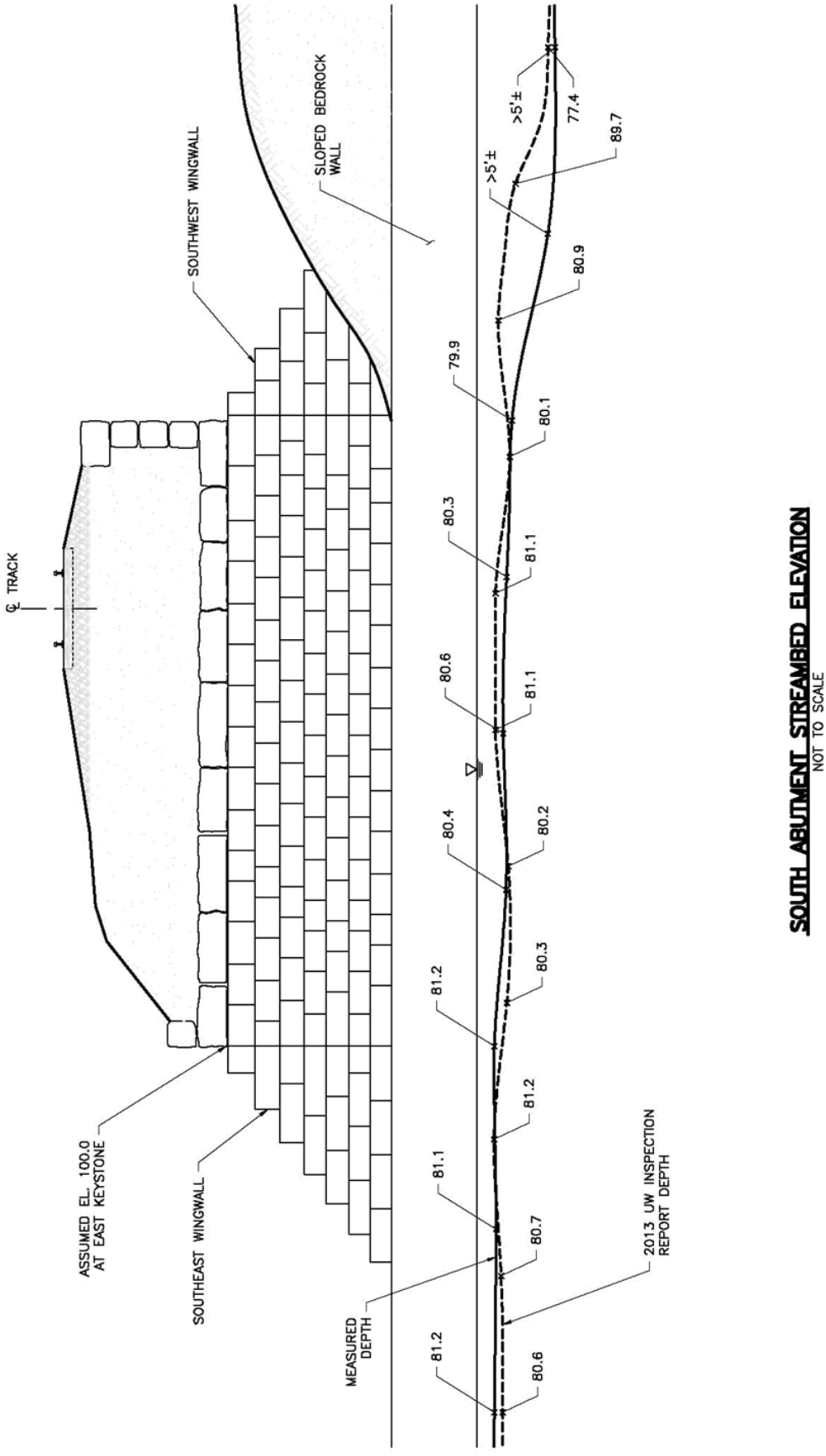
SOUNDINGS
NOT TO SCALE

NORTH ABUTMENT STREAMBED ELEVATION



NORTH ABUTMENT STREAMBED ELEVATION
NOT TO SCALE

SOUTH ABUTMENT STREAMBED ELEVATION



AVAILABLE PLANS

The following reports were made available to Diversified Technology Consultants (DTC) and were used during the inspection of this structure. Sketches were field checked/verified by DTC Inspection Personnel in October 2014.

The Louis Berger Group, Inc.
MBTA Bridge Rating
Plymouth Branch over Monatiquot River – Braintree, MA
Bridge No. B-21-041 (B45)
Mile Post 11.667
November 2012

The Louis Berger Group, Inc.
MBTA Bridge Inspection
Plymouth Branch over Monatiquot River – Braintree, MA
Bridge No. B-21-041 (B45)
Mile Post 11.667
September 2010

Diversified Technology Consultants
MBTA Bridge Rating
Plymouth Branch over Monatiquot River – Braintree, MA
Bridge No. B-21-041 (B45)
Mile Post 11.667
May 2006

APPENDIX A – 4D INSPECTION REPORT

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

STRUCTURES INSPECTION FIELD REPORT

RAILROAD/TRANSIT ROUTINE ARCH INSPECTION

2-DIST	B.I.N.	BR. DEPT. NO.
06	B45	B-21-041

CITY/TOWN	8.-STRUCTURE NO.	MILEPOST/T ID	41-STATUS	90-ROUTINE INSP. DATE
BRAINTREE	B21041-B45-MBT-RRO	011.670	A:OPEN	OCT 7, 2014

07-FACILITY CARRIED/LINE	MEMORIAL NAME/LOCAL NAME	27-YR BUILT	106-YR REBUILT	VERT. UNDERCLEARANCE
RR MBTA	MONATIQUOT RIVER	1900	0000	

06-FEATURES INTERSECTED	26-FUNCTIONAL CLASS	MBTA Area Engineer
WATER MONATIQUOT RIVER		

43-STRUCTURE TYPE	22-OWNER	21-MAINTAINER	TEAM LEADER	PROJ MGR	NO. TRACKS
811 : Masonry Arch - Deck	Other State Agencies	Other State Agencies	C. Wall	Diversified Technology	1

107-DECK TYPE	WEATHER	TEMP. (air)	TEAM MEMBERS	NO. SPANS
N : Not applicable	Cloudy	18°C	K. DOY	1

ITEM 58 — DECK — 7

		DEF
1. Wearing surface	N	-
2. Deck Condition	N	-
3. Spandrel Fill	7	-
4. Curbs	N	-
5. Median	N	-
6. Sidewalks	N	-
7. Parapets/Coping	N	-
8. Railing	N	-
9. Anti Missile Fence	N	-
10. Drainage System	4	S-P
11. Lighting Standards	N	-
12. Utilities	N	-
13. Deck Joints	N	-
14. Ties	6	-
15. Approach Settlement	7	-
16. Ballast	7	-

CURB REVEAL (In millimeters)	E	W
	0	0

APPROACHES

		DEF
a. Appr. pavement condition	N	-
b. Appr. Roadway Settlement	N	-
c. Appr. Sidewalk Settlement	N	-
d.		

OVERHEAD SIGNS (Attached to bridge) (Y/N) N

		DEF
a. Condition of Welds	N	-
b. Condition of Bolts	N	-
c. Condition of Signs	N	-

ITEM 59 — SUPERSTRUCTURE — 5

		DEF
1. Arch/Arch Ring	5	S-P
2. Keystone Area	6	-
3. Stringers/Tee Beams	N	-
4. Floorbeams	N	-
5. Spandrel Walls	5	M-P
6. Spring Lines	6	-
7. Diaphragms/Cross Frames	N	-
8. Conn Plt's, Gussets & Angles	N	-
9. Hangers	N	-
10. Masonry Joints	5	S-P
11. Rivets & Bolts	N	-
12. Welds	N	-
13. Deformation/Flattening	7	-
14. Member Alignment	5	-
15. Paint/Coating	N	-
16.		

Year Painted	0

COLLISION DAMAGE: *Please explain*
None (X) Minor ( ) Moderate ( ) Severe ( )

LOAD DEFLECTION: *Please explain*
None (X) Minor ( ) Moderate ( ) Severe ( )

LOAD VIBRATION: *Please explain*
None (X) Minor ( ) Moderate ( ) Severe ( )

Any Fracture Critical Member: (Y/N) N

Any Cracks: (Y/N) N

ITEM 60 — SUBSTRUCTURE — 5

	Dive	Cur	N	DEF
1. Abutments			N	
a. Pedestals	N	N		-
b. Bridge Seats	N	N		-
c. Backwalls	N	N		-
d. Breastwalls	6	5		-
e. Wingwalls	6	5		-
f. Slope Paving/Rip-Rap	N	N		-
g. Pointing	5	5		S-P
h. Footings	6	H		-
i. Piles	N	N		-
j. Scour	6	6		M-P
k. Settlement	N	7		-
l.				
m.				
2. Piers or Bents			N	
a. Pedestals	N	N		-
b. Caps	N	N		-
c. Columns	N	N		-
d. Stems/Webs/Pierwalls	N	N		-
e. Pointing	N	N		-
f. Footing	N	N		-
g. Piles	N	N		-
h. Scour	N	N		-
i. Settlement	N	N		-
j.				
k.				
3. Pile Bents			N	
a. Pile Caps	N	N		-
b. Piles	N	N		-
c. Diagonal Bracing	N	N		-
d. Horizontal Bracing	N	N		-
e. Fasteners	N	N		-

UNDERMINING (Y/N) If YES please explain: Y

COLLISION DAMAGE:
None (X) Minor ( ) Moderate ( ) Severe ( )

I-60 (Dive Report): 6 *I-60 (This Report):* 5

93B-U/W (DIVE) Insp 04/04/2013

X=UNKNOWN N=NOT APPLICABLE H=HIDDEN/INACCESSIBLE R=REMOVED

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041-B45-MBT-RRO**	**OCT 7, 2014**

ITEM 61 — CHANNEL & CHANNEL PROTECTION: 6

	Dive	Cur	DEF
1. Channel Scour	6	6	-
2. Embankment Erosion	7	6	-
3. Debris	6	5	-
4. Vegetation	7	7	-
5. Utilities	N	N	-
6. Rip-Rap/Slope Protection	N	N	-
7. Aggradation	N	6	-
8. Fender System	N	N	-
9.			
10.			
11.			

STREAM FLOW VELOCITY:
Tidal ( ) High ( ) Moderate ( ) Low (**X**) None ( )

ITEM 61 (Dive Report): **6** ***ITEM 61 (This Report)*** **6**

93b-U/W INSP. DATE: 04/04/2013

ITEM 36 — *TRAFFIC SAFETY*

	36	COND	DEF
a Bridge Railing		N	-
b Transitions		N	-
c Approach Guardrail		N	-
d Approach Guardrail Ends		N	-

WEIGHT POSTING

Not Applicable **X**

	H	3	3S2	Single
Actual Posting	N	N	N	N
Recommended Posting	N	N	N	N

Waived Date: 00/00/00 **EJDMT Date:** 00/00/00

Signs In Place (Y=Yes,N=No, NR=NotRequired) Legibility/ Visibility	At bridge N	At bridge S	Other Advance N	Other Advance S

CLEARANCE POSTING

Not Applicable **X**

	E ft	E in	W ft	W in	meter
Actual Field Measurement		0		0	
Posted Clearance		0		0	

Signs In Place (Y=Yes,N=No, NR=NotRequired) Legibility/ Visibility	At bridge E	At bridge W	Advance E	Advance W

ACCESSIBILITY (Y/N/P)

	Needed	Used
Lift Bucket	N	N
Ladder	N	N
Boat	N	N
Waders	Y	Y
Inspector 50	N	N
Rigging	N	N
Staging	N	N
Traffic Control	N	N
RR Flagger	Y	Y
Police	N	N
Other:		

TOTAL HOURS 12

PLANS (Y/N): N

(V.C.R.) (Y/N): N

TAPE#: _____

List of field tests performed:
Hands-on, visual

RATING

Rating Report (Y/N): Y

Date: 11/07/2012

(To be filled out by DBIE)
Request for Rating or Rerating (Y/N): N

If YES please give priority: HIGH ( ) MEDIUM ( ) LOW ( )

REASON: _____

CONDITION RATING GUIDE

(For Items 58, 59, 60 and 61)

	CODE	CONDITION	DEFECTS
	N	NOT APPLICABLE	
G	9	EXCELLENT	Excellent condition.
G	8	VERY GOOD	No problem noted.
G	7	GOOD	Some minor problems.
F	6	SATISFACTORY	Structural elements show some minor deterioration.
F	5	FAIR	All primary structural elements are sound but may have minor section loss, cracking, spalling or scour.
P	4	POOR	Advance section loss, deterioration, spalling or scour.
P	3	SERIOUS	Loss of section, deterioration, spalling or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.
C	2	CRITICAL	Advance deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.
C	1	"IMMINENT" FAILURE	Major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stablility. Bridge is closed to traffic but corrective action may put it back in light service.
	0	FAILED	Out of service - beyond corrective action.

DEFICIENCY REPORTING GUIDE

DEFICIENCY: A defect in a structure that requires corrective action.

CATEGORIES OF DEFICIENCIES:

M= Minor Deficiency - Deficiencies which are minor in nature, generally do not impact the structural integrity of the bridge and could easily be repaired. Examples include but are not limited to: Spalled concrete, Minor pot holes, Minor corrosion of steel, Minor scouring, Clogged drainage, etc.

S= Severe/Major Deficiency - Deficiencies which are more extensive in nature and need more planning and effort to repair. Examples include but are not limited to: Moderate to major deterioration in concrete, Exposed and corroded rebars, Considerable settlement, Considerable scouring or undermining, Moderate to extensive corrosion to structural steel with measurable loss of section, etc.

C-S= Critical Structural Deficiency - A deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge.

C-H= Critical Hazard Deficiency - A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples include but are not limited to: Loose concrete hanging down over traffic or pedestrians, A hole in a sidewalk that may cause injuries to pedestrians, Missing section of bridge railing, etc.

URGENCY OF REPAIR:

I = Immediate- [Inspector(s) immediately contact District Bridge Inspection Engineer (DBIE) to report the Deficiency and to receive further instruction from him/her].

A = ASAP- [Action/Repair should be initiated by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) upon receipt of the Inspection Report].

P = Prioritize- [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available].

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041-B45-MBT-RRO**	**OCT 7, 2014**

REMARKS

BRIDGE ORIENTATION

The bridge has a clear span of 21'-6", a vertical clearance of 17'-7" from the west keystone to the waterline, has an out-to-out width of 44'-0". There is no skew on the bridge. The two abutments are labeled north and south and deficiencies are labeled as either west of the east abutment or vise-versa. The river runs approximately west to east.

GENERAL REMARKS

Bridge Description

Bridge B-21-024 is a single span masonry arch structure that carries a single active track of the Old Colony Line, Plymouth Branch, over the Monatiquot River in the Town of Braintree, MA. The masonry arch bridge consists of a single arch barrel, spandrel walls, and wingwalls, all made of granite masonry blocks. The south abutment rests on a large natural stone formation. The bridge is assumed to be constructed around 1900 and widened and additional 15 feet at the east fascia at a later date.

Scope of Inspection

The scope of the routine inspection covered by this report was to determine the physical and functional condition of the structure, to gather information for preparing a load rating, and to identify any changes from the previously recorded conditions to ensure the structure continues to satisfy present service requirements. It includes a hands-on inspection to establish the condition ratings, identify deficiencies/defects that require corrective action, and determine the urgency of needed repairs.

Field Notes

Deficiencies/defects were recorded and findings are included as part of this report. Bridge measurements were taken to prepare and/or update sketches included as a part of this report. Inventory and deterioration photos were taken and included as a part of this report.

Findings (Minor/Major/Critical) with Locations

A summary of the findings is as follows:

- No critical-structure deficiencies were found.
- No critical-hazard deficiencies were found.
- Four (4) items were defined as having a "Severe/Major Deficiency" (S) with an urgency of repair designated "Prioritize" (P)
  - -**Item 58.10 - Drainage System;** Heavy water seepage throughout the entire structure.
  - -**Item 59.1 - Arch/Arch Ring;** Circumferential separation of the east fascia stones.
  - -**Item 59.10 - Masonry Joints;** Extensive cracked, loose, and missing mortar.
  - -**Item 60.1.g - Pointing;** Extensive cracked, loose, and missing mortar at wingwalls. Focused at the southeast wingwall.
- Three (3) items were defined as having a "Minor Deficiency" (M) with an urgency of repair designated "Prioritize" (P)
  - -**Item 59.5 - Spandrel walls;** Missing stone at east fascia.
  - -**Item 60.1.j - Scour;** Local scour and minor areas of undermining along the north abutment.
  - -**Item 61.3 - Debris;** Debris obstructing the upstream inlet of the structure.

Recommendations

A. Structural Repair

Program repairs to the following items as part of the MBTA's Bridge Managment Program as funds and/or manpower becomes availiable with the next two (2) years or prior to the next Routine Inspection:

- **Item 59.1 - Arch/Arch Ring;** Realign and secure eastern fascia stones to superstructure.
- **Item 59.10 - Masonry Joints;** Clean and re-point deficient masonry joints.
- **Item 60.1.g - Pointing;** Clean and re-point deficient masonry joints .
- **Item 59.5 - Spandrel walls;** Replace missing stone in east spandrel wall.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041-B45-MBT-RRO**	**OCT 7, 2014**

REMARKS

B. Monitoring
Deficiencies to the following items should be monitored on future inspections:

- **Item 58.10 - Drainage System;** Monitor water seepage on the underside of the structure for freeze/thaw damage.
- **Item 59.10 - Masonry Joints**
- **Item 60.1.g - Pointing**
- **Item 60.1.j - Scour;** Continue to monitor scour and minor undermining along the north abutment

C. Maintenance
Program repairs to the following items as part of the MBTA's Bridge Managment Program as funds and/or manpower becomes availiable with the next two (2) years or prior to the next Routine Inspection:

- **Item 61.3 - Debris;** Remove obstuction at structure inlet

Preliminary Repair Costs
No major/severe findings requiring repair within the next six (6) months.

Work Access Notes
The bridge was accessed by utilizing a flagman provided by Keolis during daytime hours (07:30 to 16:00) and walking next to the track from the crossing at John Mahar Highway, which is located about a quarter of a mile southeast of the bridge. There is also direct access from a parking lot near the bridge which can be used for future inspections

Clearance Notes
The minimum vertical clearance to the keystone of the structure from the waterline was measured to be 17'-7".

Bridge Bearing Notes
There are no bearings for the masonry arch.

Rating Notes
The load rating prepared by DTC in November 2012 was made available at the time of this inspection. The bridge was rated for AREMA Cooper E-80, F40PH (280K) Modified, 286K Rail Car, and the 263K Rail Car. The next load rating to be performed should rate the structure for AREMA Cooper E-80, HSP-46 Locomotive, 286K Rail Car, and 315K Rail Car or as directed by the MBTA or as directed by the MBTA.

ITEM 58 - DECK

Item 58.10 - Drainage System
(Poor); The arch underside showed signs of extensive water seepage and efflorescence. No signs of a drainage system were found.

Item 58.14 - Ties
(Satisfactory); The timber ties exhibit normal checks and splits along their lengths and appear unchanged since previous inspection.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041-B45-MBT-RRO**	**OCT 7, 2014**

REMARKS

ITEM 59 - SUPERSTRUCTURE

Item 59.1 - Arch/Arch Ring
(Fair); The arch exhibits moderate to heavy efflorescence and missing mortar throughout the underside with the heaviest efflorescence occuring at the 15'-0" section east of the construction joint. **(See photos 8, 13, & 14)** The construction joint between the two portions of the arch is between 3"-4" wide. Several isolated stones were found to be cracked throughout the structure. A 1/8" crack is present on the North section of the arch. The crack is approximately 10ft from the west fascade and extends from the springline to the crown. **(See photo 15)** The crack does not appear to have changed since the last inspection report. The eastern fascade stones are pulling away from the arch. The gap between stones is as large as 2.5" and extends from the south springline to the north springline. **(See photo 16 & 17)** The previous inspection report describes this separation as 1.5" wide.

Item 59.2 - Keystone Area
(Satisfactory); The keystones are regularly shaped and aligned on both fascias. There is efflorescence on the underside of both stones.

Item 59.5 - Spandrel Walls
(Fair); The east spandrel wall has missing mortar and minor vegetation growth throughout. A stone is missing from the north end of the east fascia. **(See photo 18)** The west spandrel wall is in satisfactory condition with a single marking of graffiti above the keystone. The condition of both walls appear unchanged since the previous inspection report.

Item 59.6 - Spring Lines
(Satisfactory); Both springlines exhibit random areas of missing mortar. **(See photos 9 & 10)**

Item 59.10 - Masonry Joints
(Fair); Poor drainage and excessive water seepage has caused the masonry joints in the structure to become loose or missing with moderate to heavy efflorescence throughout. The west spandrel wall is in satisfactory condition with only minor areas of loose or missing mortar **(See photos 13 & 14)**

Item 59.14 - Member Alignment
The original portion of the arch contains irregular shaped stones **(See photo 19)** The 15'-0" addition to the arch contains more regular shaped stones arranged in a more organized pattern.

ITEM 60 - SUBSTRUCTURE

Item 60.1 - Abutments
Item 60.1.d - Breastwalls
(Fair); The south breastwall consits of a large rock ledge that contains chips, cracks, and irregularities in multiple locations. There is a large irregularity in the west corner of the south breastwall. **(See photos 10 & 20)** The north breastwall contains areas of missing mortar and cracked stone. See item 59.1 for more information.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041-B45-MBT-RRO**	**OCT 7, 2014**

REMARKS

Item 60.1.e - Wingwalls
(Fair); The overall condition of the four wingwalls was found to be in fair condition. The northeast wingwall was found to be in satisfactory condition with areas of missing mortar and minor vegetation growth. The southeast wingwall was found to be in fair condtion with missing mortar throughout and and heavy vegetation growth in the center of the wingwall. **(See photo 21)** Directly below the southeast wingwall there is an area of chipped and missing stone in the natural rock formation. **(See photo 22)** The northwest wingwall is in good condition. The southwest wingwall was found to be in satisfactory condition with areas of missing mortar and moderate vegetation growth.

Item 60.1.g - Pointing
(Fair); Areas of missing mortar is common in all wingwalls and retaining walls. The most severe repairs needed are at the southeast wingwall where almost all the mortar joints are loose or missing. **(See photo 21)**

Item 60.1.j - Scour
(Satisfactory); Moderate local scour was found at the southwest inlet of the bridge. Minor undermining was recorded at two locations along the north abutment. See 2013 underwater inspection report for comments on local areas of undermining along the north abutment.

SubStructure Undermining Notes
See 2013 underwater inspection report for details.

SubStructure Scour Notes
There are areas of minor scour along the north abutment and moderate scour upstream of the structure.

ITEM 61 - CHANNEL AND CHANNEL PROTECTION

Item 61.1 - Channel Scour
(Satisfactory); Heavy scour was found upstream of the bridge along the southside of the streambed. The depth of the scour is over 4ft deeper than the average stream bed depth and was unable to be accurately measured due to safety concerns. This area of scour is directly below where there is a small waterfall in the streambed due to a large natural rock formation.

Item 61.2 - Embankment Erosion
(Satisfactory); Minor erosion was found downstream of the structure on both the north and south side. **(See photo 12)**

Item 61.3 - Debris
(Fair); Debris was found throughout the channel bed in the form of both rocks and man-made refuse. At the southwest entrance to the structure, a large tree branch has fallen into the stream bed and is disrupting flow. The tree is obstructing over half of the waterway. **(See photos 11 & 23)**

Sketch / Photo Log
Sketch 1 : Location map
Sketch 2 : Description of bridge
Sketch 3 : Bridge plan
Sketch 4 : General elevation
Sketch 5 : Typical bridge cross section
Sketch 6 : Soundings plan
Sketch 7 : North abutment streambed elevation
Sketch 8 : South abutment streambed elevation

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041-B45-MBT-RRO**	**OCT 7, 2014**

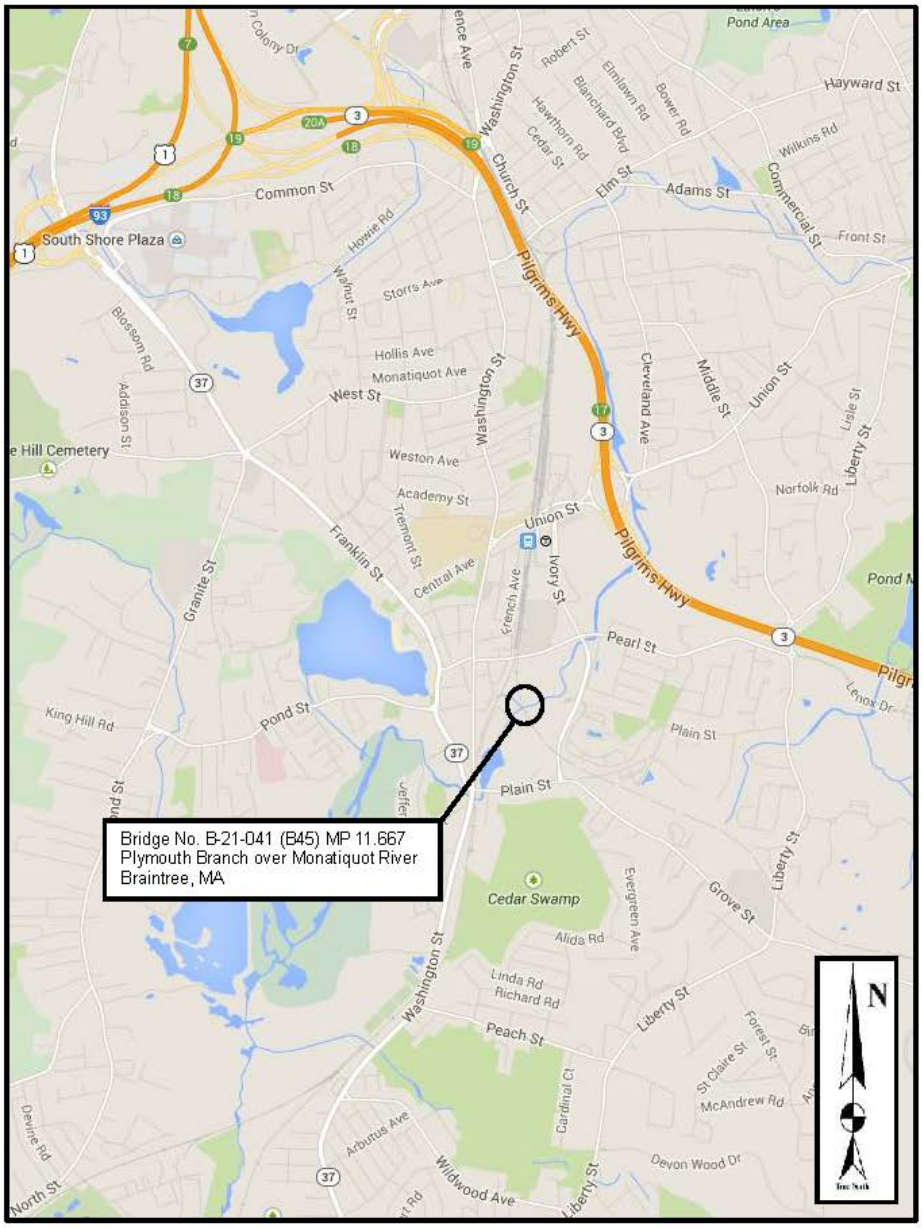
REMARKS

Sketch / Photo Log (Cont'd)

Sketch 9 : Available plans
Photo 1 : East elevation
Photo 2 : West elevation
Photo 3 : North approach looking south
Photo 4 : South approach looking north
Photo 5 : Looking east from bridge
Photo 6 : Looking west from bridge
Photo 7 : Typical topside of bridge
Photo 8 : Typical underside of bridge
Photo 9 : North Abutment
Photo 10 : South abutment
Photo 11 : Debris in stream at upstream end of bridge
Photo 12 : Minor bank erosion downstream
Photo 13 : Heavy efflorescence and missing mortar on east underside of arch
Photo 14 : Typical missing mortar throughout underside of structure
Photo 15 : Crack in north section of arch from springline to crown
Photo 16 : East fascia stones separating from arch looking south
Photo 17 : East fascia stones separating from arch looking north
Photo 18 : East spandrel wall missing stone and missing mortar
Photo 19 : Original underside with irregular shaped stones
Photo 20 : Irregularity in stone foundation near southwest abutment corner
Photo 21 : Missing mortar and heavy vegetation growth at southeast wingwall
Photo 22 : Cracked and missing stone directly below southeast wingwall
Photo 23 : Debris in waterway along the southwest entrance to the structure
Photo 24 : Northeast wingwall elevation
Photo 25 : Northwest wingwall and retaining wall elevation
Photo 26 : Southeast wingwall elevation
Photo 27 : Southwest wingwall elevation

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041-B45-MBT-RRO**	**OCT 7, 2014**

SKETCHES



Sketch 1: Location map

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041-B45-MBT-RRO**	**OCT 7, 2014**

SKETCHES

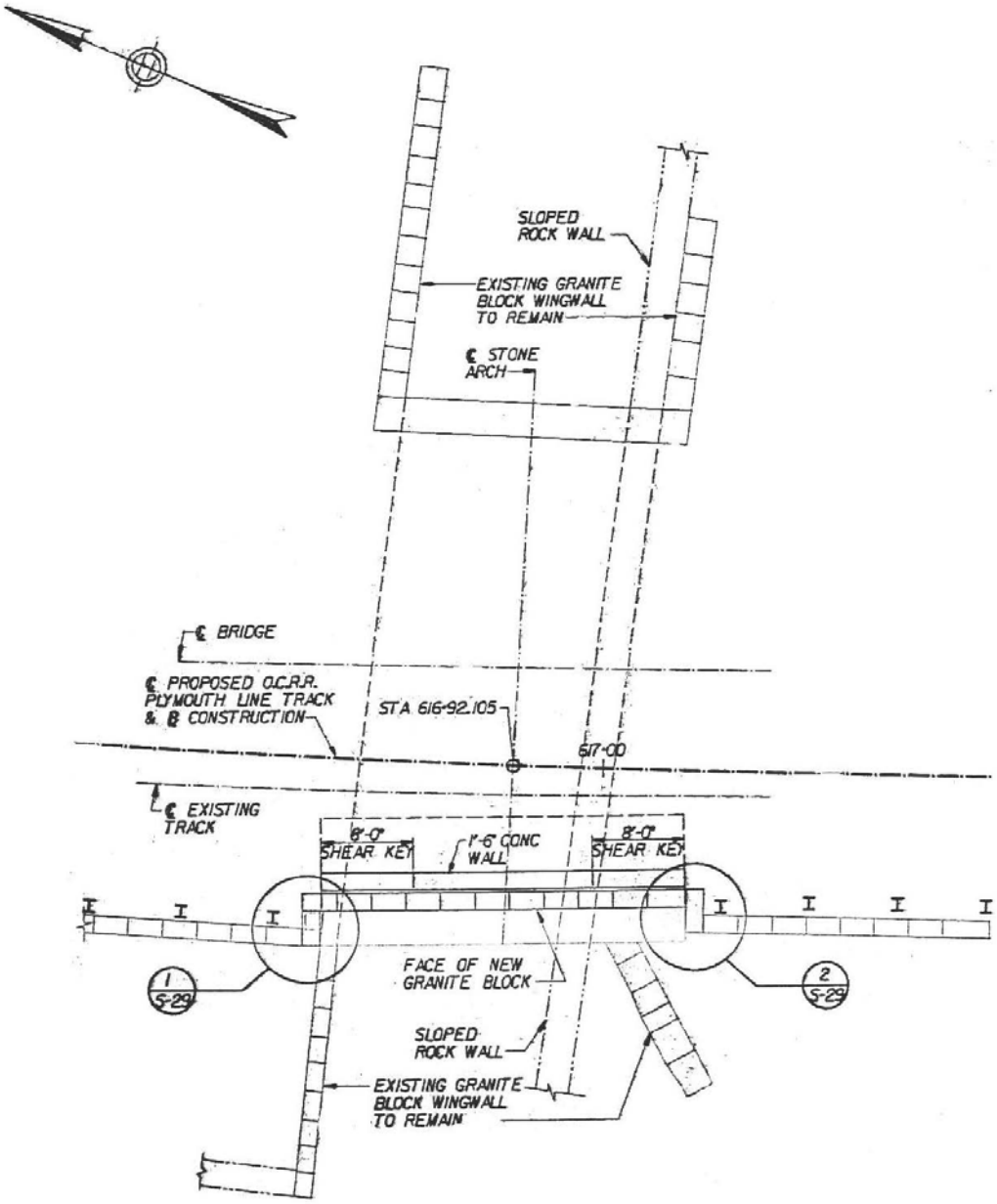
DESCRIPTION OF BRIDGE

Date of Construction:	1900 (Assumed)
Original Design Loading:	Unknown
Bridge Type:	Stone Masonry Arch Culvert
Skew:	0°
Spans:	One (1) span; 21'-6" clear distance at spring lines
Width of Bridge Deck:	44'-0" out-to-out
Track Surface:	One (1) track (without guard rails); timber ties and ballasted deck
Curbs:	None
Sidewalk/Walkway/Median:	None
Bridge Railing:	Steel pedestrian handrail on west side of the bridge only
Protective Screen:	None
Approach Railing:	None
Superstructure:	Stone masonry closed spandrel deck arch
Modifications to Original Superstructure:	Arch was widened approximately 15'-0" on the east side at an earlier date. A reinforced concrete retaining wall with granite facing and cap was also added above the west fascia of the arch in approx. 1994
Utilities:	None
Substructure:	Stone masonry breastwalls, spandrel walls, and wingwalls. A sloped and exposed ledge footing supports the south.
Modifications to Original Substructure:	Arch was widened approximately 15'-0" on the east side

Sketch 2: Description of bridge

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041-B45-MBT-RRO**	**OCT 7, 2014**

SKETCHES



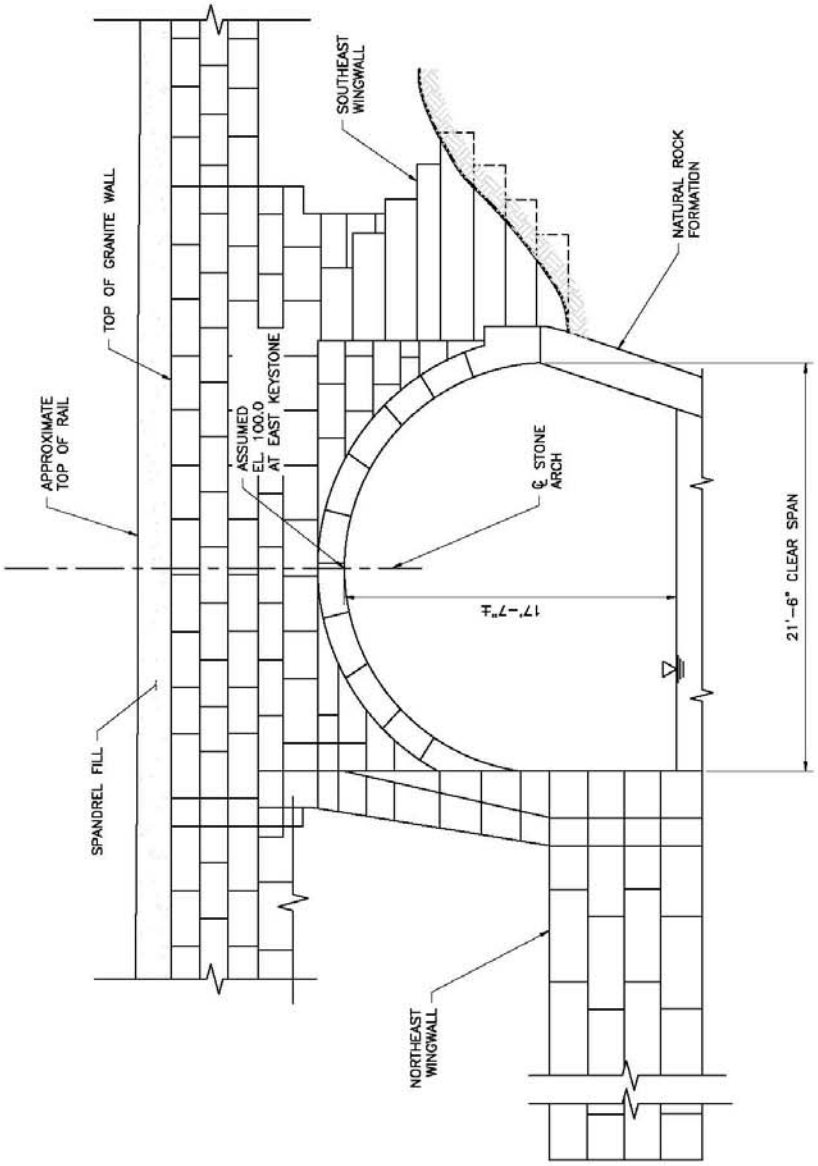
BRIDGE PLAN
NOT TO SCALE

NOTE: SKETCH IS FROM PRIOR INSPECTION REPORT AND HAS BEEN UPDATED AS NECESSARY.

Sketch 3: Bridge plan

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041-B45-MBT-RRO**	**OCT 7, 2014**

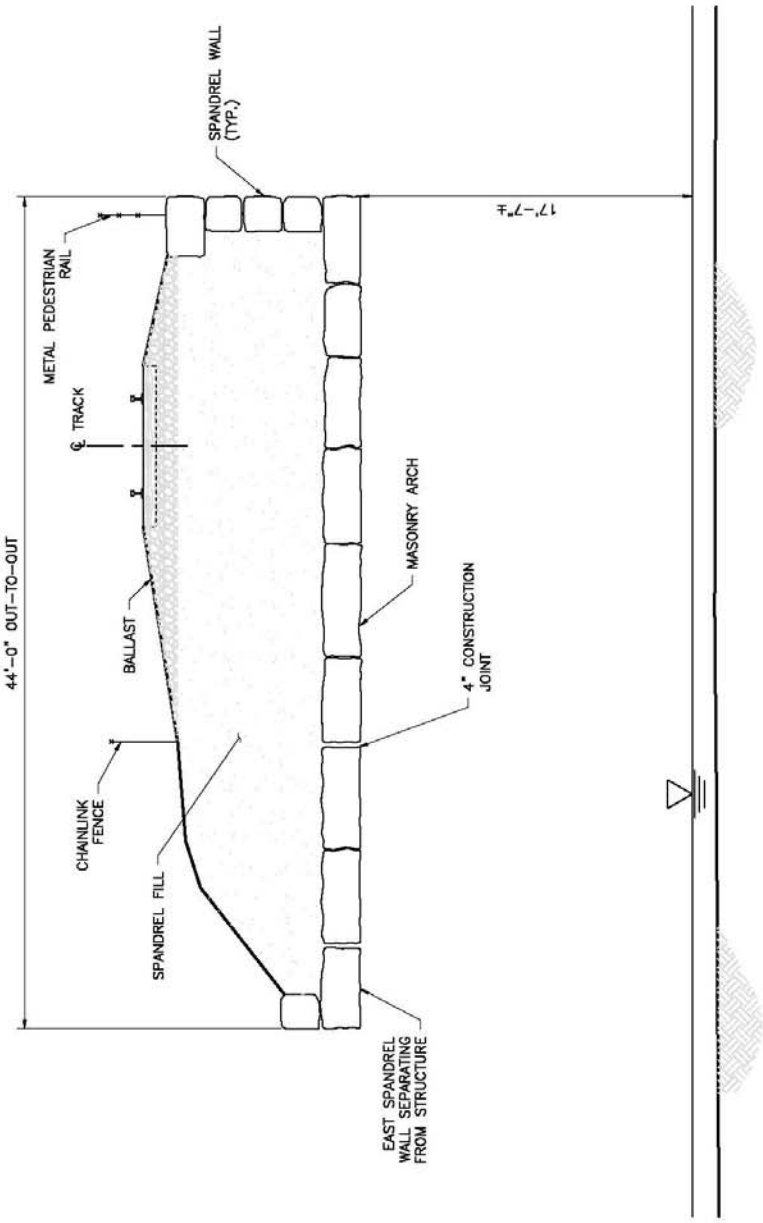
SKETCHES



Sketch 4: General elevation

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041-B45-MBT-RRO**	**OCT 7, 2014**

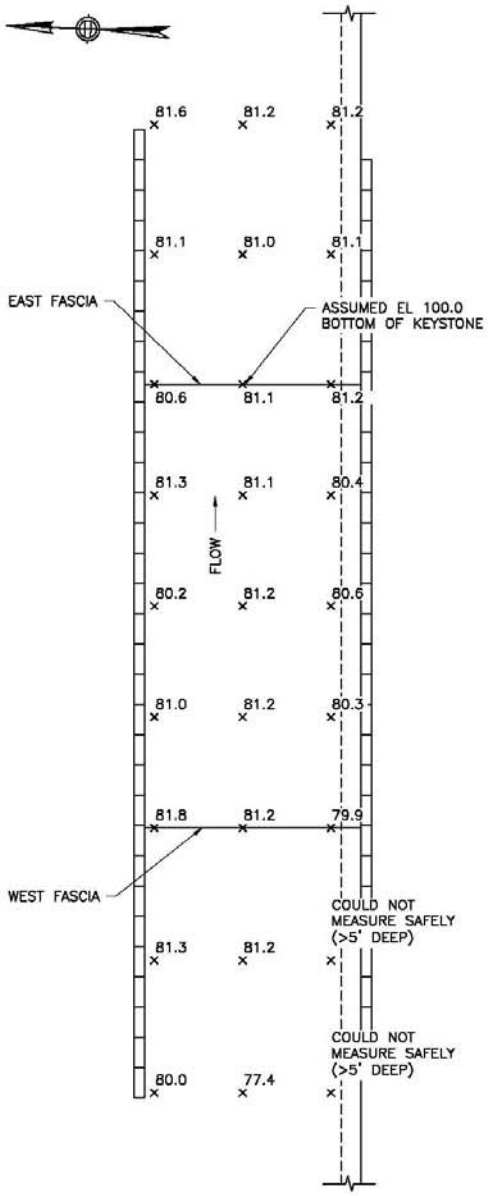
SKETCHES



Sketch 5: Typical bridge cross section

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041-B45-MBT-RRO**	**OCT 7, 2014**

SKETCHES

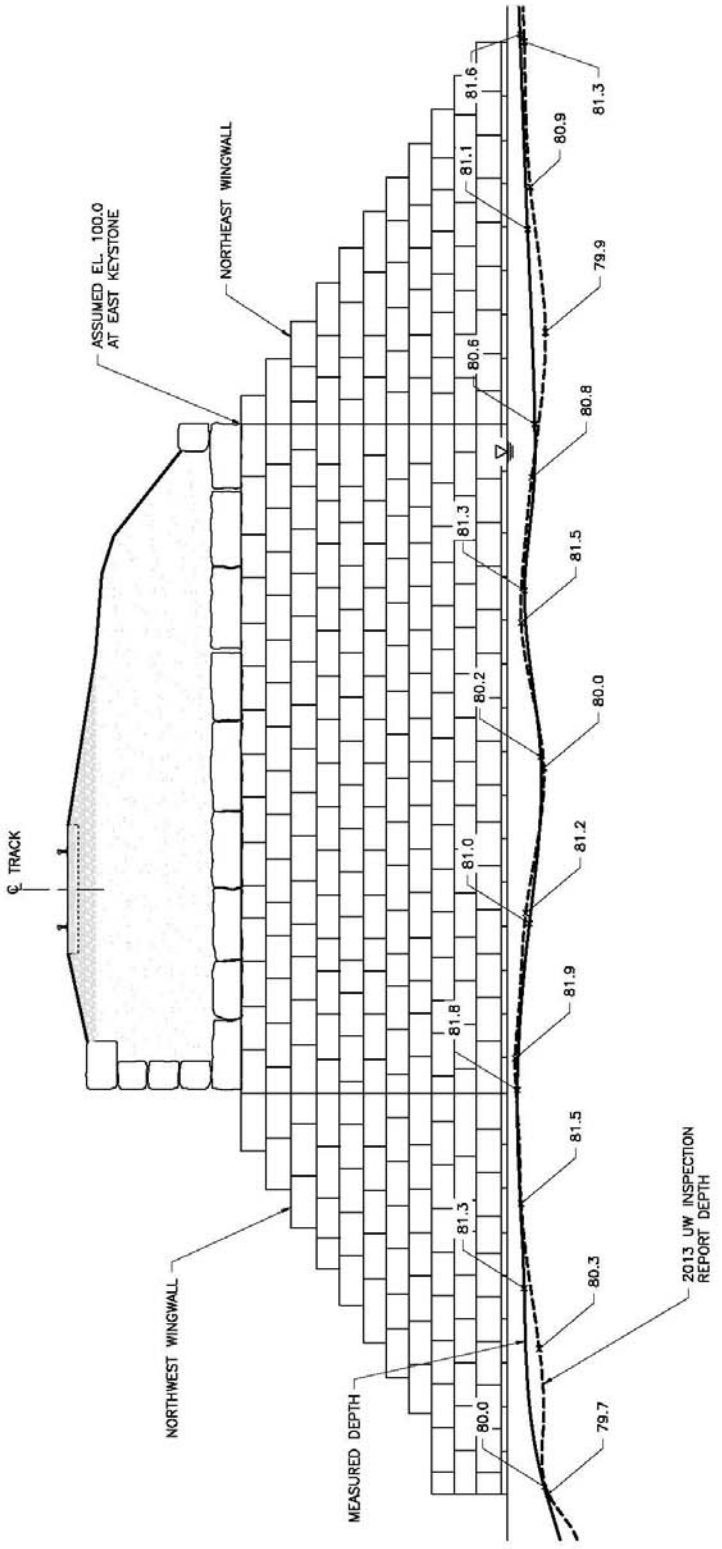


SOUNDINGS
NOT TO SCALE

Sketch 6: Soundings plan

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041-B45-MBT-RRO**	**OCT 7, 2014**

SKETCHES

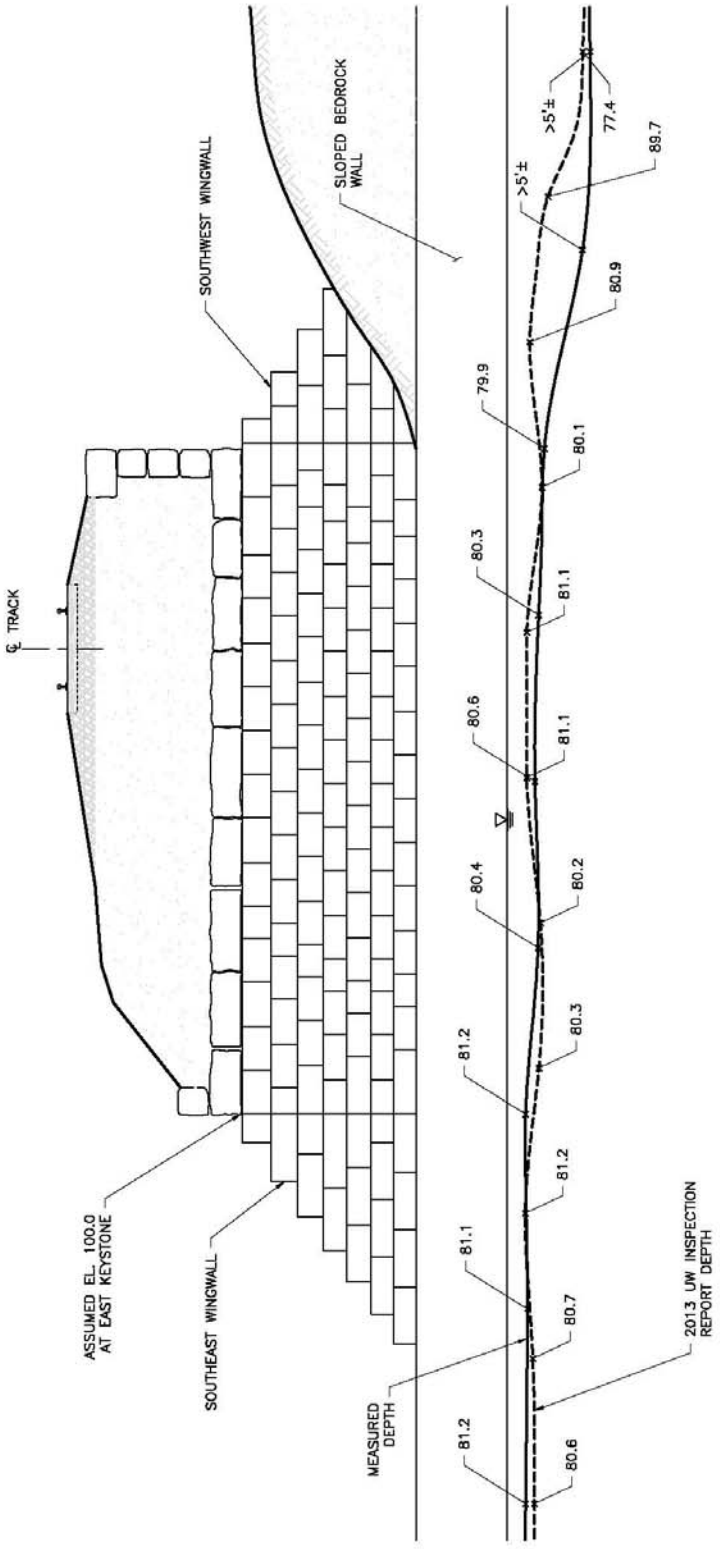


NORTH ABUTMENT STREAMBED ELEVATION
NOT TO SCALE

Sketch 7: North abutment streambed elevation

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041-B45-MBT-RRO**	**OCT 7, 2014**

SKETCHES



Sketch 8: South abutment streambed elevation

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041-B45-MBT-RRO**	**OCT 7, 2014**

SKETCHES

AVAILABLE PLANS

The following reports were made available to Diversified Technology Consultants (DTC) and were used during the inspection of this structure. Sketches were field checked/verified by DTC Inspection Personnel in October 2014.

The Louis Berger Group, Inc.
MBTA Bridge Rating
Plymouth Branch over Monatiquot River – Braintree, MA
Bridge No. B-21-041 (B45)
Mile Post 11.667
November 2012

The Louis Berger Group, Inc.
MBTA Bridge Inspection
Plymouth Branch over Monatiquot River – Braintree, MA
Bridge No. B-21-041 (B45)
Mile Post 11.667
September 2010

Diversified Technology Consultants
MBTA Bridge Rating
Plymouth Branch over Monatiquot River – Braintree, MA
Bridge No. B-21-041 (B45)
Mile Post 11.667
May 2006

Sketch 9: Available plans

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041-B45-MBT-RRO**	**OCT 7, 2014**

PHOTOS

Photo 1: **East elevation**

Photo 2: **West elevation**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041-B45-MBT-RRO**	**OCT 7, 2014**

PHOTOS

Photo 3: **North approach looking south**

Photo 4: **South approach looking north**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041-B45-MBT-RRO**	**OCT 7, 2014**

PHOTOS

Photo 5: **Looking east from bridge**

Photo 6: **Looking west from bridge**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041-B45-MBT-RRO**	**OCT 7, 2014**

PHOTOS

Photo 7: **Typical topside of bridge**

Photo 8: **Typical underside of bridge**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041-B45-MBT-RRO**	**OCT 7, 2014**

PHOTOS

Photo 9: **North Abutment**

Photo 10: **South abutment**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041-B45-MBT-RRO**	**OCT 7, 2014**

PHOTOS

Photo 11: Debris in stream at upstream end of bridge

Photo 12: Minor bank erosion downstream

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041-B45-MBT-RRO**	**OCT 7, 2014**

PHOTOS

Photo 13: Heavy efflorescence and missing mortar on east underside of arch

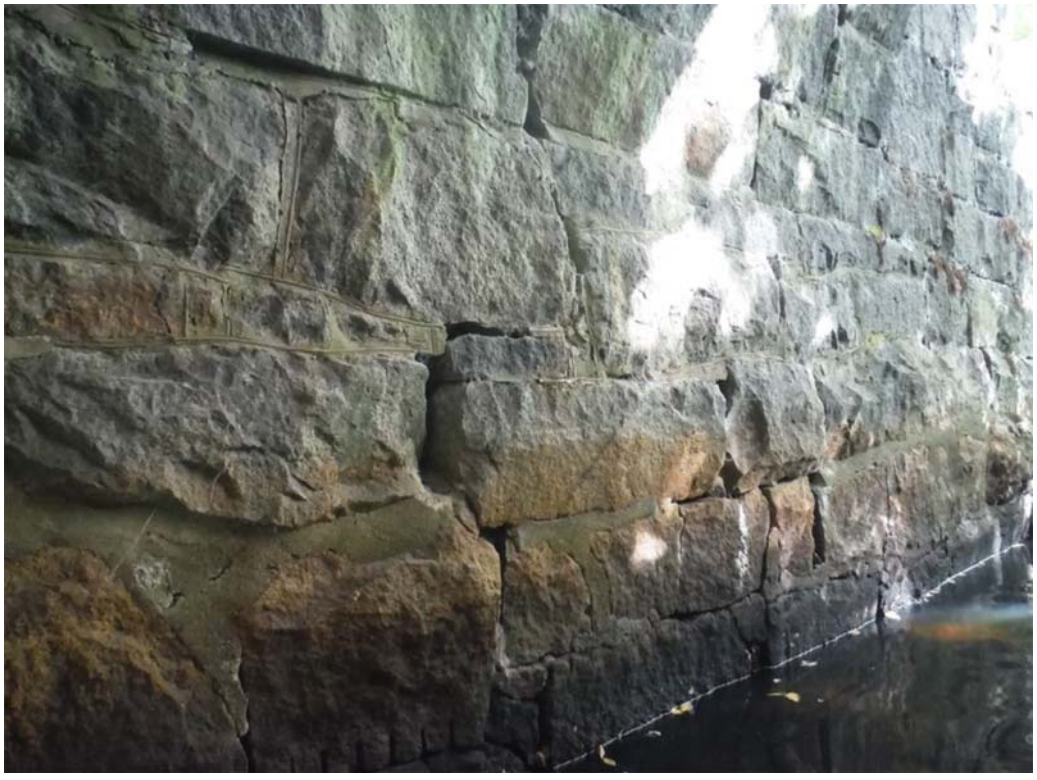


Photo 14: Typical missing mortar throughout underside of structure

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041-B45-MBT-RRO**	**OCT 7, 2014**

PHOTOS

Photo 15: **Crack in north section of arch from springline to crown**

Photo 16: **East fascia stones separating from arch looking south**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041-B45-MBT-RRO**	**OCT 7, 2014**

PHOTOS

Photo 17: **East fascia stones separating from arch looking north**

Photo 18: **East spandrel wall missing stone and missing mortar**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041-B45-MBT-RRO**	**OCT 7, 2014**

PHOTOS

Photo 19: Original underside with irregular shaped stones

Photo 20: Irregularity in stone foundation near southwest abutment corner

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041-B45-MBT-RRO**	**OCT 7, 2014**

PHOTOS

Photo 21: **Missing mortar and heavy vegetation growth at southeast wingwall**

Photo 22: **Cracked and missing stone directly below southeast wingwall**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041-B45-MBT-RRO**	**OCT 7, 2014**

PHOTOS

Photo 23: Debris in waterway along the southwest entrance to the structure

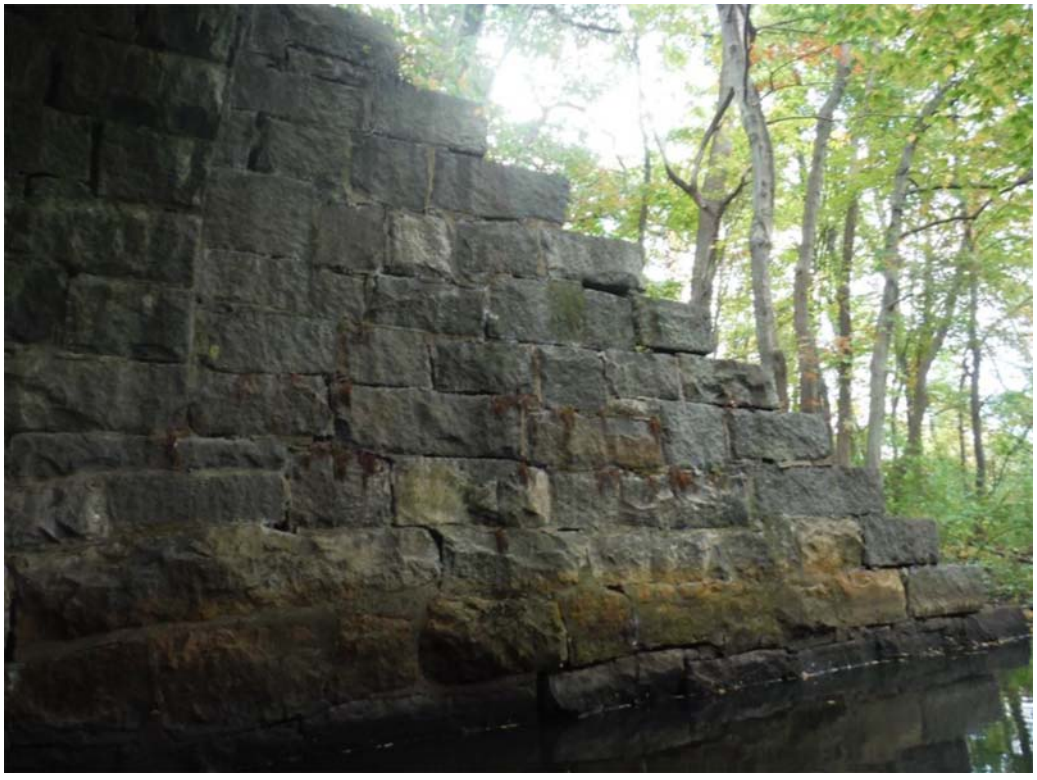


Photo 24: Northeast wingwall elevation

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041-B45-MBT-RRO**	**OCT 7, 2014**

PHOTOS

Photo 25: Northwest wingwall and retaining wall elevation

Photo 26: Southeast wingwall elevation

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041-B45-MBT-RRO**	**OCT 7, 2014**

PHOTOS

Photo 27: Southwest wingwall elevation

APPENDIX B – SI&A FORM

RAILROAD STRUCTURE INVENTORY AND APPRAISAL SHEET

Report Date: January 6, 2015 MONATIQUOT RIVER

State Information

BDEPT#= B21041 Agency Br.No.
Town= Braintree L.O.
B.I.N= B45 AASHTO= 041.0

Identification

(8) Structure Number B21041B45MBTRRO
RAILROAD BRIDGE NO 11.667
RAILROAD BRANCH NAME PLYMOUTH LINE
(2) State Highway Department District 06
(6) Features Intersected **WATER MONATIQUOT RIVER**
(7) Facility Carried **RR MBTA**
(9) Location PLYMOUTH LINE MP 11.667
(16) Latitude 42 DEG 12 MIN 00.00 SEC
(17) Longitude 71 DEG 00 MIN 06.91 SEC
(98) Border Bridge State Code Share %
(99) Border Bridge Structure No. #

Structure Type and Material

(43) Structure Type Main: Masonry Code 811
Arch - Deck Jointless bridge type: Not applicable
(44) Structure Type Appr:
Other Code 000
(45) Number of spans in main unit 001
(46) Number of approach spans 0000
(107) Deck Structure Type - Not applicable Code N
(108) Wearing Surface / Protective System:
(omit (a) and (b))
C) Type of deck protection - Not applicable=no deck Code N
Ballast:
Type of Ties:

Age and Service

(27) Year Built 1900
(106) Year Reconstructed 0000
(42) Type of Service: On - Railroad
Under - Waterway Code 25
(28) Tracks : On Structure 01 Under structure 00

Geometric Data

(48) Length of maximum span 21.500 FT
(49) Structure Length 21.500 FT
(50) Curb or sidewalk: Left FT Right FT
(51) Bridge Roadway Width Curb to Curb 44.000 FT
(52) Deck Width Out to Out 44.000 FT
(34) Skew 00 DEG (35) Structure Flared
(10) Inventory Route MIN Vert Clear 99 FT 99.00 IN
(47) Inventory Route Total Horiz Clear 327.755 FT
(53) Min Vert Clear Over Bridge Rdwy 99 FT 099.00 IN
(54) Min Vert Underclear ref N FT N IN
(55) Min Lat Underclear RT ref N FT
(56) Min Lat Underclear LT FT

Navigation Data

(38) Navigation Control - No navigation control on waterway Code 0
(111) Pier Protection Code 1
(39) Navigation Vertical Clearance
(116) Vert-lift Bridge Nav Min Vert Clear FT
(40) Navigation Horizontal Clearance FT

Classification — Code

(112) NBIS Bridge Length Y
(21) Maintain - Other State Agencies 21
(22) Owner - Other State Agencies 21
(37) Historical Significance

Condition — Code

(58) Deck 7
(59) Superstructure 5
(60) Substructure 5
(61) Channel & Channel Protection 6
(62) Culverts N

Load Rating and Posting — Code

(41) Structure - Open A

Appraisal — Code

(71) Waterway adequacy 9
(72) Approach Roadway Alignment N
(36) Traffic Safety Features N N N N
(113) Scour Critical Bridges 6

Proposed Improvements

(75) Type of Work Code 1
(76) Length of Structure Improvement FT
(94) Bridge Improvement Cost (K) $0
(95) Road Improvement Cost (K) $0
(96) Total Project Cost (K) $0
(97) Year of Improvement Cost Estimate 2008
(114)Future ADT 0
(115)Year of Future ADT 0000

Inspections

(90) Inspection Date 10/07/14 (91) Frequency 24 MO
(92) Critical Feature Inspection: (93) CFI DATE

(A) Fracture Critical Detail	N	00	MO A)	00/00/00
(B) Underwater Inspection	N	00	MO B)	00/00/00
(C) Other Special Inspection	N	00	MO C)	00/00/00
(*) Other Inspection ()	N	00	MO *)	00/00/00
(*) Closed Bridge	N	00	MO *)	00/00/00
(*) UW Special Inspection	Y	60	MO *)	04/04/13
(*) Damage Inspection			MO *)	00/00/00

Rating Loads

Report Date 11/13/12

	E80	F40PH	284K	263K
NORMAL	54.0	427.0	267.0	267.0
MAXIMUM				
FATIGUE				

Accessibility (Needed/Used)

N / N	Liftbucket	N / N	Rigging	N / N	Rigging
N / N	Ladder	N / N	Staging		
N / N	Boat	N / N	Traffic Control		
Y / Y	Wader	Y / Y	RR Flagperson		
N / N	Inspector 50	N / N	Police		

Inspection Hours: 012

RAILROAD STRUCTURE INVENTORY AND APPRAISAL SHEET

Report Date: November 3, 2014 MONATIQUOT RIVER

State Information

BDEPT#= B21041 Agency Br.No.

Town= Braintree L.O.

B.I.N= B45 AASHTO= 041.0

Identification

(8) Structure Number B21041B45MBTRRO

RAILROAD BRIDGE NO 11.667

RAILROAD BRANCH NAME PLYMOUTH LINE

(2) State Highway Department District 06

(6) Features Intersected **WATER MONATIQUOT RIVER**

(7) Facility Carried **RR MBTA**

(9) Location PLYMOUTH LINE MP 11.667

(16) Latitude 42 DEG 12 MIN 00.00 SEC

(17) Longitude 71 DEG 00 MIN 06.91 SEC

(98) Border Bridge State Code Share %

(99) Border Bridge Structure No. #

Structure Type and Material

(43) Structure Type Main: Masonry Code 811

Arch - Deck Jointless bridge type: Not applicable

(44) Structure Type Appr:

Other Code 000

(45) Number of spans in main unit 001

(46) Number of approach spans 0000

(107) Deck Structure Type - Not applicable Code N

(108) Wearing Surface / Protective System:

(omit (a) and (b))

C) Type of deck protection - Not applicable=no deck Code N

Ballast:

Type of Ties:

Age and Service

(27) Year Built 1900

(106) Year Reconstructed 0000

(42) Type of Service: On - Railroad

Under - Waterway 01 Code 25

(28) Tracks : On Structure ~~00~~ Under structure 00

Geometric Data

(48) Length of maximum span 21.500 FT

(49) Structure Length 21.500 FT

(50) Curb or sidewalk: Left FT Right FT

(51) Bridge Roadway Width Curb to Curb 44.000 FT

(52) Deck Width Out to Out 44.000 FT

(34) Skew 00 DEG (35) Structure Flared

(10) Inventory Route MIN Vert Clear 99 FT 99.00 IN

(47) Inventory Route Total Horiz Clear 9999 ~~327.755 FT~~

(53) Min Vert Clear Over Bridge Rdwy 99 FT 099.00 IN

(54) Min Vert Underclear ref ~~R~~ N 0000 ~~18 FT~~ ~~6.00 IN~~ N

(55) Min Lat Underclear RT ref N FT

(56) Min Lat Underclear LT FT

Navigation Data

(38) Navigation Control - No navigation control on waterway Code 0

(111) Pier Protection Code 1

(39) Navigation Vertical Clearance

(116) Vert-lift Bridge Nav Min Vert Clear FT

(40) Navigation Horizontal Clearance FT

Classification — Code

(112) NBIS Bridge Length Y

(21) Maintain - Other State Agencies 21

(22) Owner - Other State Agencies 21

(37) Historical Significance

Condition — Code

(58) Deck 7

(59) Superstructure 5

(60) Substructure 5

(61) Channel & Channel Protection 6

(62) Culverts N

Load Rating and Posting — Code

(41) Structure - Open A

Appraisal — Code

(71) Waterway adequacy 9

(72) Approach Roadway Alignment N

(36) Traffic Safety Features N N N N

(113) Scour Critical Bridges 6

Proposed Improvements

(75) Type of Work Code 1

(76) Length of Structure Improvement FT

(94) Bridge Improvement Cost (K) $0

(95) Road Improvement Cost (K) $0

(96) Total Project Cost (K) $0

(97) Year of Improvement Cost Estimate 2008

(114)Future ADT 0

(115)Year of Future ADT 0000

leave blank

Inspections

(90) Inspection Date 10/07/14 (91) Frequency 24 MO

(92) Critical Feature Inspection: (93) CFI DATE

(A) Fracture Critical Detail	N	00	MO A)	00/00/00
(B) Underwater Inspection	N	00	MO B)	00/00/00
(C) Other Special Inspection	N	00	MO C)	00/00/00
(*) Other Inspection ()	N	00	MO *)	00/00/00
(*) Closed Bridge	N	00	MO *)	00/00/00
(*) UW Special Inspection	Y	60	MO *)	00/00/00 04/04/2013
(*) Damage Inspection			MO *)	00/00/00

Rating Loads

Report Date 11/13/12

	E80	F40PH	284K	263K
NORMAL	54.0	427.0	267.0	267.0
MAXIMUM				
FATIGUE				

Accessibility (Needed/Used)

N/N	Liftbucket	N/N	Rigging	Rigging
N/N	Ladder	N/N	Staging	
N/N	Boat	N/N	Traffic Control	
Y / Y	Wader	Y / Y	RR Flagperson	Inspection Hours: 000
N/N	Inspector 50	N/N	Police	12

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

BRIDGE INSPECTION

OLD COLONY LINE
PLYMOUTH BRANCH OVER MONATIQUOT RIVER
BRAINTREE, MA
BRIDGE NO. B-21-041
BIN NO. B45
MILE POST 11.667
STRUCTURE NO. B21041B45MBTRRO

PREPARED BY
THE LOUIS BERGER GROUP, INC.
117 Kendrick Street, Suite 400
Needham, MA 02494

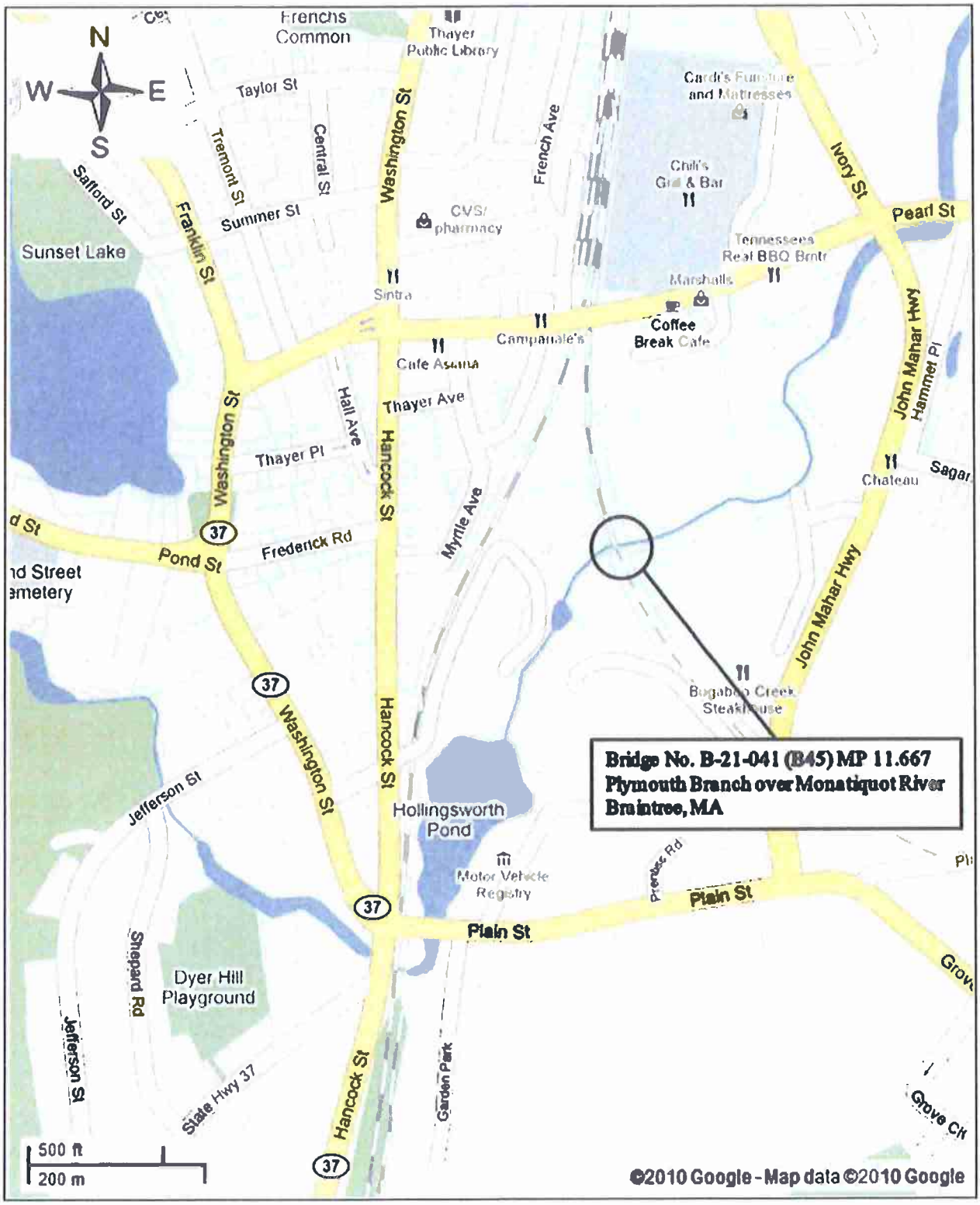
SEPTEMBER 2010

COMMONWEALTH OF MASSACHUSETTS
JOHN J. FITZGERALD
CIVIL
No. 49242
REGISTERED PROFESSIONAL ENGINEER

John Fitzgerald

TABLE OF CONTENTS

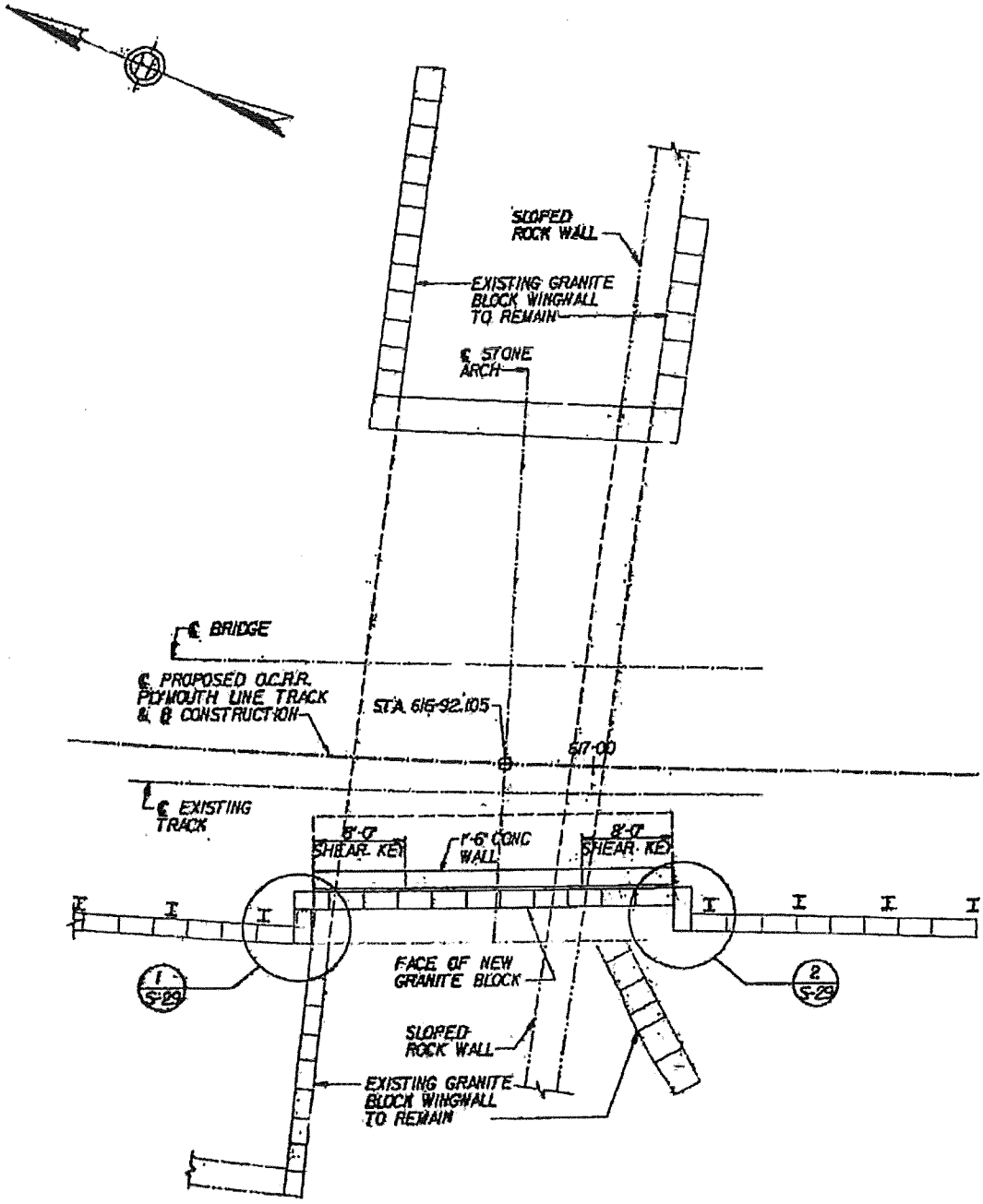
LOCATION MAP



DESCRIPTION OF BRIDGE

Date of Construction:	Unknown; 1900 Assumed
Original Design Loading:	Unknown
Posted Limit:	None
Bridge Type:	Stone Masonry Arch
Skew:	0 degrees
Spans:	1 Span at 21'-6" Clear Distance at Spring Line
Width of Bridge Deck:	44'- 0" width out-to-out
Track Surface:	One Track with CWR; Timber Ties on Ballast
Curbs:	None
Sidewalks/Walkway:	None
Bridge Railing:	Steel Pedestrian Handrail on the west side of the Bridge only
Superstructure:	Stone Masonry Closed Spandrel Arch
Modifications to Original Superstructure:	The arch was widened 15'-0" on the east side at an earlier date. A reinforced concrete retaining wall with granite facing and cap was also added above the west fascia of the arch in approx. 1994.
Utilities:	None
Substructure:	Stone Masonry breastwall supports the north portion of the arch and a sloped, exposed ledge footing supports the south.
Modifications to Original Substructure:	The arch was widened 15'-0" on the east side.

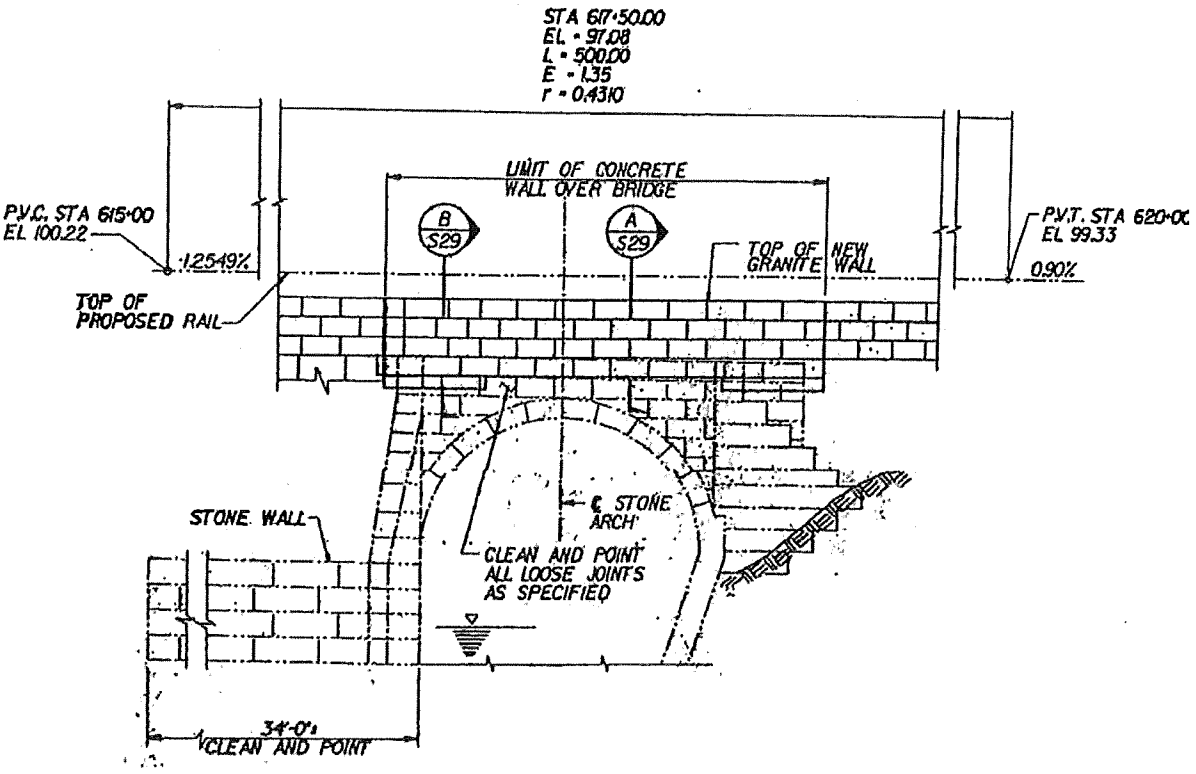
BRIDGE PLAN



PROPOSED PLAN
1/8" = 1'-0"

SKETCH OBTAINED FROM JULY 2005 INSPECTION REPORT

GENERAL ELEVATION

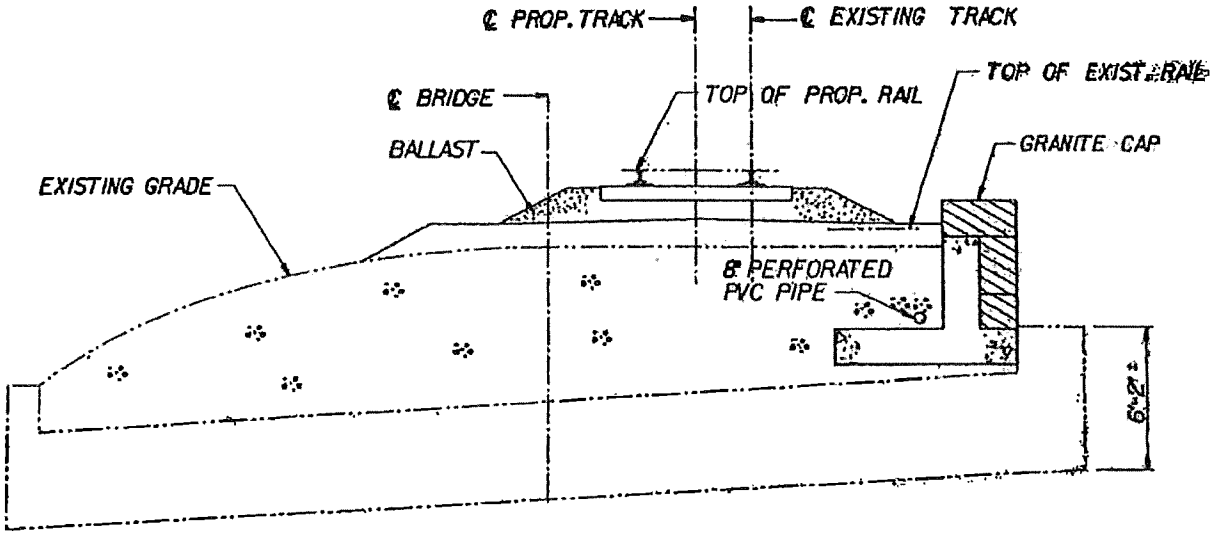


PROPOSED ELEVATION

1/8" = 1'-0"

SKETCH OBTAINED FROM JULY 2005 INSPECTION REPORT

TYPICAL BRIDGE CROSS SECTION



SECTION @ ℄ OF STONE ARCH
3/16" = 1'-0"

SKETCH OBTAINED FROM JULY 2005 INSPECTION REPORT

INSPECTION FINDINGS AND RECOMMENDATIONS

MILE POST: 11.667

INSPECTION FINDINGS

Bridge B-21-041 is a single span stone masonry arch that carries a single track of the Old Colony Line, Plymouth Branch over the Monatiquot River in the town of Braintree, MA. The date of original construction is assumed to be around 1900. A 15 foot long section of the east end of the arch appears to have been widened at a later date. The arch has a clear span of 22' – 0" measured at the spring lines with an overall barrel length of 44' – 0". The arch barrel, spandrel walls and wingwalls consist of granite blocks.

The orientation of the structure is south to north with abutments/breastwalls labeled south and north. The river runs approx. west to east.

ITEM 58 – DECK

The bridge deck items were found to be in generally good condition. The ballast is distributed evenly between the ties which exhibit typical checks and weathering.

ITEM 59 – SUPERSTRUCTURE

The original portion of the arch barrel consists of irregularly shaped stones that exhibit heavy efflorescence and areas of loose stones and missing mortar. The 15' – 0" eastern portion of the barrel consists of stones that are more regularly shaped however it still exhibits heavy efflorescence and loose stones and missing mortar. The construction joint between these two portions is up to 3" to 4" wide. The east fascia voussoir stones are pulling away from the arch barrel as noted by the circumferential gap, approx. 1"to 1.5" wide. An 1/8" wide vertical crack was found along the north half underside of arch approx. 10 ft from the west portal extending from the springline to the crown. Extensive ground water evidence is noted throughout the underside. The east spandrel wall was found to have missing mortar and a stone is missing from the north side.

ITEM 60 – SUBSTRUCTURE

Substructure was found to be in fair condition. The sloped ledge face at the south end exhibits extensive leakage and large cracks along the entire face. The north breastwall was found to have areas of local undermining and exhibits cracked/loose stones along the entire length of the barrel. The wingwalls were found to have missing mortar and loose stones, especially at the east wingwalls.

INSPECTION FINDINGS AND RECOMMENDATIONS

ITEM 61 – CHANNEL AND CHANNEL PROTECTION

The channel was scattered with larger stones throughout the middle of the arch and moderate debris was found upstream. There is moderate local scour along the southwest inlet. A small sandbar was also found at the northeast embankment.

RECOMMENDATIONS

The Louis Berger Group Inc. recommends the following:

ITEM 58 – DECK

- None.

ITEM 59 – SUPERSTRUCTURE

- Clean and re-point deficient masonry joints throughout.
- Replace missing stones in east spandrel wall.
- Continue to monitor the circumferential separation of the east fascia stones during subsequent inspections.
- Consideration should be given to installing a waterproofing membrane over the arch to stop the water seepage onto the arch blocks to prevent freeze thaw damage from deteriorating the granite block arch.

ITEM 60 – SUBSTRUCTURE

- Clean and re-point deficient masonry joints and gaps between stones.

ITEM 61 – CHANNEL AND CHANNEL PROTECTION

- Clear debris downstream.
- Continue to monitor local scour conditions.

GENERAL

- General Maintenance and inspection of the bridge should continue at regular intervals.
- Perform underwater inspection.

AVAILABLE PLANS

The following reports were made available to The Louis Berger Group Inc. for use during the bridge inspection:

Diversified Technology Consultants
MBTA Bridge Inspection
Plymouth Branch – Stream MP 11.667
Dated: July 2005

This report contained sheets showing the bridge plan, general elevation and section of stone arch. Field measurements were taken by The Louis Berger Group Inc. during field inspections in September 2010 to verify information shown in the July 2005 Bridge Inspection Report.

APPENDIX A- INSPECTION FORMS, FIELD NOTES, AND PHOTOS

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

STRUCTURES INSPECTION FIELD REPORT

RAILROAD/TRANSIT ROUTINE ARCH INSPECTION

2-DIST	B.I.N.	BRIDGE NO.
4	B45	B-21-041

4-CITY/TOWN	8-STRUCTURE NO./MDPW BRIDGE NO	MILEPOST/T ID NO	41-STATUS	INSPECTION DATE
Braintree	B21041B45MBTRRO	11.667	Open	05/13/2010 & 09/10/2010

7-FACILITY CARRIED/LINE	MEMORIAL NAME/LOCAL NAME	27-YR BUILT	106-YR REBUILT	VERT. UNDERCLEARANCE
Old Colony Line - Plymouth Branch		1900	X	19'-0"

06-FEATURES INTERSECTED	26-FUNCTIONAL CLASS.	QUALITY CONTROL ENGINEER
Monatiquot River	CommuterRail	Paul F. Kirby, P.E.

43-STRUCTURE TYPE	22-OWNER	21-MAINTAINER	TEAM LEADER	NO. TRACKS
Stone Masonry Arch	MBTA	MBTA	John Fitzgerald	1

107-DECK TYPE	WEATHER	TEMP. (air)	TEAM MEMBERS	NO. SPANS
Ballasted Deck	Sunny	60 F	Nicholas Caron, Dan O'Keefe	1

ITEM 58 — DECK: 7

		DEF
1. Wearing Surface	N	
2. Deck Condition	N	
3. Spandrel Fill	7	
4. Curbs	N	
5. Medians	N	
6. Sidewalks	N	
7. Parapets/Coping	N	
8. Railings	N	
9. Anti-Missile Fence	N	
10. Drainage System	4	S/P
11. Lighting Standards	N	
12. Utilities	N	
13. Deck Joints	N	
14. Ties	6	
15. Approach Settlement	7	
16. Ballast	7	

CURB REVEAL (In millimeters)	N/E	S/W
	N	N

ITEM 59 — SUPERSTRUCTURE: 5

		DEF
1. Arch/Arch Ring	5	S/P
2. Keystone Area	6	
3. Stringers/Tee Beams	N	
4. Floor Beams	N	
5. Spandrel Walls	5	M/P
6. Spring Lines	6	
7. Diaphrams	N	
8. Conn Plt's, Gussets Angles	N	
9. Hangers	N	
10. Masonry Joints	5	S/P
11. Rivets & Bolts	N	
12. Welds	N	
13. Deformation/Flattening	7	
14. Member Alignment	5	
15. Paint/Coating	N	
16.		
Year Painted:	N	

ITEM 60 — SUBSTRUCTURE: 5

	Dive Rpt.	This Rpt.		DEF
1. Abutments			5	
a. Pedestals	N	N		
b. Bridge Seats	N	N		
c. Backwalls	N	N		
d. Breastwalls	N	5		
e. Wingwalls	N	5		
f. Slope Paving/Rip-Rap	N	N		
g. Pointing	N	5		S/P
h. Footings	N	H		
i. Piles	N	N		
j. Scour	N	6		
k. Settlement	N	7		
l.				
m.				
2. Piers or Bents			N	
a. Pedestals				
b. Caps				
c. Columns				
d. Stems/Webs/Pierwalls				
e. Pointing				
f. Footing				
g. Piles				
h. Scour				
i. Settlement				
j.				
k.				
3. Pile Bents			N	
a. Pile Caps				
b. Piles				
c. Diagonal Bracing				
d. Horizontal Bracing				
e. Fasteners				

APPROACHES

		DEF
a. Appr. pavement condition	N	
b. Appr. Roadway Settlement	N	
c. Appr. Sidewalk Settlement	N	

COLLISION DAMAGE: None (●) Minor ( ) Moderate ( ) Severe ( )

LOAD DEFLECTION: None (●) Minor ( ) Moderate ( ) Severe ( )

LOAD VIBRATION: None (●) Minor ( ) Moderate ( ) Severe ( )

UNDERMINING (Y/N) *If YES please explain* N

COLLISION DAMAGE: None (●) Minor ( ) Moderate ( ) Severe ( )

I-60 (Dive Report): N *I-60 (This Report):* 5

93b-U/W (DIVE) INSP DATE:

OVERHEAD SIGNS (Attached to bridge) (Y/N) N

		DEF
a. Condition of Welds		
b. Condition of Bolts		
c. Condition of Signs		

Any Fracture Critical Member? : (Y/N) N

Any Cracks : (Y/N) N *If YES Please explain*

X=UNKNOWN N=NOT APPLICABLE H=HIDDEN/INACCESSIBLE R=REMOVED

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8-STRUCTURE NO.	INSPECTION DATE
Braintree	**B45**	**B-21-041**	**B21041B45MBTRRO**	**05/13/2010 & 09/10/2010**

ITEM 61 — CHANNEL & CHANNEL PROTECTION: 6

	Dive Rpt.	This Rpt.	DEF
1. Channel Scour	N	6	
2. Embankment Erosion	N	6	
3. Debris	N	5	M/P
4. Vegetation	N	7	
5. Utilities	N	N	
6. Rip-Rap/Slope Protection	N	N	
7. Aggradation	N	6	
8. Fender System	N	N	
9. Effectiveness/Alignment	N	7	

STREAM FLOW VELOCITY: Tidal ○ High ○ Medium ○ Low ◉

I-61 (Dive Report): N *I-61 (This Report):* 7

93b-U/W INSP DATE

ITEM 36 — *TRAFFIC SAFETY*

	36	COND	DEF
1. Bridge Railing	N		
2. Transitions	N		
3. Approach Guardrail	N		
4. Approach Guardrail Ends	N		

WEIGHT POSTING: *Not Applicable* ■

	H	3	3S2	SINGLE
Actual Posting				
Recommended Posting				

Waived Date: **EJDMT Date:**

	At bridge N/E	At bridge S/W	Other Advance N/E	Other Advance S/W
Signs in Place (Y=Yes N=No)				
Legibility/ Visibility				

CLEARANCE POSTING: *Not Applicable* ■

	N/E ft	N/E in	S/W ft	S/W in	meters
Actual Field Measurement					
Posted Clearance					

	At bridge N/E	At bridge S/W	Advance N/E	Advance S/W
Signs in Place (Y=Yes N=No)				
Legibility/ Visibility				

ACCESSIBILITY: (Y/N/P)

	Needed	Used
Lift Bucket	N	N
Ladder	N	N
Boat	N	N
Wader	Y	Y
Inspector 50	N	N
Rigging	N	N
Staging	N	N
Traffic Control	N	N
RR Flagger	Y	Y
Police	N	N

TOTAL HOURS:

PLANS: (Y/N) N

(V.C.R.): (Y/N) N

TAPE #:

List of Field Tests Performed:

RATING:

Rating Report (Y/N): N

Date:

(To be filled out by QCE)

Request for Rating or Rerating (Y/N):

If YES please give priority: High ○ Medium ○ Low ○

Reason:

CONDITION RATING GUIDE (for Items 58, 59, 60)

	CODE	CONDITION	DEFECTS
	N	NOT APPLICABLE	
G	9	EXCELLENT	Excellent condition.
G	8	VERY GOOD	No problem noted.
G	7	GOOD	Some minor problems.
F	6	SATISFACTORY	Structural elements show some minor deterioration.
F	5	FAIR	All primary structural elements are sound but may have minor section loss, cracking, spalling or scour.
P	4	POOR	Advanced section loss, deterioration, spalling or scour.
P	3	SERIOUS	Loss of section, deterioration, spalling or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.
C	2	CRITICAL	Advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.
C	1	"IMMINENT" FAILURE	Major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic but corrective action may put it back in light service.
	0	FAILED	Out of service - beyond corrective action.

DEFICIENCY REPORTING GUIDE

DEFICIENCY: A defect in a structure that requires corrective action.

CATEGORIES OF DEFICIENCIES:

M= Minor Deficiency - Deficiencies which are minor in nature, generally do not impact the structural integrity of the bridge and could easily be repaired. Examples include but are not limited to: Spalled concrete, Minor pot holes, Minor corrosion to steel, Minor scouring, Clogged drainage, etc.

S= Severe/Major Deficiency - Deficiencies which are more extensive in nature and need more planning and effort to repair. Examples include but are not limited to: Moderate to major deterioration in concrete, Exposed and corroding rebars, Considerable settlement, Considerable scouring or undermining, Moderate to extensive corrosion to structural steel with measurable loss of section, etc.

C-S= Critical-Structural Deficiency - A deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge.

C-H= Critical-Hazard Deficiency - A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples include but are not limited to: Loose concrete hanging down over traffic or pedestrians, A hole in a sidewalk that may cause injuries to pedestrians, Missing section of bridge railing, etc.

URGENCY OF REPAIR:

I= Immediate - [Inspector(s) immediately contact District Bridge Inspection Engineer (DBIE) to report the Deficiency and to receive further instruction from him/her].

A= As soon as possible - [Action/Repair should be initiated by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) upon receipt of the Inspection Report].

P= Prioritize - [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available].

CITY/TOWN	B.I.N	BR. DEPT. NO.	8-STRCUTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041B45MBTRRO**	**5/13/2010, 9/10/2010**

REMARKS & PHOTOS

Bridge B-21-041 is a single span stone masonry arch that carries a single track of the Old Colony Line, Plymouth Branch over the Monatiquot River in the town of Braintree, MA. The date of original construction is assumed to be around 1900. A 15 foot long section of the east end of the arch appears to have been widened at a later date. The arch has a clear span of 22' – 0" measured at the spring lines with an overall barrel length of 44' – 0". The arch barrel, spandrel walls and wingwalls consist of granite blocks.

The orientation of the structure is south to north with abutments/breastwalls labeled south and north. The river runs approx. west to east.

ITEM 58 – DECK

58.3 Spandrel Fill (Good); No deficiencies found.

58.10 Drainage System (Poor); The arch underside exhibited extensive water seepage. No signs of a drain system were found.

58.14 Ties (Satisfactory); The timber ties exhibit normal checks along their lengths.

58.15 Approach settlement (Good); No deficiencies noted.

58.16 Ballast (Good); The ballast is evenly distributed between ties.

ITEM 59 – SUPERSTRUCTURE

59.1 Arch/Arch Ring (Fair); The original portion of the arch barrel consists of irregularly shaped stones and the 15' – 0" eastern portion of the barrel consists of stones that are more regularly shaped. The construction joint between these two portions is up to 3-4" wide. The east fascia voussoir stones are pulling away from the arch barrel as noted by the circumferential gap, approx. 1"to1.5" wide. (See Photo 11) An 1/8" wide vertical crack was found along the north half underside of arch approx. 10 ft from the west portal extending from the springline to the crown. Extensive ground water seepage is evident throughout the underside. The arch barrel exhibits missing mortar and heavy efflorescence throughout. Several isolated stones were found to be cracked.

59.2 Key Stones (Satisfactory); The key stones are regularly shaped and aligned on both the east and west intrados. Both sides exhibit efflorescence particularly on the underside of the stones.

59.5 Spandrel Walls (Fair); The east spandrel walls exhibit minor vegetation and large gaps of missing mortar particularly along the top of the arch ring. A stone was found to be missing on the north side of the east spandrel wall (see Photo 8). The west spandrel wall was found to be in better condition with most of the mortar in place. The west spandrel wall exhibits moderate graffiti.

59.6 Spring Lines (Satisfactory); The spring lines were found to be in satisfactory condition. The south spring line which rests on the sloped rock ledge was found to have minor areas of missing and loose mortar/stones (see Photos 6 and 7).

59.10 Masonry Joints (Fair); Masonry Joints found to be in overall fair condition. Due to extensive water seepage the mortared joints were found to be loose and cracked with heavy efflorescence found throughout.

CITY/TOWN	B.I.N	BR. DEPT. NO.	8-STRCUTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041B45MBTRRO**	**5/13/2010, 9/10/2010**

REMARKS & PHOTOS

59.13 Deformation/Flattening (Good); No deficiencies noted.

59.14 Member Alignment (Fair); See Items 59.1 and 59.10 for locations of member misalignment and additional comments.

ITEM 60 – SUBSTRUCTURE

60.1d Breastwalls (Fair); The north breastwall consists of granite stones that were cracked along the entire length of the arch barrel. The south breastwall consists of a sloped rock ledge that exhibits very large cracks and leakage throughout (see Photos 6 and 7).

60.1b Wingwalls (Fair); The wingwalls consist of irregularly shaped stones and were found to be in fair to satisfactory condition. The Northeast and Southeast Wingwalls exhibit loose stones and missing mortar throughout. A stone was found to be missing on the Southeast Wingwall. The retaining wall behind the Southwest embankment retaining wall was found to have an area of undermining (see Photo 16). The Northwest Wingwall was found to be in good condition. The retaining wall on the northwest side of the bridge exhibits cracks in the mortar and loose stones (see Photos 12 to 15).

60.1g Pointing (Fair); Pointing is loose or missing in most areas with the exception of the Northwest Wingwall. The most severe condition of the pointing is on the east wingwalls.

60.1j Scour (Satisfactory); Moderate local scour was found at the southwest portion of the inlet. Local areas of minor undermining were detected along the north breastwall.

60.1k Settlement (Good); No deficiencies noted.

ITEM 61 – CHANNEL AND CHANNEL PROTECTION

61.1 Channel Scour (Satisfactory); Heavy local scour was found upstream of the arch on the south end. The scour depth drops over 4 feet from the average stream depth of 18". This scour is due to the sharp rise in elevation of the stream bed in the upstream direction.

61.2 Embankment Erosion (Satisfactory); Minor erosion was found on the northwest embankment.

61.3 Debris (Fair); The channel was filled with debris in the form of stones and discarded steel items. Moderate debris was found downstream of structure.

61.4 Vegetation (Good); No deficiencies noted.

61.7 Aggradation (Satisfactory); A sandbar was found at the northeast embankment.

61.9 Effectiveness/Alignment (Good); No deficiencies noted.

CITY/TOWN	B.I.N	BR. DEPT. NO.	8-STRCUTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041B45MBTRRO**	**5/13/2010, 9/10/2010**

REMARKS & PHOTOS

Photo #1 – East Elevation

Photo #2 – West Elevation

CITY/TOWN	B.I.N	BR. DEPT. NO.	8-STRCUTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041B45MBTRRO**	**5/13/2010, 9/10/2010**

REMARKS & PHOTOS

Photo #3 – South Approach Looking South

Photo #4 – North Approach Looking North

CITY/TOWN	B.I.N	BR. DEPT. NO.	8-STRCUTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041B45MBTRRO**	**5/13/2010, 9/10/2010**

REMARKS & PHOTOS

Photo #5 – Typical Top Side of Bridge

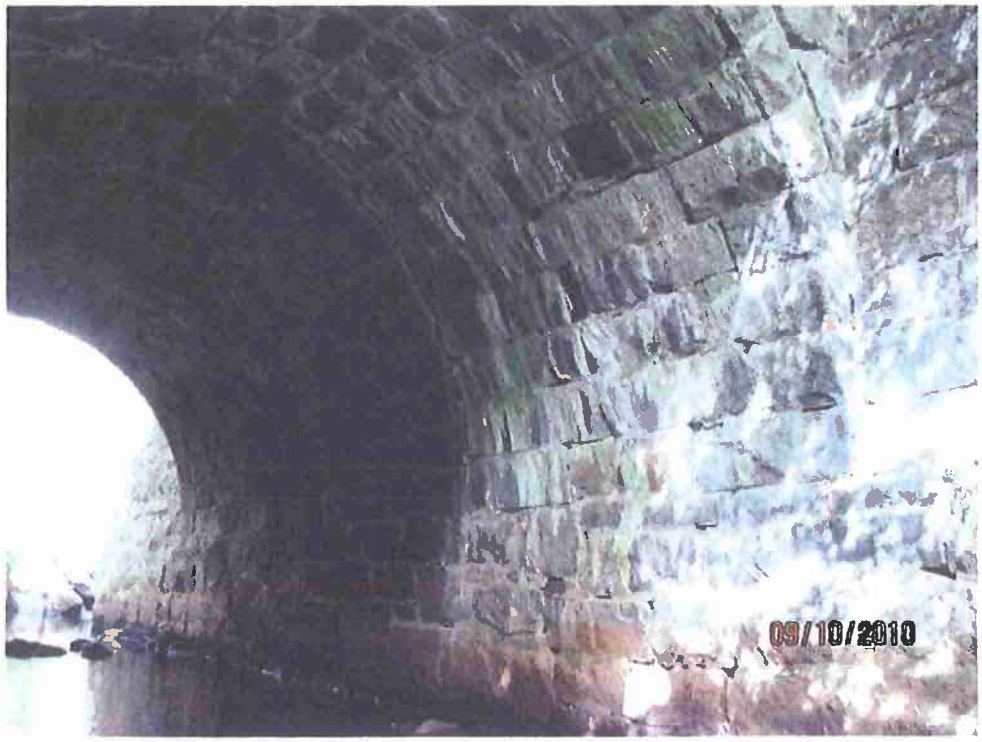


Photo #6 – Arch Barrel – North Side Looking West

CITY/TOWN	B.I.N	BR. DEPT. NO.	8-STRCUTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041B45MBTRRO**	**5/13/2010, 9/10/2010**

REMARKS & PHOTOS

Photo #7 – Arch Barrel – South Side Looking East

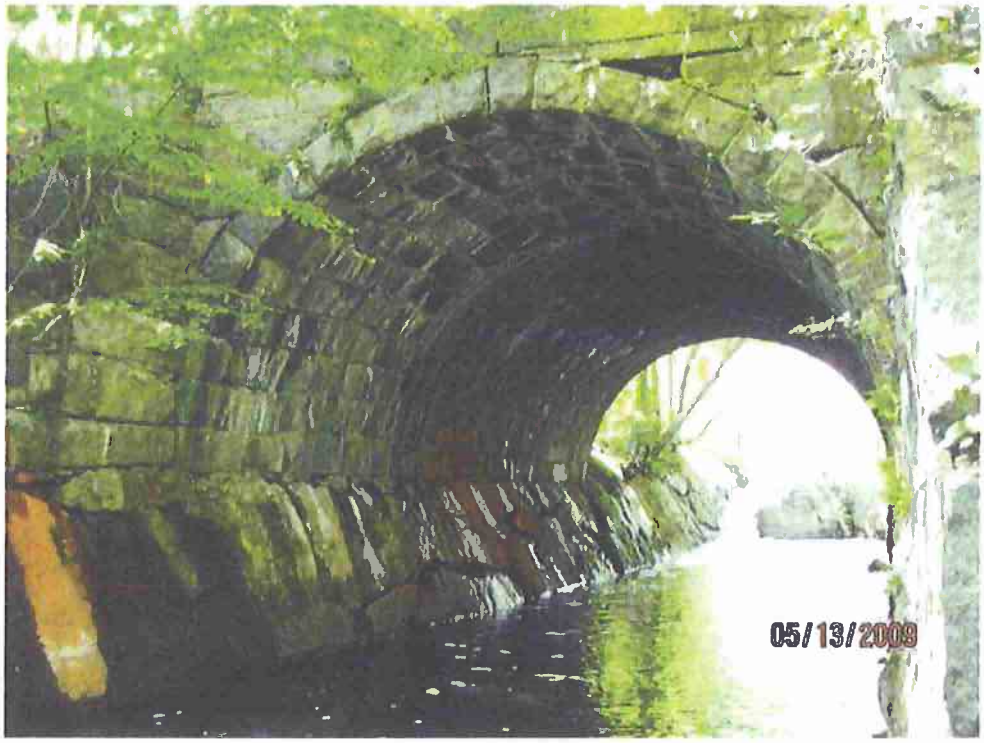


Photo #8– East Spandrel Wall

CITY/TOWN	B.I.N	BR. DEPT. NO.	8-STRCUTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041B45MBTRRO**	**5/13/2010, 9/10/2010**

REMARKS & PHOTOS

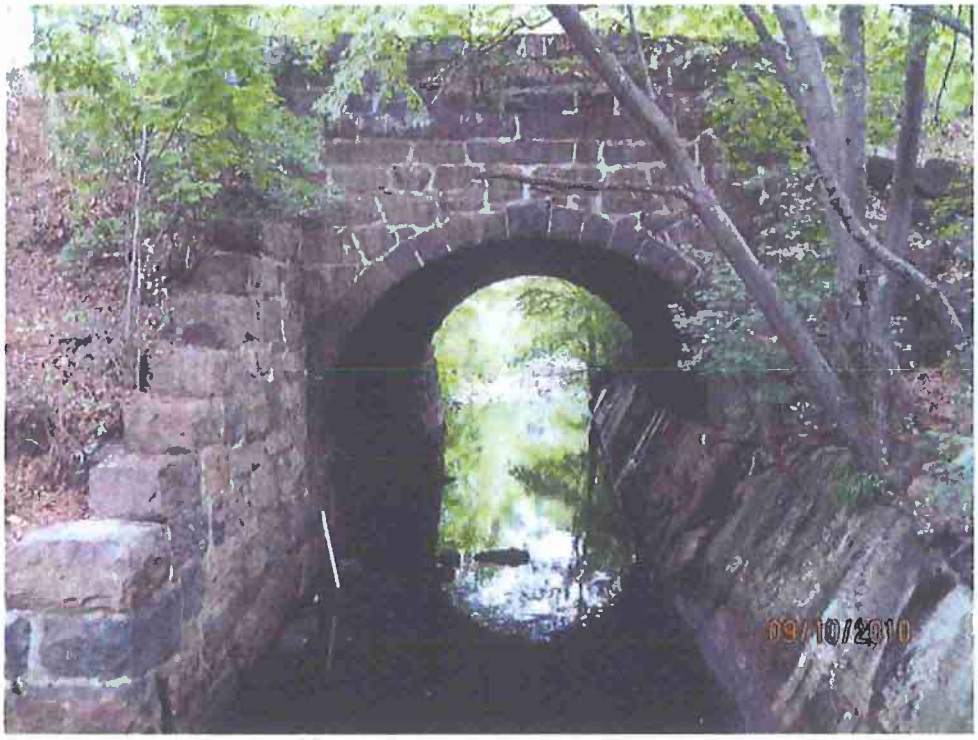


Photo #9 – West Spandrel Wall

Photo #10 – Construction Joint between East and West Portions of Arch

CITY/TOWN	B.I.N	BR. DEPT. NO.	8-STRCUTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041B45MBTRRO**	**5/13/2010, 9/10/2010**

REMARKS & PHOTOS

Photo #11 – Condition of North side of East portion of Arch. Note Separation of East Fascia Stones

Photo #12 – Southeast Wingwall

CITY/TOWN	B.I.N	BR. DEPT. NO.	8-STRCUTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041B45MBTRRO**	**5/13/2010, 9/10/2010**

REMARKS & PHOTOS

Photo #13 – Northeast Wingwall

Photo #14 – Southwest Embankment Retaining Wall

CITY/TOWN	B.I.N	BR. DEPT. NO.	8-STRCUTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041B45MBTRRO**	**5/13/2010, 9/10/2010**

REMARKS & PHOTOS

Photo #15 – Northwest Wingwall

Photo #16 – Undermining at Retaining Wall at Southwest End

CITY/TOWN	B.I.N	BR. DEPT. NO.	8-STRCUTURE NO.	INSPECTION DATE
BRAINTREE	**B45**	**B-21-041**	**B21041B45MBTRRO**	**5/13/2010, 9/10/2010**

REMARKS & PHOTOS

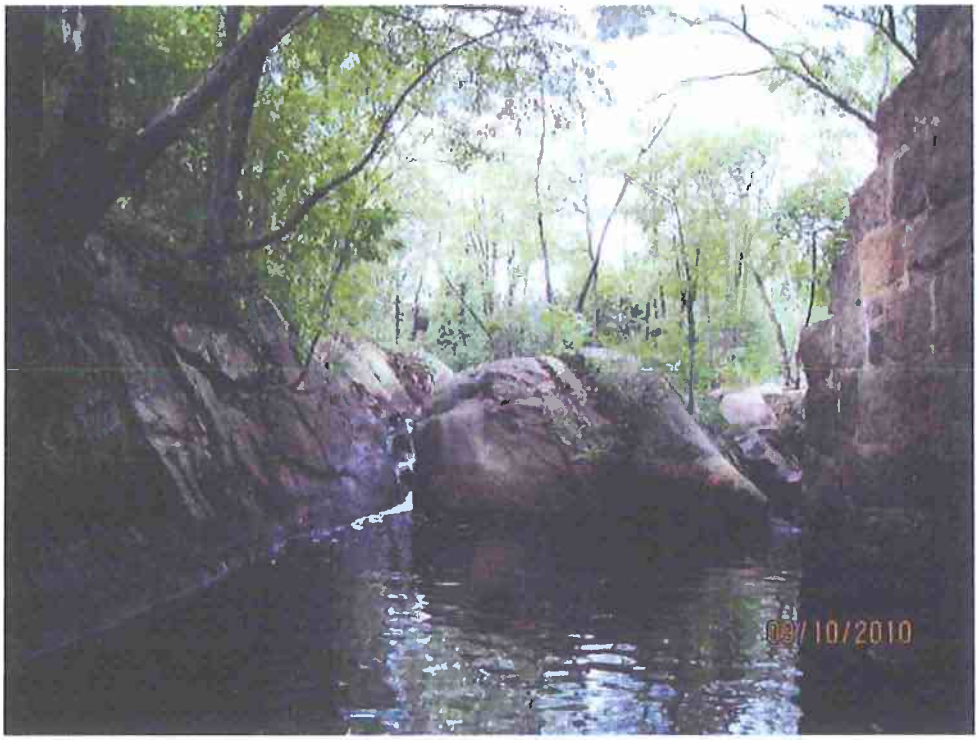


Photo #17 – Upstream

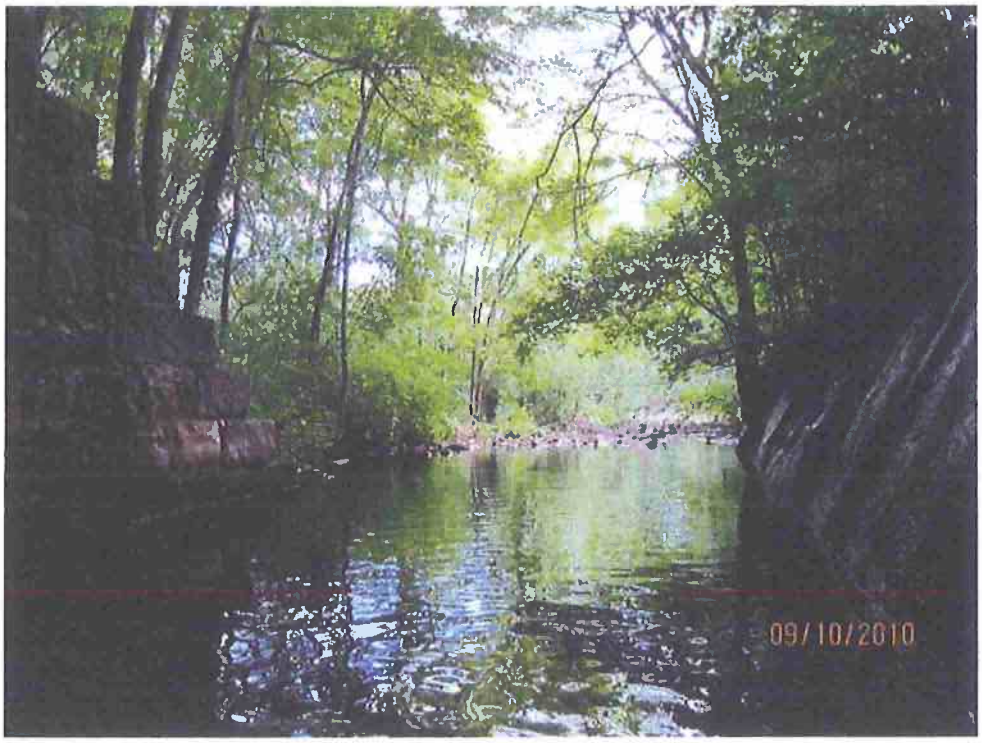


Photo #18 – Downstream

APPENDIX B- STRUCTURE INVENTORY AND APPRAISAL FORM

RAILROAD STRUCTURE INVENTORY AND APPRAISAL SHEET

********** IDENTIFICATION **********

(1)	STATE NAME:	MASSACHUSETTS	CODE: 251
(207)	RAILROAD STRUCTURE NUMBER:		B21041B45MBTRRO
(5)	INVENTORY ROUTE (ON / UNDER):	On	=
(208)	RAILROAD NAME:		MBTA/MBCR
(6)	FEATURES INTERSECTED:		MONATIQUOT RIVER
(7)	FACILITY CARRIED:		PLYMOUTH BRANCH
(9)	LOCATION:		BRAINTREE
(11)	MILEPOINT/KILOMETERPOINT:		11.667
(16)	LATITUDE:		42 DEG 12 MIN 00.00 SEC
(17)	LONGITUDE:		71 DEG 0 MIN 6.91 SEC
(98)	BORDER BRIDGE STATE CODE		% SHARE: %
(99)	BORDER BRIDGE STRUCTURE NO.:		

********* STRUCTURE TYPE & MATERIAL **********

(43)	STRUCTURE TYPE MAIN:	MATERIAL: Masonry	
		TYPE: Arch - Deck	CODE: 811
(44)	STRUCTURE TYPE APPROACH:	MATERIAL:	
		TYPE:	CODE:
(45)	NUMBER OF SPANS IN MAIN UNIT:		001
(46)	NUMBER OF APPROACH SPANS:		0000
(107)	DECK STRUCTURE TYPE:	Not Applicable	CODE: N
(108)	WEARING SURFACE / PROTECTIVE SYSTEM: (omit (a) and (b))		
C)	DECK PROTECTION:	Not Applicable	CODE: N

********** AGE AND SERVICE **********

(27)	YEAR BUILT:		1900
(106)	YEAR RECONSTRUCTED:		0000
(42)	TYPE OF SERVICE: ON:	Railroad	
	UNDER:	Waterway	CODE: 25
(28)	TRACKS ON STRUC.:	On: 01	Under: 00

********** GEOMETRIC DATA **********

(48)	LENGTH OF MAXIMUM SPAN:	CLEAR SPAN		21.5 FT
(49)	STRUCTURE LENGTH:			21.5 FT
(50)	CURB OR SIDEWALK:	LEFT: 0.0 FT	RIGHT:	0.0 FT
(51)	BRIDGE ROADWAY WIDTH, CURB TO CURB:			044.0 FT
(52)	DECK WIDTH, OUT TO OUT:			044.0 FT
(34)	SKEW:			00 DEG
(35)	STRUCTURE FLARED:			0
(10)	INVENTORY RTE. MIN. VERT. CLEAR:	99 FT		99 IN
(47)	INVENTORY RTE. TOTAL HORIZ. CLEAR:			99.00 FT
(53)	MIN VERT CLEAR Over BRIDGE RDWY:	99 FT		99 IN
(54)	MIN VERT UNDERCLEAR:	Railroad	18 FT	6 IN
(55)	MIN LAT UNDERCLEAR RT:	Railroad		N FT
(56)	MIN LAT UNDERCLEAR LT :			N FT

********** NAVIGATION DATA **********

(38)	NAVIGATION CONTROL:	Permit Not Req'd	CODE: 0
(111)	PIER PROTECTION:	Protection Not Req'd	CODE: 1
(39)	NAVIGATION VERTICAL CLEARANCE:		000 FT
(116)	VERT-LIFT BRIDGE NAV MIN VERT CLEARANCE:		FT
(40)	NAVIGATION HORIZONTAL CLEARANCE:		0000 FT

****

SUFFICIENCY RATING=
STATUS =

********** CLASSIFICATION **********

(112)	NBIS BRIDGE LENGTH:	CODE:	Y
(21)	MAINTAIN:		MBTA
(22)	OWNER:		MBTA
(37)	HISTORICAL SIGNIFICANCE:		3

********** CONDITION ********** CODE:

(58)	DECK:	7
(59)	SUPERSTRUCTURE:	5
(60)	SUBSTRUCTURE:	5
(61)	CHANNEL & CHANNEL PROTECTION:	6
(62)	CULVERTS:	N

********** LOAD RATING & POSTING ********** CODE:

(41)	STRUCTURE OPEN, POSTED OR CLOSED:		
	DESCRIPTION:	Open, No Restrictions	A

********** APPRAISAL ********** CODE:

(71)	WATERWAY ADEQUACY:	9
(72)	APPROACH ROADWAY ALIGNMENT:	N
(36)	TRAFFIC SAFETY FEATURES:	NNNN
(113)	SCOUR CRITICAL BRIDGES:	6

********** PROPOSED IMPROVEMENTS **********

(75)	TYPE OF WORK:	CODE:	
(76)	LENGTH OF STRUCTURE IMPROVEMENT:		FT
(94)	BRIDGE IMPROVEMENT COST:		
(95)	ROADWAY IMPROVEMENT COST:		
(96)	TOTAL PROJECT COST:		
(97)	YEAR OF IMPROVEMENT COST ESTIMATE:		
(114)	FUTURE ADT:		
(115)	YEAR OF FUTURE ADT:		

********** INSPECTIONS **********

(90)	INSPECTION DATE: 09/10	(91) FREQUENCY:	24	MO
(92)	CRITICAL FEATURE INSPECTION:			
A)	FRACTURE CRITICAL DETAIL:	No		MO
B)	UNDERWATER INSP.:	No		MO
C)	OTHER CRITICAL INSP.:	No		MO
(93)	CRITICAL FEATURE INSPECTION DATE:			
A)	FRACTURE CRITICAL DETAIL:			
B)	UNDERWATER INSP.:			
C)	OTHER CRITICAL INSP.:			

********** RATING LOADS **********

	N/A	E-80	F40PH	286K	263K
REPORT DATE:					
NORMAL		N/A	N/A	N/A	N/A
MAXIMUM		N/A	N/A	N/A	N/A

********** ACCESSIBILITY **********

LIFTBUCKET	N	RIGGING	N	INSPECTION
LADDER	N	STAGING	N	HOURS:
BOAT	N	TRAFFIC CONTROL	N	
WADER	Y	RR FLAGPERSON	Y	
INSPECTOR 50	N	POLICE	N	

Note: Changes in Recording from Previous Inspection Report Highlighted in Yellow

RAILROAD STRUCTURE INVENTORY AND APPRAISAL SHEET

********** IDENTIFICATION **********

(1) STATE NAME: MASSACHUSETTS CODE: 251
(207) RAILROAD STRUCTURE NUMBER: B21041B45MBTRRO
(5) INVENTORY ROUTE (ON / UNDER): =
(208) RAILROAD NAME: MBTA/MBCR
(6) FEATURES INTERSECTED: MONATIQUOT RIVER
(7) FACILITY CARRIED: RR OLD COLONY LINE
(9) LOCATION: 900 FT SOUTH OF PEARL ST
(11) MILEPOINT/KILOMETERPOINT: 11.667
(16) LATITUDE: 42 DEG 12 MIN 0.00 SEC
(17) LONGITUDE: 71 DEG 0 MIN 6.91 SEC
(98) BORDER BRIDGE STATE CODE % SHARE: %
(99) BORDER BRIDGE STRUCTURE NO.:

********** STRUCTURE TYPE & MATERIAL **********

(43) STRUCTURE TYPE MAIN: MATERIAL: Masonry
TYPE: Arch - Deck CODE: 811
(44) STRUCTURE TYPE APPROACH: MATERIAL:
TYPE: CODE:
(45) NUMBER OF SPANS IN MAIN UNIT: 001
(46) NUMBER OF APPROACH SPANS: 0000
(107) DECK STRUCTURE TYPE: Not Applicable CODE: N
(108) WEARING SURFACE / PROTECTIVE SYSTEM:
(omit (a) and (b))
C) DECK PROTECTION: Not Applicable CODE: N

********** AGE AND SERVICE **********

(27) YEAR BUILT: 1900
(106) YEAR RECONSTRUCTED: 0000
(42) TYPE OF SERVICE: ON: Railroad
UNDER: Waterway CODE: 25
(28) TRACKS ON STRUC.: On: 01 Under: 00

********** GEOMETRIC DATA **********

(48) LENGTH OF MAXIMUM SPAN: Clear Span 21.5 FT
(49) STRUCTURE LENGTH: 21.5 FT
(50) CURB OR SIDEWALK: LEFT: 0.0 FT RIGHT: 0.0 FT
(51) BRIDGE ROADWAY WIDTH, CURB TO CURB: 044.0 FT
(52) DECK WIDTH, OUT TO OUT: 044.0 FT
(34) SKEW: 00 DEG
(35) STRUCTURE FLARED: N
(10) INVENTORY RTE. MIN. VERT. CLEAR: FT IN
(47) INVENTORY RTE. TOTAL HORIZ. CLEAR: FT
(53) MIN VERT CLEAR Over BRIDGE RDWY: 99 FT 99 IN
(54) MIN VERT UNDERCLEAR: Not Hwy or RR 0 FT 0 IN
(55) MIN LAT UNDERCLEAR RT: Not Hwy or RR 0.0 FT
(56) MIN LAT UNDERCLEAR LT : 0.0 FT

********** NAVIGATION DATA **********

(38) NAVIGATION CONTROL: Permit Not Req'd CODE: 0
(111) PIER PROTECTION: CODE:
(39) NAVIGATION VERTICAL CLEARANCE: FT
(116) VERT-LIFT BRIDGE NAV MIN VERT CLEARANCE: FT
(40) NAVIGATION HORIZONTAL CLEARANCE: FT

****

SUFFICIENCY RATING=
STATUS =

********** CLASSIFICATION **********

(112) NBIS BRIDGE LENGTH: CODE: Y
(21) MAINTAIN: MBTA
(22) OWNER: MBTA
(37) HISTORICAL SIGNIFICANCE: 3

********** CONDITION ********** CODE:

(58) DECK: N
(59) SUPERSTRUCTURE: 5
(60) SUBSTRUCTURE: 5
(61) CHANNEL & CHANNEL PROTECTION: 7
(62) CULVERTS: N

********** LOAD RATING & POSTING ********** CODE:

(41) STRUCTURE OPEN, POSTED OR CLOSED:
DESCRIPTION: Open, No Restrictions A

********** APPRAISAL ********** CODE:

(71) WATERWAY ADEQUACY: 9
(72) APPROACH ROADWAY ALIGNMENT: N
(36) TRAFFIC SAFETY FEATURES: NNNN
(113) SCOUR CRITICAL BRIDGES: 6

********** PROPOSED IMPROVEMENTS **********

(75) TYPE OF WORK: CODE:
(76) LENGTH OF STRUCTURE IMPROVEMENT: FT
(94) BRIDGE IMPROVEMENT COST:
(95) ROADWAY IMPROVEMENT COST:
(96) TOTAL PROJECT COST:
(97) YEAR OF IMPROVEMENT COST ESTIMATE:
(114) FUTURE ADT:
(115) YEAR OF FUTURE ADT:

********** INSPECTIONS **********

(90) INSPECTION DATE: 07/05 (91) FREQUENCY: 24 MO
(92) CRITICAL FEATURE INSPECTION:
A) FRACTURE CRITICAL DETAIL: No MO
B) UNDERWATER INSP.: No MO
C) OTHER CRITICAL INSP.: No MO
(93) CRITICAL FEATURE INSPECTION DATE:
A) FRACTURE CRITICAL DETAIL:
B) UNDERWATER INSP.:
C) OTHER CRITICAL INSP.:

Note: This is a copy of the SI&A sheet as presented in the July 2005 previous Inspection Report.

STRUCTURES INSPECTION FIELD REPORT

ROUTINE INSPECTION

2-DIST	B.I.N.	BR. DEPT. NO.
06	361	B-21-014

CITY/TOWN	8.-STRUCTURE NO.	11-Kilo. POINT	41-STATUS	90-ROUTINE INSP. DATE
BRAINTREE	B21014-361-DOT-NBI	000.000	A:OPEN	OCT 8, 2014

07-FACILITY CARRIED	MEMORIAL NAME/LOCAL NAME	27-YR BUILT	106-YR REBUILT	YR REHAB'D (NON 106)
HWY PLAIN ST	CORP.G.W.REARDON MEM	1929	1975	0000

06-FEATURES INTERSECTED	26-FUNCTIONAL CLASS	DIST. BRIDGE INSPECTION ENGINEER
WATER MONATIQUOT RIVER	Urban Minor Arterial	J. O'Connor

43-STRUCTURE TYPE	22-OWNER	21-MAINTAINER	TEAM LEADER
501 : Prestressed Concrete Slab	State Highway Agency	State Highway Agency	M. Hart

107-DECK TYPE	WEATHER	TEMP. (air)	TEAM MEMBERS
2 : Concrete Precast Panels	Sunny	20°C	J. P. HURTON, M. COMEAU

ITEM 58 — DECK: 5

		DEF
1.Wearing surface	7	M-P
2.Deck Condition	5	M-P
3.Stay in place forms	N	-
4.Curbs	7	M-P
5.Median	N	-
6.Sidewalks	6	M-P
7.Parapets	N	-
8.Railing	7	M-P
9.Anti Missile Fence	N	-
10.Drainage System	N	-
11.Lighting Standards	N	-
12.Utilities	7	M-P
13.Deck Joints	N	-
14.	N	-
15.	N	-
16.	N	-

CURB REVEAL (In millimeters)	N	S
	200	200

APPROACHES

		DEF
a. Appr. pavement condition	6	M-P
b. Appr. Roadway Settlement	7	-
c. Appr. Sidewalk Settlement	5	M-P
d.	N	-

OVERHEAD SIGNS (Attached to bridge) (Y/N): N

		DEF
a. Condition of Welds	N	-
b. Condition of Bolts	N	-
c. Condition of Signs	N	-

ITEM 59 — SUPERSTRUCTURE: 5

		DEF
1.Stringers	N	-
2.Floorbeams	N	-
3.Floor System Bracing	N	-
4.Beams	5	M-P
5.Trusses - General	N	-
a. Upper Chords	N	-
b. Lower Chords	N	-
c. Web Members	N	-
d. Lateral Bracing	N	-
e. Sway Bracings	N	-
f. Portals	N	-
g. End Posts	N	-
6.Pin & Hangers	N	-
7.Conn Plt's, Gussets & Angles	N	-
8.Cover Plates	N	-
9.Bearing Devices	H	-
10.Diaphragms/Cross Frames	N	-
11.Rivets & Bolts	4	S-P
12.Welds	N	-
13.Member Alignment	7	-
14.Paint/Coating	N	-
15.	N	-

Year Painted	N

COLLISION DAMAGE: *Please explain*
None (X) Minor ( ) Moderate ( ) Severe ( )

LOAD DEFLECTION: *Please explain*
None (X) Minor ( ) Moderate ( ) Severe ( )

LOAD VIBRATION: *Please explain*
None ( ) Minor (X) Moderate ( ) Severe ( )

Any Fracture Critical Member: (Y/N) N

Any Cracks: (Y/N) N

ITEM 60 — SUBSTRUCTURE: 5

	Dive	Cur		DEF
1. Abutments			5	
a. Pedestals	N	N		-
b. Bridge Seats	N	7		-
c. Backwalls	N	H		-
d. Breastwalls	4	5		S-P
e. Wingwalls	5	6		M-P
f. Slope Paving/Rip-Rap	7	7		-
g. Pointing	N	N		-
h. Footings	X	H		-
i. Piles	X	N		-
j. Scour	6	H		-
k. Settlement	7	7		-
l. Gunite	6	6		M-P
m.	N	N		-
2. Piers or Bents			N	
a. Pedestals	N	N		-
b. Caps	N	N		-
c. Columns	N	N		-
d. Stems/Webs/Pierwalls	N	N		-
e. Pointing	N	N		-
f. Footing	N	N		-
g. Piles	N	N		-
h. Scour	N	N		-
i. Settlement	N	N		-
j.	N	N		-
k.	N	N		-
3. Pile Bents			N	
a. Pile Caps	N	N		-
b. Piles	N	N		-
c. Diagonal Bracing	N	N		-
d. Horizontal Bracing	N	N		-
e. Fasteners	N	N		-

UNDERMINING (Y/N) If YES please explain: N

COLLISION DAMAGE:
None (X) Minor ( ) Moderate ( ) Severe ( )

SCOUR: *Please explain*
None (X) Minor ( ) Moderate ( ) Severe ( )

I-60 (Dive Report): 5 *I-60 (This Report):* 5

93B-U/W (DIVE) Insp 08/20/2012

X=UNKNOWN N=NOT APPLICABLE H=HIDDEN/INACCESSIBLE R=REMOVED

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	361	B-21-014	B21014-361-DOT-NBI	OCT 8, 2014

ITEM 61 — CHANNEL & CHANNEL PROTECTION

7

	Dive	Cur	DEF
1.Channel Scour	6	H	-
2.Embankment Erosion	7	7	-
3.Debris	7	7	-
4.Vegetation	7	7	-
5.Utilities	N	N	-
6.Rip-Rap/Slope Protection	7	7	-
7.Aggradation	7	H	-
8.Fender System	N	N	-

STREAM FLOW VELOCITY:

Tidal ( ) High ( ) Moderate ( ) Low (X) None ( )

ITEM 61 (Dive Report): 7 *ITEM 61 (This Report):* 7

93b-U/W INSP. DATE: 08/20/2012

ITEM 36 — *TRAFFIC SAFETY*

	36	COND	DEF
A. Bridge Railing	0	7	M-P
B. Transitions	0	7	M-P
C. Approach Guardrail	1	4	S-A
D. Approach Guardrail Ends	0	5	M-P

WEIGHT POSTING — *Not Applicable* X

	H	3	3S2	Single
Actual Posting	N	N	N	N
Recommended Posting	N	N	N	N

Waived Date: 00/00/00 EJDMT Date: 00/00/00

Signs In Place (Y=Yes,N=No, NR=NotRequired) Legibility/ Visibility	At bridge E	At bridge W	Other Advance E	Other Advance W

CLEARANCE POSTING — *Not Applicable* ☐

	N ft	N in	S ft	S in	meter
Actual Field Measurement		0		0	
Posted Clearance		0		0	

Signs In Place (Y=Yes,N=No, NR=Not Required) Legibility/ Visibility	At bridge N	At bridge S	Advance N	Advance S
	N	N	N	N

ACCESSIBILITY (Y/N/P)

	Needed	Used
Lift Bucket	N	N
Ladder	N	N
Boat	Y	Y
Waders	N	N
Inspector 50	N	N
Rigging	N	N
Staging	N	N
Traffic Control	N	N
RR Flagger	N	N
Police	N	N
Other:		
	N	N

TOTAL HOURS 12

PLANS (Y/N): Y

(V.C.R.) (Y/N): N

TAPE#: _____

List of field tests performed:

RATING

Rating Report (Y/N): Y

Date: 01/01/2006

Inspection data at time of existing rating

I 58: 5 I 59: 5 I 60: 5 Date :10/06/2004

(To be filled out by DBIE)

Request for Rating or Rerating (Y/N): N

If YES please give priority: HIGH ( ) MEDIUM ( ) LOW ( )

REASON: _____

CONDITION RATING GUIDE (For Items 58, 59, 60 and 61)

	CODE	CONDITION	DEFECTS
	N	NOT APPLICABLE	
G	9	EXCELLENT	Excellent condition.
G	8	VERY GOOD	No problem noted.
G	7	GOOD	Some minor problems.
F	6	SATISFACTORY	Structural elements show some minor deterioration.
F	5	FAIR	All primary structural elements are sound but may have minor section loss, cracking, spalling or scour.
P	4	POOR	Advance section loss, deterioration, spalling or scour.
P	3	SERIOUS	Loss of section, deterioration, spalling or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.
C	2	CRITICAL	Advance deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.
C	1	"IMMINENT" FAILURE	Major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic but corrective action may put it back in light service.
	0	FAILED	Out of service - beyond corrective action.

DEFICIENCY REPORTING GUIDE

DEFICIENCY: A defect in a structure that requires corrective action.

CATEGORIES OF DEFICIENCIES:

M= Minor Deficiency - Deficiencies which are minor in nature, generally do not impact the structural integrity of the bridge and could easily be repaired. Examples include but are not limited to: Spalled concrete, Minor pot holes, Minor corrosion of steel, Minor scouring, Clogged drainage, etc.

S= Severe/Major Deficiency - Deficiencies which are more extensive in nature and need more planning and effort to repair. Examples include but are not limited to: Moderate to major deterioration in concrete, Exposed and corroded rebars, Considerable settlement, Considerable scouring or undermining, Moderate to extensive corrosion to structural steel with measurable loss of section, etc.

C-S= Critical Structural Deficiency - A deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge.

C-H= Critical Hazard Deficiency - A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples include but are not limited to: Loose concrete hanging down over traffic or pedestrians, A hole in a sidewalk that may cause injuries to pedestrians, Missing section of bridge railing, etc.

URGENCY OF REPAIR:

I = Immediate- [Inspector(s) immediately contact District Bridge Inspection Engineer (DBIE) to report the Deficiency and to receive further instruction from him/her].

A = ASAP- [Action/Repair should be initiated by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) upon receipt of the Inspection Report].

P = Prioritize- [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available].

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	361	B-21-014	B21014-361-DOT-NBI	OCT 8, 2014

REMARKS

BRIDGE ORIENTATION
The approaches are west and east and elevations are south and north. There are twelve beams numbered from south to north. This is a one span structure.

ITEM 58 - DECK

Item 58.1 - Wearing surface
Bituminous concrete wearing surface. East end along the east abutment, light transverse cracking, see photo 1. West end along the west abutment, 4' L light transverse crack. Eastbound roadway, sporatic light map cracking. Westbound roadway, light transverse cracking and minor heaving along the north curb. There is also map cracking by the north curb adjacent to the patch in the west approach. See photo 2.

Item 58.2 - Deck Condition
See Item 59.4.

Item 58.4 - Curbs
Minor plow damage at the top edges of both granite curbs. There are two through cracks in the south curb in the first block from the west.

Item 58.6 - Sidewalks
The north sidewalk has minor to moderate spalling along the longitudinal joint and minor scaling in the south half of the sidewalk. The south sidewalk has very minor spalling along the longitudinal joint and minor scaling in the north half of the sidealk.

Item 58.8 - Railing
AL-3 with chain link mesh panels, non standard.

Item 58.12 - Utilities
Outside the south side of bridge, the utilities have light rusting throughout.

APPROACHES

Approaches a - Appr. pavement condition
Both east and west approaches have minor transverse cracking above the backwalls. Also, numerous cracks have been sealed with liquid asphalt throughout both approaches.
West approach has a minor transverse crack. There is a full width crack 7' off west abutment. The westbound roadway has map cracking at the center of roadway. At the north end of the north abutment by fog-line, there is a bituminous patch, 3' x 3' with two minor potholes at the north edge with cracking and a 2' W x 8" L x 4" D pothole adjacent to the west joint. See photo 2.
East approach eastbound roadway, full length longitudinal cracking and random light transverse and longitudinal cracking as well as map cracking in the center of the travel lane, see photo 1.

Approaches c - Appr. Sidewalk Settlement
A bituminous leveling course/patch is at all four approach sidewalks. The southwest and northwest both have 1" of settlement along the granite curb.

In the **northeast sidewalk** there is a transverse crack 20' from the bridge. The 4th curb from the bridge has some minor spalling along the inside edge. The 3rd and 4th curbs from the bridge are slightly leaning into the road. The 14th and 15th curbs from the bridge are leaning into the road up to 3". The 12th and 13th curbs from the bridge have through cracks.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	361	B-21-014	B21014-361-DOT-NBI	OCT 8, 2014

REMARKS

ITEM 59 - SUPERSTRUCTURE

Item 59.4 - Beams

The deck beams are numbered south to north, B1 to B12.
Water is leaching through between beams with efflorescence in random location throughout.
The following problems were noted during the inspection:
B1- Near midspan an area of delamination adjacent to B2.
B2- Near midspan an area of delamination adjacent to B1. Two minor delaminated areas and some longitudinal cracking near midspan adjacent to B3 with rust staining.
B3- Several minor delamination areas with a longitudinal crack adjacent to B2. There is an 18" diameter area of delamination at midspan.
B4- Easterly end, delamination, 9' L x 1-1/2' W. Westerly end, delamination, 3' L x 8" W.
B5 and B6- Delamination, cracking with rust staining full length. The easterly end being the worst, where there is also a 10" W x 20" L spall with exposed rusted rebar. See photo 3.
B7 and B8- Numerous delaminated areas with rust staining throughout with minor spalling with rebar exposed from the west end to midspan. See photo 4.
B9- Westerly end adjacent to B10, an area of delamination, 4' L x 1-1/2' W. There is also minor delamination adjacent to beam 8.
B10 and B11- Heavy delamination with cracking and rust staining with random minor spalls with rebar exposed throughout beams. See photo 5.
B12- Delamination adjacent to B11 at the east end, 4' L x 1-1/2' W.
Between beams1 and 2, 5 and 6, 7 and 8, 9 and 10 and 10 and 11, oakum hanging down. See photo 6.

Item 59.11 - Rivets & Bolts

The nuts at the post tensioning rods exhibit heavy rust.

SuperStructure Load Vibration Notes

There is minor vibration felt under heavy truck loads.

ITEM 60 - SUBSTRUCTURE

Item 60.1 - Abutments

Item 60.1.d - Breastwalls

Both breastwalls between exposed granite blocks at bottom and gunite above blocks, there is light to moderate horizontal crack in mortar below beams 3 through 10 at the west breastwall and between beams 3 and 9 at the east breastwall. See typical photo 7. Also, between beam 2 and the south corner of both breastwalls, there is a light horizontal crack.
West breastwall north end, heavy spalling/abrasion, 10' W x 38" H x up to 5" D, see photo 8. The south end has a corner spall with gunite repair separating, 2' 8" W x 2' H x up to 3" D, see photo 11. Breastwall cap below beams 1, 4, 5, 7 and 11 have light full height vertical cracks.
East breastwall between beams 1 and 2 adjacent to the bottom of cap, moderate spall with rebar exposed and heavy delamination, 1' H x 2-1/2' W x up to 1-1/2" D. See photo 9. North end, spalling/ abrasion, 29" W x 10 " H x up to 4" D, below the concrete cap, see photo 10. Breastwall cap below beams 3, 6 and 10 have hair to light full height vertical cracks.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	361	B-21-014	B21014-361-DOT-NBI	OCT 8, 2014

REMARKS

Item 60.1.e - Wingwalls

The **southwest wing** has a corner spall with delamination adjacent to the west breastwall, 2' 8" W x 2" H x up to 3" D with a surface spall west of corner spall. To the west of this spall there is another minor spall, 8" H x 14" W. See photo 11. There is a 2' L moderate vertical crack with delamination at the southeast wing adjacent to backwall.

The **southeast wing** has a minor spall with exposed aggregate, delamination and cracking adjacent to the east breastwall. See photo 12.

The **northwest wing** has a minor spall with exposed aggregate adjacent to the west breastwall with a light diagonal crack which runs west 6' to a surface spall. See photo 13.

Northeast wing has a surface spall with delamination, 19" W x 18" H x up to 2-1/4" D, with a light horizontal crack which runs around corner along the east breastwall. See photo 14.

All four wings have cracking in the gunite finish.

Item 60.1.l - Gunite

There is cracking and spalling in the gunite repairs at breastwalls and wings. The Gunite is deteriorating from just above midheight down throughout both breastwalls. See photos 7-9.

TRAFFIC SAFETY

Item 36a - Bridge Railing

AL-3 with chain link mesh panels, non standard.

Item 36b - Transitions

Type "ss" guardrail ties into endpost at all four corners. There is improper spacing of posts and there are no rub rails below type "ss" guardrail at the transitions, non standard.

Item 36c - Approach Guardrail

The northeast guardrail has two areas of minor to moderate collision damage, see photo 15. Type "ss" approach guardrail, standard. The southeast corner is missing a five foot section of guardrail, see photo 16.

Item 36d - Approach Guardrail Ends

Southwest, northwest and northeast all have boxing glove ends, non standard. The southeast continues around the corner of the side street (Garden Park) and has no terminal. See photo 17. Minor to moderate collision damage at the northeast.

Photo Log

Photo 1 : Transverse cracking in the wearing surface by the east abutment and map cracking in the east approach, eastbound roadway.

Photo 2 : West approach north end of west abutment by fog line, 3' x 3' bituminous patch with 2' x 8" x 4" pothole and cracking.

Photo 3 : Between beam 5 and beam 6, east end, heavy delamination with cracking and rust staining and 10" x 20" spall with exposed rebar.

Photo 4 : Beams 7 and 8, westerly end to midspan, numerous delaminated areas with spalling and rust staining.

Photo 5 : Between beams 10 and 11, looking west, both beams have minor spalls with rebar exposed, delamination and rust staining.

Photo 6 : Looking north, typical underside with oakum hanging down between beams 1&2, 5&6, 7&8, 9&10 and 10&11.

Photo 7 : West breastwall between beams 3 and 10, horizontal crack between granite blocks and concrete breastwall and deteriorating gunite.

Photo 8 : West breastwall north end, heavy spalling/ abrasion, 10' L x 38" H x up to 5" D.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	361	B-21-014	B21014-361-DOT-NBI	OCT 8, 2014

REMARKS

Photo Log (Cont'd)

Photo 9 : East breastwall between beams 1 and 2 adjacent to cap, moderate spall with rebar exposed and delamination as well as deteriorating gunite in breastwall.
Photo 10 : East breastwall, north end has spalling/ abrasion, 29" W x 10" H x up to 4" D below the concrete cap, with cracking at northeast corner of breastwall.
Photo 11 : Southwest wing, moderate corner spall, 2' 8" W x 2' H x up to 3" D with delamination and a surface spall west of corner spall.
Photo 12 : Southeast wing, minor spall with delamination and cracking.
Photo 13 : Northwest wing, two minor spalls with delamination and cracking.
Photo 14 : Northeast Wing, minor spall with delamination and cracking.
Spall measures 19" W x 18" H x up to 2-1/4" D.
Photo 15 : Two areas of collision damage in the northeast approach railing.
Photo 16 : Southeast corner, five foot section of guardrail missing.
Leveling patch at southeast approach sidewalk.
Photo 17 : Southeast approach rail missing boxing glove end.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	361	B-21-014	B21014-361-DOT-NBI	OCT 8, 2014

PHOTOS

Photo 1: Transverse cracking in the wearing surface by the east abutment and map cracking in the east approach, eastbound roadway.

Photo 2: West approach north end of west abutment by fog line, 3' x 3' bituminous patch with 2' x 8" x 4" pothole and cracking.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	361	B-21-014	B21014-361-DOT-NBI	OCT 8, 2014

PHOTOS

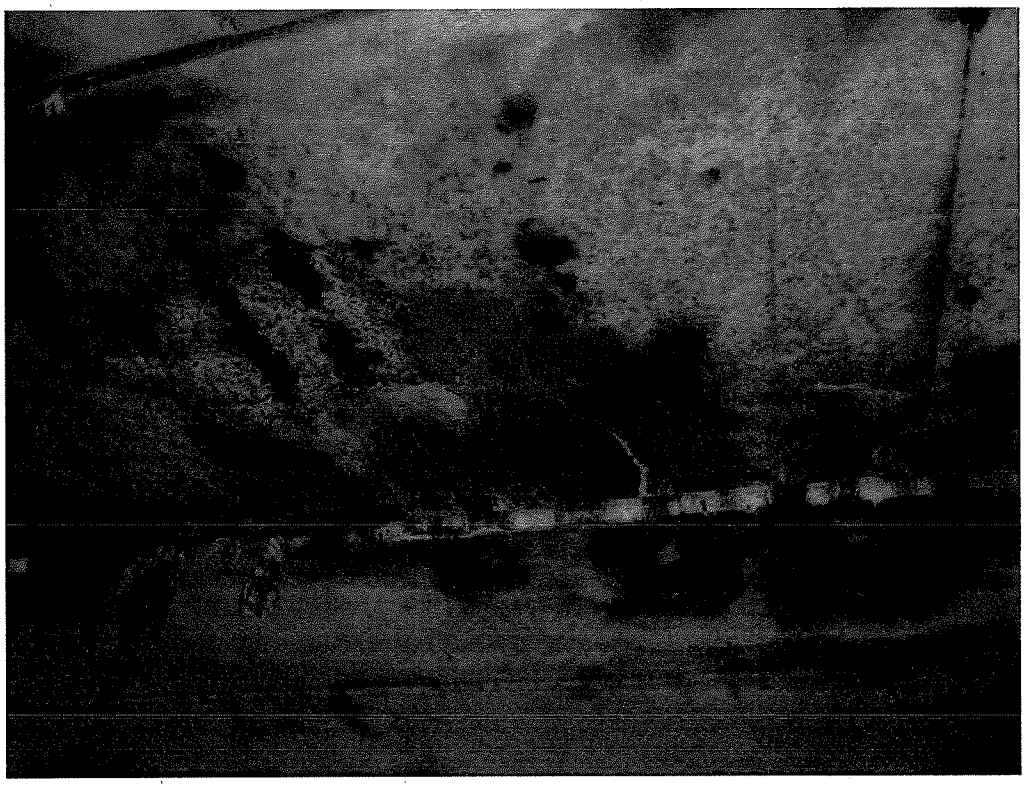


Photo 3: Between beam 5 and beam 6, east end, heavy delamination with cracking and rust staining and 10" x 20" spall with exposed rebar.

Photo 4: Beams 7 and 8, westerly end to midspan, numerous delaminated areas with spalling and rust staining.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	361	B-21-014	B21014-361-DOT-NBI	OCT 8, 2014

PHOTOS

Photo 5: Between beams 10 and 11, looking west, both beams have minor spalls with rebar exposed, delamination and rust staining.

Photo 6: Looking north, typical underside with oakum hanging down between beams 1&2, 5&6, 7&8, 9&10 and 10&11.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	361	B-21-014	B21014-361-DOT-NBI	OCT 8, 2014

PHOTOS

Photo 7: West breastwall between beams 3 and 10, horizontal crack between granite blocks and concrete breastwall and deteriorating gunite.

Photo 8: West breastwall north end, heavy spalling/ abrasion, 10' L x 38" H x up to 5" D.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	361	B-21-014	B21014-361-DOT-NBI	OCT 8, 2014

PHOTOS

Photo 9: East breastwall between beams 1 and 2 adjacent to cap, moderate spall with rebar exposed and delamination as well as deteriorating gunite in breastwall.

Photo 10: East breastwall, north end has spalling/ abrasion, 29" W x 10" H x up to 4" D below the concrete cap, with cracking at northeast corner of breastwall.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	361	B-21-014	B21014-361-DOT-NBI	OCT 8, 2014

PHOTOS

Photo 11: Southwest wing, moderate corner spall, 2' 8" W x 2' H x up to 3" D with delamination and a surface spall west of corner spall.

Photo 12: Southeast wing, minor spall with delamination and cracking.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	361	B-21-014	B21014-361-DOT-NBI	OCT 8, 2014

PHOTOS

Photo 13: Northwest wing, two minor spalls with delamination and cracking.

Photo 14: Northeast Wing, minor spall with delamination and cracking. Spall measures 19" W x 18" H x up to 2-1/4" D.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	361	B-21-014	B21014-361-DOT-NBI	OCT 8, 2014

PHOTOS

Photo 15: Two areas of collision damage in the northeast approach railing.

Photo 16: Southeast corner, five foot section of guardrail missing. Leveling patch at southeast approach sidewalk.

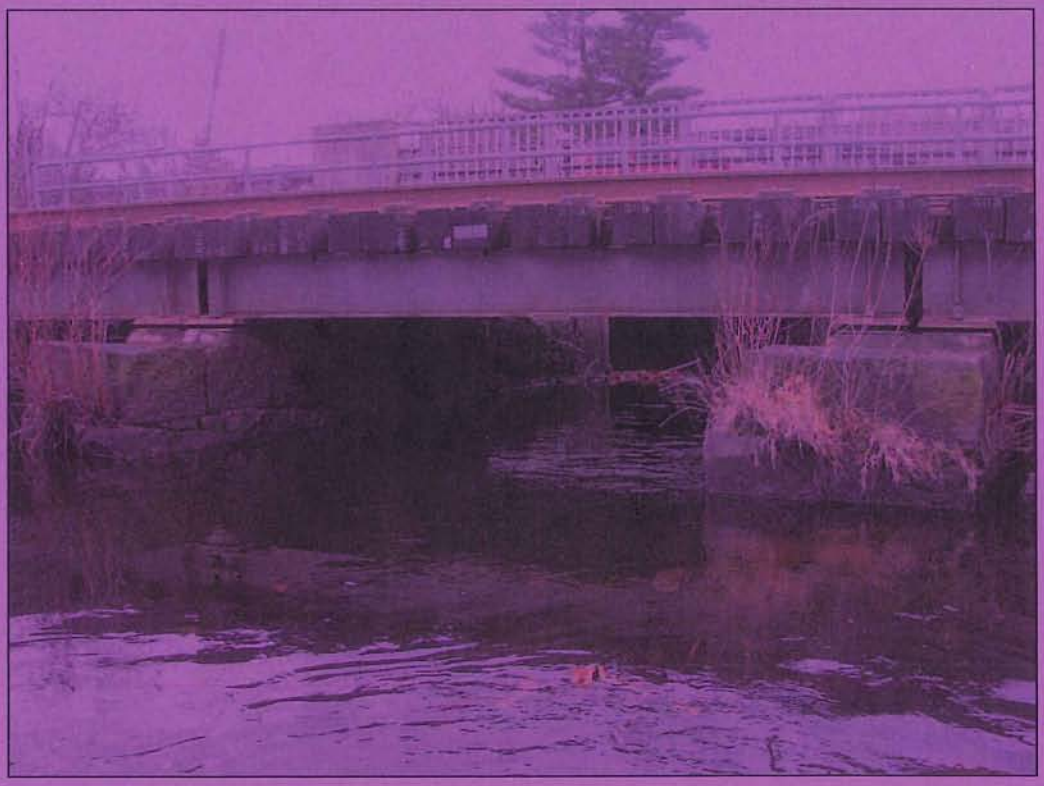
CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	361	B-21-014	B21014-361-DOT-NBI	OCT 8, 2014

PHOTOS

Photo 17: Southeast approach rail missing boxing glove end.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

BRIDGE INSPECTION



OLD COLONY LINE
MIDDLEBORO BRANCH OVER MONATIQUOT RIVER
BRAINTREE
BRIDGE NO. B-21-042
BIN NO. B48
MILE POINT 11.981
STRUCTURE NO. B21042-B48-MBT-RRO

PREPARED BY:
GREEN INTERNATIONAL AFFILIATES, INC
239 LITTLETON ROAD, SUITE 3, WESTFORD, MA 01886

IN AFFILIATION WITH:
THE LOUIS BERGER GROUP, INC
75 SECOND AVENUE, SUITE 700, NEEDHAM, MA 02494

COMMONWEALTH OF MASSACHUSETTS
MICHAEL A. CRUZ
STRUCTURAL
No. 41500
REGISTERED
PROFESSIONAL ENGINEER

DECEMBER 2010

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

BRIDGE INSPECTION

OLD COLONY LINE
MIDDLEBORO BRANCH OVER MONATIQUOT RIVER
BRAINTREE
BRIDGE NO. B-21-042
BIN NO. B48
MILE POINT 11.981
STRUCTURE NO. B21042-B48-MBT-RRO

PREPARED BY:
GREEN INTERNATIONAL AFFILIATES, INC
239 LITTLETON ROAD, SUITE 3, WESTFORD, MA 01886

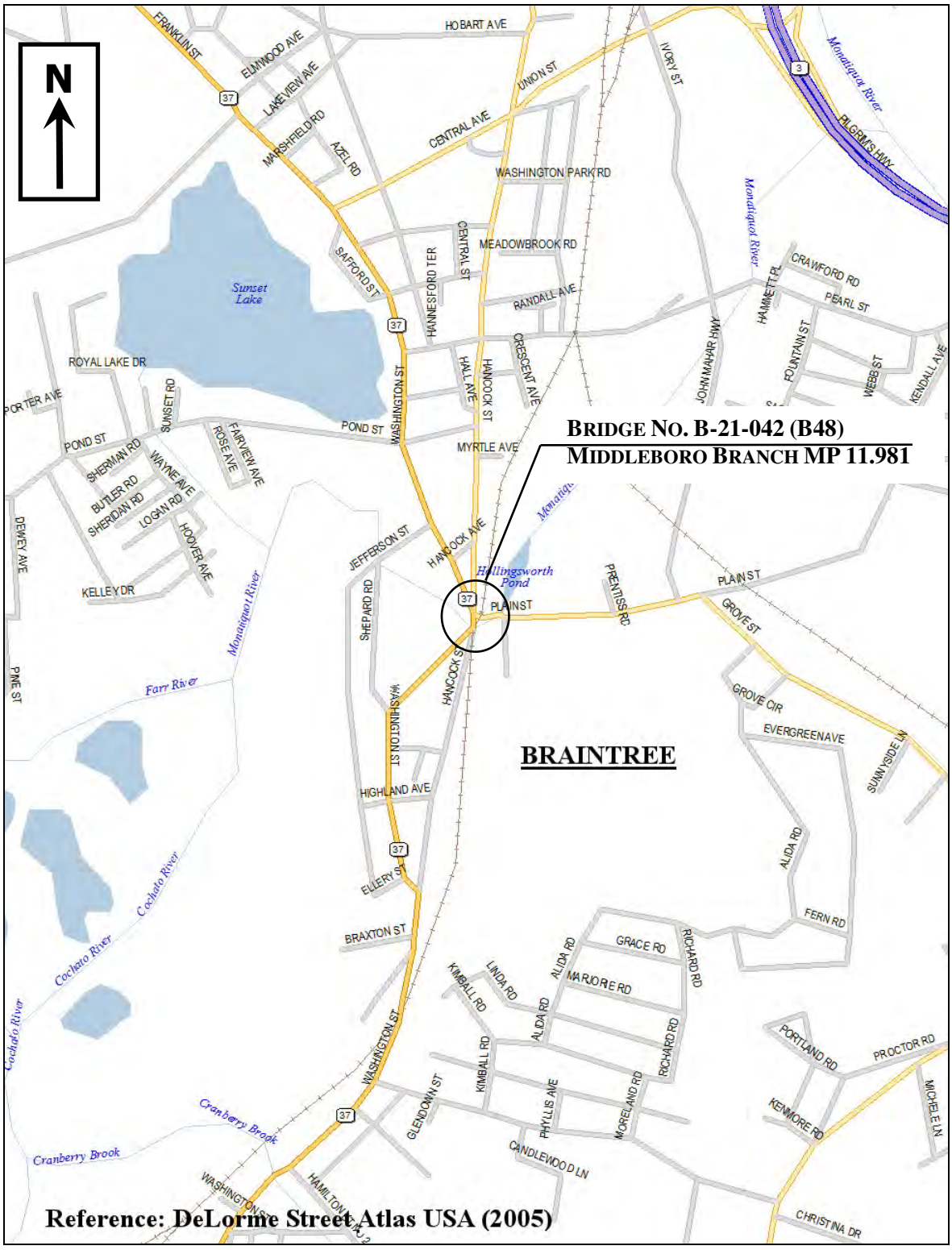
IN AFFILIATION WITH:
THE LOUIS BERGER GROUP, INC
75 SECOND AVENUE, SUITE 700, NEEDHAM, MA 02494

DECEMBER 2010

COMMONWEALTH OF MASSACHUSETTS
MICHAEL A. CRUZ
STRUCTURAL
No. 41500
REGISTERED
PROFESSIONAL ENGINEER

TABLE OF CONTENTS

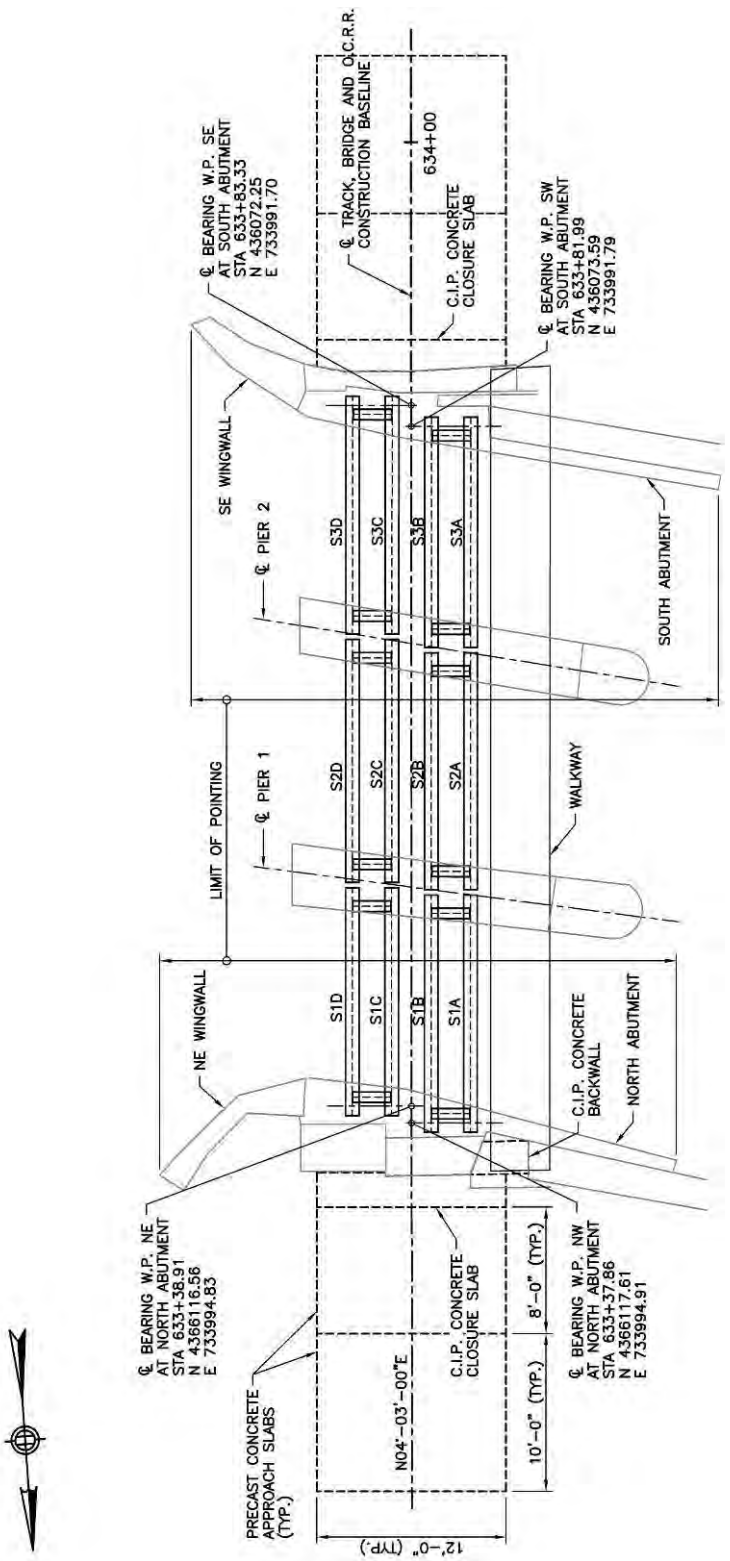
LOCATION MAP



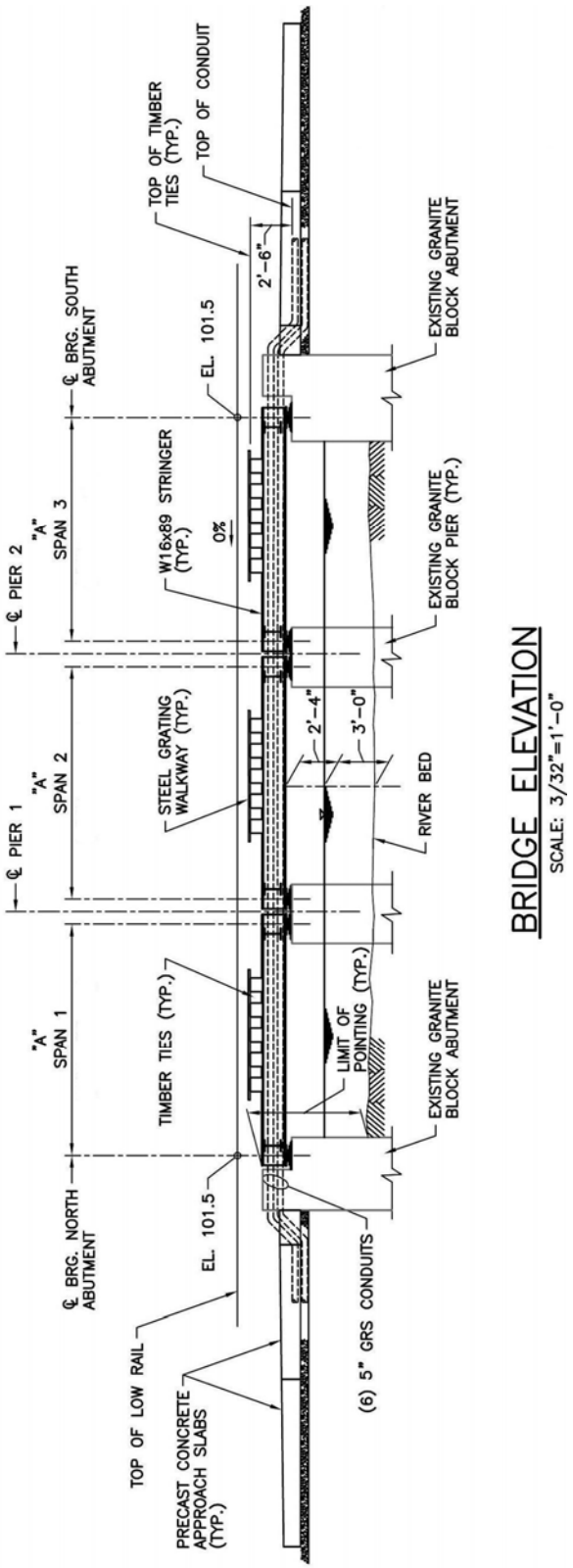
DESCRIPTION OF BRIDGE

Date of Construction:	1895 (Assumed); 1994 (Approx. Date of Reconstruction)
Original Design Loading:	Unknown
Bridge Type:	Steel Stringer/Multi-Beam
Skew:	10° (Approximate)
Spans:	Three (3) Simple Spans with Variable Span Lengths; 13'-3" Minimum and 14'-3" Maximum Span Length
Width of Bridge Deck:	14'-6" Out-to-Out of Timber Tie
Track Surface:	One (1) Track with Welded Steel Rails and Guard Rails on Timber Ties (Open Deck)
Curbs:	None
Sidewalk/Walkway/Median:	4'-0" Steel Grating Walkway on West Side
Bridge Railing:	2 1/2" Steel Pipe Handrail on West Side
Protective Screen:	None
Approach Railing:	None
Superstructure:	Four (4) W16x89 Rolled Steel Beams with W14 Diaphragms Directly Supporting Timber Ties
Modifications to Original Superstructure:	Completely Replaced (1994 Approximately)
Utilities:	Six (6) 5" Dia. General Railway Signal Conduits on West Side of Bridge
Substructure:	Two (2) Granite Block Abutments and Two (2) Granite Block Piers
Modifications to Original Substructure:	New Concrete Backwalls and Closure Slabs were Added to Each Abutment. New Concrete Noses were Added to the Upstream Faces of Both Piers. Abutments and Piers have been Re-pointed (1994 Approximately)

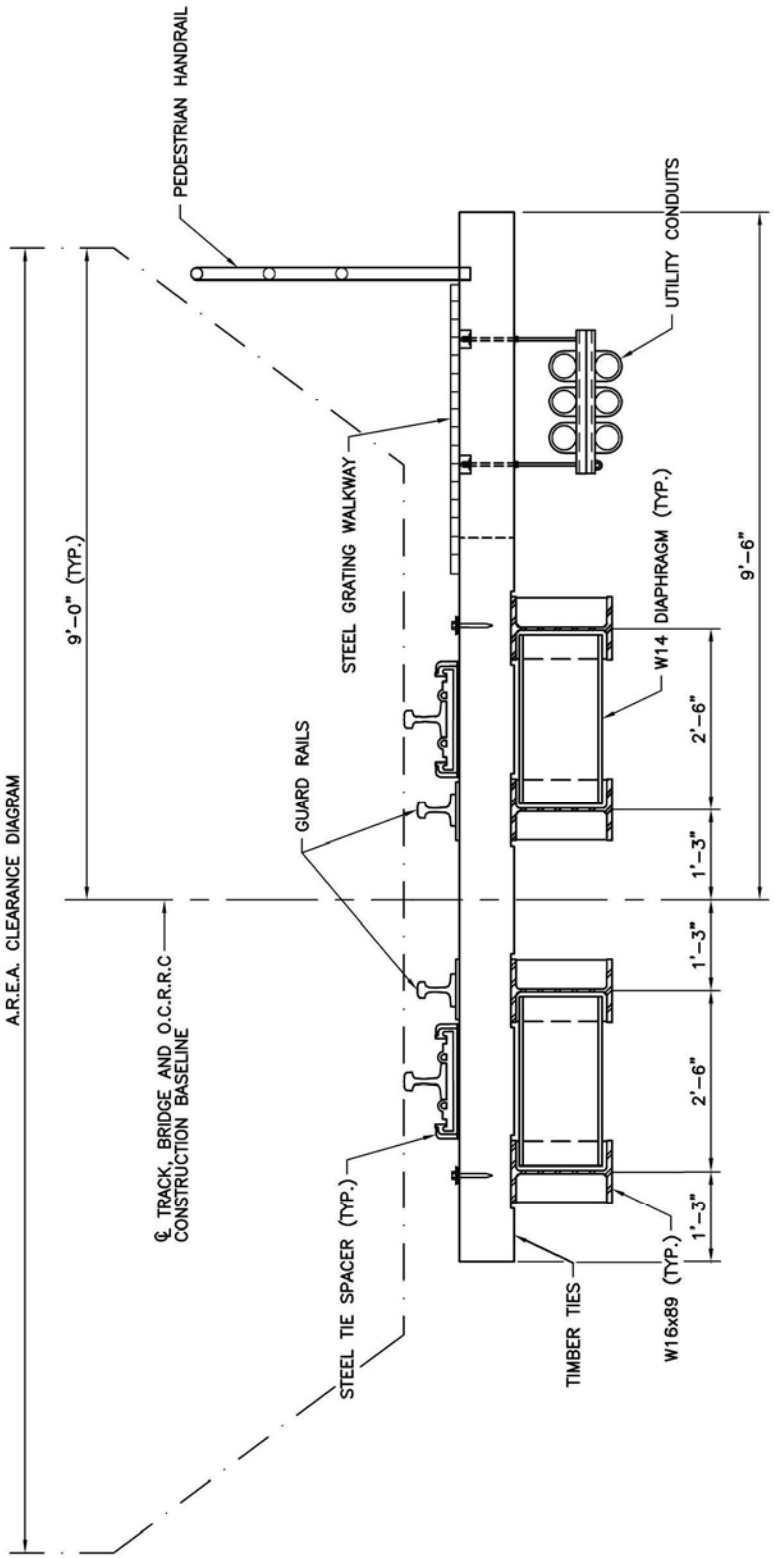
TYPICAL BRIDGE FRAMING PLAN



TYPICAL BRIDGE ELEVATION



TYPICAL BRIDGE CROSS SECTION



INSPECTION FINDINGS AND RECOMMENDATIONS

MILE POST: 11.981

INSPECTION FINDINGS

Bridge No. B-21-042 consists of three simple spans of varying lengths with an overall structure length of 50'-7 1/4". Spans are numbered S1 through S3 from north to south. The bridge, reconstructed in 1994, carries a single MBTA Old Colony Line Middleboro Branch Commuter Rail track over the Monatiquot River in Braintree, Massachusetts. The superstructure consists of four W16x89 rolled steel beams spaced at 2'-6" on center, with W14 diaphragms, directly supporting timber ties. Beams are numbered A through D from west to east. The substructure consists of two granite block abutments and two granite block piers. New concrete backwalls and closure slabs have been added to each abutment. The upstream faces of both piers have been covered with concrete noses.

ITEM 58 – DECK

The bridge deck items were found to be in good condition. Timber ties exhibit minor checking.

ITEM 59 – SUPERSTRUCTURE

The bridge superstructure items were found to be in generally good condition. There is a gap between the masonry plate and the grout plate on the north bearing of Beam D in Span 2 that closes completely during the passing of trains. The north bearing of Beam D in Span 2 is missing both nuts on the west anchor bolt.

ITEM 60 – SUBSTRUCTURE

The bridge substructure was found to be in satisfactory condition. There are numerous locations of loose, cracked, and missing mortar in the abutment stems, wingwalls and piers. There is minor vegetation growth on all bridge seats. There is minor accumulation of debris on the south abutment bridge seat. The are large scour holes at the west end of both piers and the piers also exhibit minor local scour holes along their faces. There is a large void in the south face of Pier 2.

ITEM 61 – CHANNEL

The channel was found to be in satisfactory condition. There is a construction silt fence that has been left in the channel in Span 1. There is moderate accumulation of debris in the channel at the upstream end of Span 2.

INSPECTION FINDINGS AND RECOMMENDATIONS (CONT'D)

RECOMMENDATION

Green International Affiliates, Inc. recommends the following:

Continue general maintenance and inspection of the bridge at regular intervals.

ITEM 58 – DECK

- Replace deteriorated ties. It is our understanding that the timber ties are scheduled to be replaced under the ARRA fund.

ITEM 59 – SUPERSTRUCTURE

- Fill the gap between the masonry plate and the grout plate on the north bearing of Beam D in Span 2.
- Replace missing nuts on anchor bolts.

ITEM 60 – SUBSTRUCTURE

- Fill and patch the large void located in the south face of Pier 2 at the west end with mortar.
- Re-point the abutments, piers and wingwalls.
- Remove debris from the bridge seats

ITEM 61 – CHANNEL

- Enact scour counter measures to avoid further scouring at piers and abutments.
- Remove debris from the channel.

AVAILABLE PLANS

The following plans were made available to Green International Affiliates, Inc. for use during the routine inspection of this structure.

Massachusetts Bay Transportation Authority
Old Colony Railroad Rehabilitation Project
Contract No.: C4CN10
Plan Nos.: S-1 through S-3 of 71
Dated: August 1994

Sketches used in this report were obtained from the previous routine inspection report by Green International Affiliates, Inc dated August 2005.

APPENDIX A – ROUTINE BRIDGE INSPECTION FORM

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

STRUCTURES INSPECTION FIELD REPORT

RAILROAD/TRANSIT BRIDGE INSPECTION

2-DIST	B.I.N.	BRIDGE NO.
06	B48	B-21-042

4-CITY/TOWN	8-STRUCTURE No./MDPW BRIDGE No.	MILE POST/T ID No.	41-STATUS	INSPECTION DATE
Braintree	B21042-B48-MBT-RRO	11.981	Open	12/13/2010

7-FACILITY CARRIED/LINE	MEMORIAL NAME/LOCAL NAME	27-YR BUILT	106-YR REBUILT	VERT. UNDERCLEARANCE
Old Colony Line Middleboro Branch		1895	1994	

06-FEATURES INTERSECTED/BRIDGE OVER	26-FUNCTIONAL CLASS.	QUALITY CONTROL ENGINEER
Monatiquot River	Commuter Rail	S. Vimadalal, P.E.

43-STRUCTURE TYPE	22-OWNER	21-MAINTAINER	TEAM LEADER	NO. TRACKS
Steel Stringer/Multi-Beam	MBTA	MBTA	M. Cruz, P.E.	01

107-DECK TYPE	WEATHER	TEMP. (air)	TEAM MEMBERS	NO. SPANS
Open Deck	Rain	40 °F	A. Richardson	03

ITEM 58 — DECK: 7

		DEF
1. Structural Condition	N	
2. Ballast	N	
3. Ties	7	
4. Deck Joints	N	
5. Walkways	7	
6. Drainage	N	
7. Fire Protection	N	
8. Handrails	7	
9. Utilities	7	
10. Approach Settlement	8	
11.		

APPROACHES

		DEF
a. Appr. pavement condition	N	
b. Appr. Roadway Settlement	N	
c. Appr. Sidewalk Settlement	N	
d.		

OVERHEAD SIGNS (Attached to bridge) (Y/N) N

		DEF
a. Condition of Welds	N	
b. Condition of Bolts	N	
c. Condition of Signs	N	

ITEM 59 — SUPERSTRUCTURE: 7

		DEF
1. Girders, Beams or Trusses		
a. Top Flange or Chord	7	
b. Bottom Flange or Chord	7	
c. Web or Diagonals	7	
d. Truss Joints	N	
e. Bearing Stiffeners	7	
f. Cross Frames, Diaphragms	7	
g. Knee Braces	N	
h. Pins	N	
i. Rivets or Bolts	N	
j. Welds	8	
k. Conn Plt's, Gussets & Angles	7	
l. Top Lateral Bracing	N	
m. Bottom Lateral Bracing	N	
n. Sway Frames	N	
o. Portals	N	
p. Hangers	N	
q. Bearings	6	M/P
r.		
2. Floor Beams		
a. Top Flanges	N	
b. Bottom Flanges	N	
c. Webs	N	
d. Stiffeners	N	
e. Rivets or Bolts	N	
f. Welds	N	
g. Connections	N	
h.		
3. Stringers		
a. Top Flanges	N	
b. Bottom Flanges	N	
c. Webs	N	
d. Stiffeners	N	
e. Rivets or Bolts	N	
f. Welds	N	
g. Connections	N	
h. Diaphragms	N	
i.		
4. Superstructure (General)		
a. Paint	7	
b. Action Under Trains	7	
c. Collision Damage	8	
d. Member Alignment	8	
e.		

ITEM 60 — SUBSTRUCTURE: 6

		DEF
1. Abutments	6	
a. Stems	6	M/P
b. Wingwalls	6	M/P
c. Backwalls	7	
d. Pedestals	7	
e. Bridge Seat	6	M/P
f. Pointing	5	M/P
g. Footing	N	
h. Erosion	6	
i. Settlement	7	
j.		
2. Piers or Bents	6	
a. Piles	N	
b. Footings	N	
c. Stem or Columns	6	M/P
d. Cap Beams	N	
e. Top of Stem or Cap	7	
f. Pedestals	6	
g. Diagonal Bracing	N	
h. Fender System	N	
i. Erosion or Scour	5	M/P
j. Settlement	N	
k. Pointing	5	M/P
l.		

UNDERMINING (Y/N) *If YES please explain* N

COLLISION DAMAGE: None ☒ Minor ○ Moderate ○ Severe ○

I-60 (Dive Report): N *I-60 (This Report):* 6

93b-U/W (DIVE) INSP DATE: N

Any Fracture Critical Member : (Y/N) N

Any Cracks in Tension Plates : (Y/N) N

Year Painted : Unknown

COLLISION DAMAGE: None ☒ Minor ○ Moderate ○ Severe ○

LOAD DEFLECTION: None ○ Minor ☒ Moderate ○ Severe ○

LOAD VIBRATION: None ○ Minor ☒ Moderate ○ Severe ○

X = UNKNOWN N = NOT APPLICABLE H = HIDDEN / INACCESSIBLE R = REMOVED

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8-STRUCTURE NO.	INSPECTION DATE
Braintree	**B48**	**B-21-042**	**B21042-B48-MBT-RRO**	**12/13/2010**

ITEM 61

CHANNEL & CHANNEL PROTECTION

7

		DEF
1. Channel Scour	6	
2. Embankment Erosion	7	
3. Drift	7	
4. Channel Alignment	7	
5. Vegetation	7	
6. Rip-Rap	7	
7. Silt	7	
8. Debris in Channel	5	M/P
9.		

STREAM FLOW VELOCITY:
Tidal ○ High ⊗ Medium ○ Low ○

I-61 (Dive Report): **N** *I-61 (This Report):* **7**

93b-U/W INSP DATE **N**

ITEM 62 *CULVERT & RETAINING WALLS*

		DEF			DEF
1. Barrel	N		5. Settlement	N	
2. Headwall	N		6. Footings	N	
3. Wingwalls	N		7. Adequacy of Cover	N	
4. Cutoff Wall	N		8.		

CLEARANCE POSTING: N/E S/W

Not Applicable [X]

	N/E ft	N/E in	S/W ft	S/W in	meter
Actual Field Measurement					
Posted Clearance					

	At bridge N/E	*At bridge* S/W	*Other Advance* N/E	*Other Advance* S/W
Signs in Place (Y=Yes N=No)				
Legibility/ Visibility				

ACCESSIBILITY: (Y/N/P)

	Needed	Used
Lift Bucket	N	N
Ladder	N	N
Boat	N	N
Wader	Y	Y
Inspector 50	N	N
Rigging	N	N
Staging	N	N
Traffic Control	N	N
RR Flagger	Y	Y
Police	N	N
Other	N	N

TOTAL HOURS: **10**

PLANS: (Y/N) **Y**

(V.C.R.): (Y/N) **N**

TAPE #: ____

List of Field Tests Performed:

GENERAL

		DEF
1. Clearance Signs	N	
2. Rail on Bridge	8	
3. Track Guard Rail	7	
4. Rail Fasteners	7	
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		

CONDITION RATING GUIDE (for Items 58, 59, 60)

	CODE	CONDITION	DEFECTS
	N	NOT APPLICABLE	
G	9	EXCELLENT	Excellent condition.
G	8	VERY GOOD	No problem noted.
G	7	GOOD	Some minor problems.
F	6	SATISFACTORY	Structural elements show some minor deterioration.
F	5	FAIR	All primary structural elements are sound but may have minor section loss, cracking, spalling or scour.
P	4	POOR	Advanced section loss, deterioration, spalling or scour.
P	3	SERIOUS	Loss of section, deterioration, spalling or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.
C	2	CRITICAL	Advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.
C	1	"IMMINENT" FAILURE	Major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic but corrective action may put it back in light service.
	0	FAILED	Out of service - beyond corrective action.

DEFICIENCY REPORTING GUIDE

DEFICIENCY: A defect in a structure that requires corrective action.

CATEGORIES OF DEFICIENCIES:

M= Minor Deficiency - Deficiencies which are minor in nature, generally do not impact the structural integrity of the bridge and could easily be repaired. Examples include but are not limited to: Spalled concrete, Minor pot holes, Minor corrosion to steel, Minor scouring, Clogged drainage, etc.

S= Severe/Major Deficiency - Deficiencies which are more extensive in nature and need more planning and effort to repair. Examples include but are not limited to: Moderate to major deterioration in concrete, Exposed and corroding rebars, Considerable settlement, Considerable scouring or undermining, Moderate to extensive corrosion to structural steel with measurable loss of section, etc.

C-S= Critical-Structural Deficiency - A deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge.

C-H= Critical-Hazard Deficiency - A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples include but are not limited to: Loose concrete hanging down over traffic or pedestrians, A hole in a sidewalk that may cause injuries to pedestrians, Missing section of bridge railing, etc.

URGENCY OF REPAIR:

I= Immediate - [Inspector(s) immediately contact District Bridge Inspection Engineer (DBIE) to report the Deficiency and to receive further instruction from him/her].

A= As soon as possible - [Action/Repair should be initiated by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) upon receipt of the Inspection Report].

P= Prioritize - [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available].

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8-STRUCTURE NO.	INSPECTION DATE
Braintree	**B48**	**B-21-042**	**B21042-B48-MBT-RRO**	**12/13/2010**

REMARKS

BRIDGE DESCRIPTION

Bridge No. B-21-042 consists of three simple spans of varying lengths with an overall structure length of 50'-7 1/4". Spans are numbered S1 through S3 from north to south. The bridge, reconstructed in 1994, carries a single MBTA Old Colony Line Middleboro Branch Commuter Rail track over the Monatiquot River in Braintree, Massachusetts. The superstructure consists of four W16x89 rolled steel beams spaced at 2'-6" on center, with W14 diaphragms, directly supporting timber ties. Beams are numbered A through D from west to east. The substructure consists of two granite block abutments and piers. New concrete backwalls and closure slabs have been added to each abutment. The upstream faces of both piers have been covered with concrete noses.

ITEM 58 – DECK

58.3 **Ties** (Good) – Timber ties exhibit minor checking. Approach ties in both directions exhibit minor to moderate checking **(see photo 13)**.

58.5 **Walkways** (Good) – 4'-0" wide steel grate walkway on the west side of the bridge with minor vegetation growth through the steel grate at the north end **(see photo 14)**.

58.8 **Handrails** (Good) – 4'-0" high steel handrail on the west side of the bridge walkway exhibits minor scrapes and spotty light rust on top rail.

58.9 **Utilities** (Good) – There are six 5" outside diameter utility conduits running beneath the west side of the superstructure with no deficiencies noted.

58.10 **Approach Settlement** (Good) – No deficiencies noted.

ITEM 59 – SUPERSTRUCTURE

59.1a **Top Flange** (Good) – Beams exhibit spotty light rust on top flange. There are prefabricated unused holes in the top flange at the north end of beams C and D and also at the south end of Beams A and B **(see photo 15)**.

59.1b **Bottom Flange** (Good) – Beams exhibit spotty light rust on bottom flange.

59.1c **Web** (Good) – No deficiencies noted.

59.1e **Bearing Stiffeners** (Good) – No deficiencies noted.

59.1f **Diaphragms** (Good) – Diaphragms exhibit spotty light rust on the top and bottom flanges.

59.1j **Welds** (Very Good) – No deficiencies noted.

59.1k **Connection Plates** (Good) – No deficiencies noted.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8-STRUCTURE NO.	INSPECTION DATE
Braintree	**B48**	**B-21-042**	**B21042-B48-MBT-RRO**	**12/13/2010**

REMARKS

ITEM 59 – Cont.

59.1q Bearings (Satisfactory) – Bearing sole plates exhibit light rust throughout. There is up to a 1" gap between the masonry plate and the grout pad on the north bearing of Beam D in Span 2 that closes completely during the passing of trains **(see photo 16)**. West anchor bolts on the north bearing of Beam D in Span 1 are tilted southwest **(see photo 17)**. The north bearing of Beam D in Span 2 is missing both nuts on the west anchor bolt. The second nut on anchor bolt is backed off at several bearing locations.

59.4a Paint (Good) – There is spotty light rust throughout the superstructure.

59.4b Action Under Trains (Good) – Minor load deflection and vibration during passing trains.

59.4c Collision Damage (Very Good) – No deficiencies noted.

59.4d Member Alignment (Very Good) – No deficiencies noted.

ITEM 60 - SUBSTRUCTURE

60.1a Stems (Satisfactory) – There are numerous locations of loose, cracked, and missing mortar **(see photo 18)**. There is also a 24" outfall with 100% loss in the South Abutment **(see photo 19)**.

60.1b Wingwalls (Satisfactory) – There are numerous locations of loose, cracked, and missing mortar, as well as minor vegetation growth in the joints.

60.1c Backwalls Good) – No deficiencies noted.

60.1d Pedestals (Good) – No deficiencies noted.

60.1e Bridge Seats (Good) – There is minor vegetation growth on all bridge seats **(see photo 20)**. There is minor accumulation of debris on the South Abutment bridge seat.

60.1f Pointing (Fair) – The abutments have been re-pointed but several joints along the base of the abutments and wingwalls have cracked and/or missing mortar.

60.1h Erosion (Satisfactory) – There is minor erosion at the west ends (upstream) of both abutments. Riprap stones are placed around the abutments at several locations.

60.1i Settlement (Very Good) – No deficiencies noted.

60.2c Stems (Satisfactory) – There are numerous locations of loose, cracked, and missing mortar. Joints exhibit minor to moderate vegetation growth **(see photo 21)**. There is a 10" long diagonal crack on the north face of Pier 2 between Beams B and C **(see photo 22)**. There is a 14" high by up to 8" wide by 14" deep void in the south face of Pier 2, located at the west end of the pier adjacent to Beam A **(see photo 23)**.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8-STRUCTURE NO.	INSPECTION DATE
Braintree	**B48**	**B-21-042**	**B21042-B48-MBT-RRO**	**12/13/2010**

REMARKS

ITEM 60 – Cont.

60.2e Top of Stem (Good) – There is minor to moderate vegetation growth at the top of both piers.

60.2f Pedestals (Satisfactory) – Pedestals exhibit minor hairline cracks throughout.

60.2i Erosion or Scour (Fair) – There are 1'-0" deep scour holes near the west (upstream) end of both piers where the newer concrete noses have been constructed. Both piers also have minor local scour holes along their faces. Riprap stones are placed around the piers at several locations.

60.2i Pointing (Fair) – The piers have been re-pointed but several joints along the base of both piers have cracked and/or missing mortar.

ITEM 61 – CHANNEL & CHANNEL PROTECTION

61.1 Channel Scour (Satisfactory) – Minor contraction scour of the channel, particularly in Span 2.

61.2 Embankment Erosion (Good) – No deficiencies noted.

61.3 Drift (Good) – No deficiencies noted.

61.4 Channel Alignment (Good) – No deficiencies noted.

61.5 Vegetation (Good) – No deficiencies noted.

61.6 Rip-Rap (Good) – No deficiencies noted.

61.7 Silt (Good) – No deficiencies noted.

61.8 Debris in Channel (Fair) – There is a construction silt fence that has been left in the channel in Span 1. There is moderate accumulation of debris in the channel at the upstream end of Span 2.

GENERAL

Rail on Bridge (Very Good) – No deficiencies noted.

Track Guard Rail (Good) – No deficiencies noted.

Rail Fasteners (Good) – There are several misaligned track guard rail tie plates with missing pins on the North Approach **(see photo 24)**. Rail fasteners on the bridge are in good condition with no deficiencies noted.

Photo Log (See Appendix C for Photos)

APPENDIX B – STRUCTURE INVENTORY AND APPRAISAL FORM

RAILROAD STRUCTURE INVENTORY AND APPRAISAL SHEET

********** **IDENTIFICATION** **********

(1) STATE NAME: MASSACHUSETTS CODE: 251
(207) RAILROAD STRUCTURE NUMBER: B21042B48MBTRRO
(5) INVENTORY ROUTE (ON / UNDER): On = 180000000
(208) RAILROAD NAME: MBTA
(6) FEATURES INTERSECTED: MONATIQUOT RIVER
(7) FACILITY CARRIED: OLD COLONY LINE MIDDLEBORO BRANCH
(9) LOCATION: INT. OF PLAIN ST. AND HANCOCK ST.
(11) MILEPOINT/KILOMETERPOINT: 11.981
(16) LATITUDE: 42 DEG 11 MIN 44 SEC
(17) LONGITUDE: 71 DEG 00 MIN 18 SEC
(98) BORDER BRIDGE STATE CODE % SHARE: %
(99) BORDER BRIDGE STRUCTURE NO.:

********* **STRUCTURE TYPE & MATERIAL** **********

(43) STRUCTURE TYPE MAIN: MATERIAL: Steel
TYPE: Stringer CODE: 302
(44) STRUCTURE TYPE APPROACH: MATERIAL:
TYPE: CODE:
(45) NUMBER OF SPANS IN MAIN UNIT: 003
(46) NUMBER OF APPROACH SPANS: 0000
(107) DECK STRUCTURE TYPE: Not Applicable CODE: N
(108) WEARING SURFACE / PROTECTIVE SYSTEM:
(omit (a) and (b))
C) DECK PROTECTION: Not Applicable CODE: N

********** **AGE AND SERVICE** **********

(27) YEAR BUILT: Estimated 1895
(106) YEAR RECONSTRUCTED: 1994
(42) TYPE OF SERVICE: ON: Railroad
UNDER: Waterway CODE: 25
(28) TRACKS ON STRUC.: On: 01 Under: 00

********** **GEOMETRIC DATA** **********

(48) LENGTH OF MAXIMUM SPAN: C-C 14.3 FT
(49) STRUCTURE LENGTH: 50.6 FT
(50) CURB OR SIDEWALK: LEFT: 04.0 FT RIGHT: 00.0 FT
(51) BRIDGE ROADWAY WIDTH, CURB TO CURB: FT
(52) DECK WIDTH, OUT TO OUT: 014.5 FT
(34) SKEW: APPROXIMATE 10 DEG
(35) STRUCTURE FLARED: N
(10) INVENTORY RTE. MIN. VERT. CLEAR: 99 FT 99 IN
(47) INVENTORY RTE. TOTAL HORIZ. CLEAR: 99.99 FT
(53) MIN VERT CLEAR Over BRIDGE RDWY: 99 FT 99 IN
(54) MIN VERT UNDERCLEAR: Not Hwy or RR 0 FT 0 IN
(55) MIN LAT UNDERCLEAR RT: Not Hwy or RR 0.0 FT
(56) MIN LAT UNDERCLEAR LT : 0.0 FT

********** **NAVIGATION DATA** **********

(38) NAVIGATION CONTROL: Permit Not Req'd CODE: 0
(111) PIER PROTECTION: CODE:
(39) NAVIGATION VERTICAL CLEARANCE: 000 FT
(116) VERT-LIFT BRIDGE NAV MIN VERT CLEARANCE: FT
(40) NAVIGATION HORIZONTAL CLEARANCE: 0000 FT

Note: Changes in Recording from Previous Inspection Report Highlighted in Yellow

****

SUFFICIENCY RATING=
STATUS =

********** **CLASSIFICATION** **********

(112) NBIS BRIDGE LENGTH: CODE: Y
(21) MAINTAIN: MBTA
(22) OWNER: MBTA
(37) HISTORICAL SIGNIFICANCE: 4

********** **CONDITION** ********** **CODE:**

(58) DECK: 7
(59) SUPERSTRUCTURE: 7
(60) SUBSTRUCTURE: 6
(61) CHANNEL & CHANNEL PROTECTION: 6
(62) CULVERTS: N

********** **LOAD RATING & POSTING** ********** **CODE:**

(41) STRUCTURE OPEN, POSTED OR CLOSED:
DESCRIPTION: Open, No Restrictions A

********** **APPRAISAL** ********** **CODE:**

(71) WATERWAY ADEQUACY: N
(72) APPROACH ROADWAY ALIGNMENT: N
(36) TRAFFIC SAFETY FEATURES: NNNN
(113) SCOUR CRITICAL BRIDGES: N

********** **PROPOSED IMPROVEMENTS** **********

(75) TYPE OF WORK: CODE:
(76) LENGTH OF STRUCTURE IMPROVEMENT: FT
(94) BRIDGE IMPROVEMENT COST:
(95) ROADWAY IMPROVEMENT COST:
(96) TOTAL PROJECT COST:
(97) YEAR OF IMPROVEMENT COST ESTIMATE:
(114) FUTURE ADT:
(115) YEAR OF FUTURE ADT:

********** **INSPECTIONS** **********

(90) INSPECTION DATE: 12/13/2010 (91) FREQUENCY: 24 MO
(92) CRITICAL FEATURE INSPECTION:
A) FRACTURE CRITICAL DETAIL: NO MO
B) UNDERWATER INSP.: NO MO
C) OTHER CRITICAL INSP.: NO MO
(93) CRITICAL FEATURE INSPECTION DATE:
A) FRACTURE CRITICAL DETAIL:
B) UNDERWATER INSP.:
C) OTHER CRITICAL INSP.:

********** **RATING LOADS** **********

REPORT DATE:	12/2005	E-80	F40PH	286K	263K
NORMAL		E160	1,002K	818K	817K
MAXIMUM		E204	1,400K	1046K	1046K

********** **ACCESSIBILITY** **********

Liftbucket	N	Rigging	N	Inspection	
Ladder	N	Staging	N	Hours:	10
Boat	N	Traffic Control	N		
Wader	Y	RR Flagger	Y		
Inspector 50	N	Police	N		

Report Date: **September, 2005** 12/13/2010

State Information

Bdept # =	**B-21-042**
FHWA Select List=	
Town =	**Braintree**
B.I.N. =	**B48**
AASHTO=	

Identification

(8)	Structure Number	**B21042B48MBTRRO**
(5)	Inventory Route	**180000000**
(2)	State Highway Department District	06 ~~**04**~~
(3)	County Code	**021**
(4)	Place code	**07700**
(6)	Features Intersected	**WATER MONATIQUOT RIVER**
(7)	Facility Carried	OLD COLONY LINE MIDDLEBORO BRANCH **RR MBTA/CSX**
(9)	Location	~~**Old Colony Line Middleboro Br MP 11.981**~~ INT. OF MAIN ST. AND HANCOCK ST.
(11)	Milepoint	**11.981**
(12)	Base Highway Network	**0**
(13)	LRS Inventory Route & Subroute	
(16)	Latitude	**42°11'44"**
(17)	Longitude	**71°00'18"**
(98)	Border Bridge State Code	
(99)	Border Bridge Structure No.	

Structure Type and Material

(43)	Structure Type, Main **Steel**	Code:	**302**
	Jointless bridge type:		**N/A**
(44)	Structure Type Approach Spans	Code:	**000**
(45)	Number of spans in main unit		**003**
(46)	Number of approach spans		**000**
(107)	Deck Structure Type	Code:	**N**
(108)	Wearing Surface/Protective System:		
	A) Type of wearing surface	Code:	**N**
	B) Type of membrane	Code:	**N**
	C) Type of deck protection	Code:	**N**

Age and Service

(27)	Year Built		**1895**
(106)	Year Reconstructed		**1994**
(42)	Type of Service: On **Railroad**		
	Under **Waterway**	Code:	**25**
(28)	Lanes **(1 Track on structure)**		**0100**
(29)	Average Daily Traffic		**000000**
(30)	Year of ADT	(109) Truck ADT	**00**
(19)	Bypass, detour length		

Geometric Data

(48)	Length of Maximum Span	14.3 FT. ~~**14'-3"**~~
(49)	Structure Length	50.6 FT. ~~**50'-7 1/4"**~~
(50)	curb or sw Left:	~~**000**~~ 4.0 FT.
	Right:	0.0 FT. ~~**4'-0"**~~
(51)	Bridge Roadway Width, Curb-to-Curb	~~**9'-3"**~~
(52)	Deck Width, Out-to-Out	14.5 FT. ~~**14'-6"**~~
(32)	Approach Roadway Width	**0'-0"**
(33)	Bridge Median **None** Code:	**0**
(34)	Skew **10**	
(35)	Structure Flared	**0**
(10)	Inventory Route Min. Vert. Clear	**9999**
(47)	Inventory Route Total Horiz Clear	**999**
(53)	Minimum Vertical Clearance Over Bridge Roadway	**9999**
(54)	Minimum Vertical Underclearance	**N 0'-0"**
(55)	Minimum Lateral Underclearance on Right	**N 0'-0"**
(56)	Minimum Lateral Underclearance on Left	**N 0'-0"**

Navigation Data

(38)	Navigation Control	Code:	**0**
(111)	Pier Protection	Code:	
(39)	Navigation Vertical Clearance		**000**
(116)	Vert.-lift Bridge Nav. Min. Vert. Clear.		
(40)	Navigation Horizontal Clearance		**0000**

Classification

		Code
(112)	NBIS Bridge Length	**Y**
(104)	Highway System	**0**
(26)	Functional Class	**N**
(100)	Defense Highway	**0**
(101)	Parallel Structure	**N**
(102)	Direction of Traffic	**0**
(103)	Temporary Structure	
(105)	Federal Lands Highways	**0**
(110)	Designated National Network	**0**
(20)	Toll	**N**
(21)	Maintain: **MBTA**	**27**
(22)	Owner: **MBTA**	**27**
(37)	Historical Significance	**4**

Condition

		Code
(58)	Deck	**7**
(59)	Superstructure	**7**
(60)	Substructure	**6**
(61)	Channel and Channel Protection	**6**
(62)	Culverts	**N**

Load Rating and Posting

		Code
(31)	Design Load - Railroad	**8**
(63)	Operating Rating Method - (AS)	**5**
(64)	Operating Rating	**N**
(65)	Inventory Rating Method - (AS)	**5**
(66)	Inventory Rating	**N**
(70)	Bridge Posting	**N**
(41)	Structure	**A**

Appraisal

		Code
(67)	Structural Evaluation	**6**
(68)	Deck Geometry	**N**
(69)	Underclearances, Vert. and Horiz.	**N**
(71)	Waterway Adequacy	**N**
(72)	Approach Roadway Alignment	**N**
(36)	Traffic Safety Features	**N N N N**
(113)	Scour Critical Bridges	**U**

Inspections

(90) Inspection Date	**8/30/05**	(91) Frequency		**24**
(92) Critical Feature Inspection:		(93) Crit. Feat. Insp. Date		
(A) Fracture Critical Det.	**N**	(A)		**N**
(B) Underwater Insp.	**N**	(B)		**N**
C) Other Special Insp.	**N**	C)		**N**
(*) Other Inspection	**N**	(*)		**N**
(*) Closed Bridge	**N**	(*)		**N**
(*) Damage Inspection	**N**	(*)		**N**

Rating Loads

Report Date 12/2005	H20 E-80	Type 3 F40PH	Type 3S2 266K	Type HS 263K
Operating NORMAL	E160	1002K	818K	817K
Inventory MAXIMUM	E204	1400K	1046K	1046K

Field Posting

Status		posting date	
	2 Axle	3 Axle	5 Axle
Actual			
Recommended			

Misc.

Bridge Name

_ Anti-missle fence _ Acrow Panel _ Jointless Bridge

Accessibility

N	liftbucket	**N**	rigging	inspection	
N	ladder	**N**	staging	hours:	~~**008**~~ 10
N	boat	N ~~**Y**~~	traffic control		
Y	wader	**Y**	RR flagperson		
N	inspector 50	**N**	police		

Note: This is a copy of the SI&A sheet with its markups as presented in Aug-2005 previous Inspection Report

APPENDIX C - PHOTOS

APPENDIX C - List of Photographs

Photo No. 1 – West Elevation

Photo No. 2 – East Elevation

Photo No. 3 – Bridge from South Approach

Photo No. 4 – Bridge from North Approach

Photo No. 5 – South Approach from Bridge

Photo No. 6 – North Approach from Bridge

Photo No. 7 – Looking Upstream

Photo No. 8 – Looking Downstream

Photo No. 9 – Typical Top of Track

Photo No. 10 – Typical Underside of Superstructure

Photo No. 11 – Typical Abutment Elevation

Photo No. 12 – Typical Pier Elevation

Photo No. 13 – South approach ties with moderate checking

Photo No. 14 – Minor vegetation growth through steel grate walkway

Photo No. 15 – Unused holes in top flange at north end of Beams C and D

Photo No. 16 – Up to 1" gap between masonry plate and grout pad on Beam D north bearing at Pier 2

Photo No. 17 – Anchor bolt misalignment at Span 1, Beam D

Photo No. 18 – Cracked, loose and missing mortar between granite blocks at abutment stem (typ.)

Photo No. 19 – South Abutment with drain pipe with 100% loss

Photo No. 20 – Minor vegetation growth on bridge seat (typ.)

Photo No. 21 – Moderate vegetation growth between joints at east end of Pier 2

Photo No. 22 – 10” long diagonal crack in top granite block at Pier 2 between Beams B and C

Photo No. 23 – West end of Pier 2, south face with 14" high by up to 8" wide by 14" deep void

Photo No. 24 – Misalignment of tie plate under track guard rail at the North Approach

Photo No. 1 – West Elevation

Photo No. 2 – East Elevation

Photo No. 3 – Bridge from South Approach

Photo No. 4 – Bridge from North Approach

Photo No. 5 – South Approach from Bridge

Photo No. 6 – North Approach from Bridge

Photo No. 7 – Looking Upstream

Photo No. 8 – Looking Downstream

Photo No. 9 – Typical Top of Track

Photo No. 10 – Typical Underside of Superstructure

Photo No. 11 – Typical Abutment Elevation

Photo No. 12 – Typical Pier Elevation

Photo No. 13 – South approach ties with moderate checking

Photo No. 14 – Minor vegetation growth through steel grate walkway

Photo No. 15 – Unused holes in top flange at north end of Beams C and D

Photo No. 16 – Up to 1" gap between masonry plate and grout pad on Beam D north bearing at Pier 2

Photo No. 17 – Anchor bolt misalignment at Span 1, Beam D

Photo No. 18 – Cracked, loose and missing mortar between granite blocks at abutment stem (typ.)

Photo No. 19 – South Abutment with drain pipe with 100% loss

Photo No. 20 – Minor vegetation growth on bridge seat (typ.)

Photo No. 21 – Moderate vegetation growth between joints at east end of Pier 2

Photo No. 22 – 10” long diagonal crack in top granite block at Pier 2 between Beams B and C

Photo No. 23 – West end of Pier 2, south face with 14" high by up to 8" wide by 14" deep void

Photo No. 24 – Misalignment of tie plate under track guard rail at the North Approach

STRUCTURES INSPECTION FIELD REPORT

ROUTINE INSPECTION

2-DIST	B.I.N.	BR. DEPT. NO.
06	34G	B-21-016

CITY/TOWN	8.-STRUCTURE NO.	11-Kilo. POINT	41-STATUS	90-ROUTINE INSP. DATE
BRAINTREE	B21016-34G-DOT-NBI	000.000	A:OPEN	OCT 8, 2014

07-FACILITY CARRIED	MEMORIAL NAME/LOCAL NAME	27-YR BUILT	106-YR REBUILT	YR REHAB'D (NON 106)
ST 37 WASHNGTON ST	GEORGE W ANASTOS	1924	1982	0000

06-FEATURES INTERSECTED	26-FUNCTIONAL CLASS	DIST. BRIDGE INSPECTION ENGINEER J. O'Connor
WATER MONATIQUOT RIVER	Urban Arterial	

43-STRUCTURE TYPE	22-OWNER	21-MAINTAINER	TEAM LEADER M. Hart
501 : Prestressed Concrete Slab	State Highway Agency	State Highway Agency	

107-DECK TYPE	WEATHER	TEMP. (air)	TEAM MEMBERS
2 : Concrete Precast Panels	Clear	20°C	J. P. HURTON, M. COMEAU

ITEM 58 — DECK: 5

		DEF
1.Wearing surface	6	M-P
2.Deck Condition	5	M-P
3.Stay in place forms	N	-
4.Curbs	7	M-P
5.Median	N	-
6.Sidewalks	5	M-P
7.Copings	7	-
8.Railing	7	-
9.Anti Missile Fence	N	-
10.Drainage System	N	-
11.Lighting Standards	N	-
12.Utilities	5	M-P
13.Deck Joints	N	-
14.	N	-
15.	N	-
16.	N	-

CURB REVEAL (In millimeters)	N	S
	254	292

ITEM 59 — SUPERSTRUCTURE: 5

		DEF
1.Stringers	N	-
2.Floorbeams	N	-
3.Floor System Bracing	N	-
4.Girders or Beams	5	M-P
5.Trusses - General	N	-
a. Upper Chords	N	-
b. Lower Chords	N	-
c. Web Members	N	-
d. Lateral Bracing	N	-
e. Sway Bracings	N	-
f. Portals	N	-
g. End Posts	N	-
6.Pin & Hangers	N	-
7.Conn Plt's, Gussets & Angles	N	-
8.Cover Plates	N	-
9.Bearing Devices	H	-
10.Diaphragms/Cross Frames	N	-
11.Rivets & Bolts	N	-
12.Welds	N	-
13.Member Alignment	8	-
14.Paint/Coating	N	-
15.	N	-

Year Painted	N

ITEM 60 — SUBSTRUCTURE: 6

	Dive	Cur		DEF
1. Abutments			6	
a. Pedestals	N	N		-
b. Bridge Seats	N	H		-
c. Backwalls	N	H		-
d. Breastwalls	7	6		M-P
e. Wingwalls	7	7		M-P
f. Slope Paving/Rip-Rap	7	7		-
g. Pointing	N	N		-
h. Footings	H	H		-
i. Piles	N	N		-
j. Scour	8	H		-
k. Settlement	8	8		-
l.	N	N		-
m.	N	N		-
2. Piers or Bents			N	
a. Pedestals	N	N		-
b. Caps	N	N		-
c. Columns	N	N		-
d. Stems/Webs/Pierwalls	N	N		-
e. Pointing	N	N		-
f. Footing	N	N		-
g. Piles	N	N		-
h. Scour	N	N		-
i. Settlement	N	N		-
j.	N	N		-
k.	N	N		-
3. Pile Bents			N	
a. Pile Caps	N	N		-
b. Piles	N	N		-
c. Diagonal Bracing	N	N		-
d. Horizontal Bracing	N	N		-
e. Fasteners	N	N		-

APPROACHES

		DEF
a. Appr. pavement condition	5	M-P
b. Appr. Roadway Settlement	6	M-P
c. Appr. Sidewalk Settlement	5	M-A
d.	N	-

OVERHEAD SIGNS (Attached to bridge) (Y/N): N

		DEF
a. Condition of Welds	N	-
b. Condition of Bolts	N	-
c. Condition of Signs	N	-

COLLISION DAMAGE: *Please explain*
None (X) Minor ( ) Moderate ( ) Severe ( )

LOAD DEFLECTION: *Please explain*
None (X) Minor ( ) Moderate ( ) Severe ( )

LOAD VIBRATION: *Please explain*
None ( ) Minor (X) Moderate ( ) Severe ( )

Any Fracture Critical Member: (Y/N) N

Any Cracks: (Y/N) N

UNDERMINING (Y/N) If YES please explain: N

COLLISION DAMAGE:
None (X) Minor ( ) Moderate ( ) Severe ( )

SCOUR: *Please explain*
None (X) Minor ( ) Moderate ( ) Severe ( )

I-60 (Dive Report): 7 *I-60 (This Report):* 6

93B-U/W (DIVE) Insp 11/12/2013

X=UNKNOWN N=NOT APPLICABLE H=HIDDEN/INACCESSIBLE R=REMOVED

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	34G	B-21-016	B21016-34G-DOT-NBI	OCT 8, 2014

ITEM 61 — CHANNEL & CHANNEL PROTECTION

6

	Dive	Cur	DEF
1.Channel Scour	8	H	-
2.Embankment Erosion	7	7	-
3.Debris	4	7	-
4.Vegetation	6	6	M-P
5.Utilities	N	N	-
6.Rip-Rap/Slope Protection	7	7	-
7.Aggradation	6	6	M-P
8.Fender System	N	N	-

STREAM FLOW VELOCITY:

Tidal ( ) High ( ) Moderate ( ) Low (X) None ( )

ITEM 61 (Dive Report): 6 *ITEM 61 (This Report):* 7

93b-U/W INSP. DATE: 11/12/2013

ITEM 36 — *TRAFFIC SAFETY*

	36	COND	DEF
A. Bridge Railing	0	7	M-P
B. Transitions	0	7	-
C. Approach Guardrail	1	7	M-P
D. Approach Guardrail Ends	1	7	-

WEIGHT POSTING

Not Applicable X

	H	3	3S2	Single
Actual Posting	N	N	N	N
Recommended Posting	N	N	N	N

Waived Date: 00/00/00 EJDMT Date: 00/00/00

Signs In Place (Y=Yes,N=No, NR=NotRequired) Legibility/ Visibility	At bridge E	At bridge W	Other Advance E	Other Advance W

CLEARANCE POSTING

Not Applicable [ ]

	N ft	N in	S ft	S in	meter
Actual Field Measurement		0		0	
Posted Clearance		0		0	

Signs In Place (Y=Yes,N=No, NR=Not Required) Legibility/ Visibility	At bridge N	At bridge S	Advance N	Advance S
	N	N	N	N

ACCESSIBILITY (Y/N/P)

	Needed	Used
Lift Bucket	N	N
Ladder	N	N
Boat	Y	Y
Waders	N	N
Inspector 50	N	N
Rigging	N	N
Staging	N	N
Traffic Control	N	N
RR Flagger	N	N
Police	N	N
Other:		
	N	N

TOTAL HOURS 10

PLANS (Y/N): Y

(V.C.R.) (Y/N): N

TAPE#: _____

List of field tests performed:

RATING

Rating Report (Y/N): Y

Date: 04/01/2004

Inspection data at time of existing rating

I 58: 8 I 59: 8 I 60: 8 Date :10/02/2002

(To be filled out by DBIE)

Request for Rating or Rerating (Y/N): N

If YES please give priority: HIGH ( ) MEDIUM ( ) LOW ( )

REASON: _____

CONDITION RATING GUIDE (For Items 58, 59, 60 and 61)

	CODE	CONDITION	DEFECTS
	N	NOT APPLICABLE	
G	9	EXCELLENT	Excellent condition.
G	8	VERY GOOD	No problem noted.
G	7	GOOD	Some minor problems.
F	6	SATISFACTORY	Structural elements show some minor deterioration.
F	5	FAIR	All primary structural elements are sound but may have minor section loss, cracking, spalling or scour.
P	4	POOR	Advance section loss, deterioration, spalling or scour.
P	3	SERIOUS	Loss of section, deterioration, spalling or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.
C	2	CRITICAL	Advance deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.
C	1	"IMMINENT" FAILURE	Major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic but corrective action may put it back in light service.
	0	FAILED	Out of service - beyond corrective action.

DEFICIENCY REPORTING GUIDE

DEFICIENCY: A defect in a structure that requires corrective action.

CATEGORIES OF DEFICIENCIES:

M= Minor Deficiency - Deficiencies which are minor in nature, generally do not impact the structural integrity of the bridge and could easily be repaired. Examples include but are not limited to: Spalled concrete, Minor pot holes, Minor corrosion of steel, Minor scouring, Clogged drainage, etc.

S= Severe/Major Deficiency - Deficiencies which are more extensive in nature and need more planning and effort to repair. Examples include but are not limited to: Moderate to major deterioration in concrete, Exposed and corroded rebars, Considerable settlement, Considerable scouring or undermining, Moderate to extensive corrosion to structural steel with measurable loss of section, etc.

C-S= Critical Structural Deficiency - A deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge.

C-H= Critical Hazard Deficiency - A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples include but are not limited to: Loose concrete hanging down over traffic or pedestrians, A hole in a sidewalk that may cause injuries to pedestrians, Missing section of bridge railing, etc.

URGENCY OF REPAIR:

I = Immediate- [Inspector(s) immediately contact District Bridge Inspection Engineer (DBIE) to report the Deficiency and to receive further instruction from him/her].

A = ASAP- [Action/Repair should be initiated by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) upon receipt of the Inspection Report].

P = Prioritize- [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available].

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	34G	B-21-016	B21016-34G-DOT-NBI	OCT 8, 2014

REMARKS

BRIDGE ORIENTATION
The approaches are south and north and elevations are west and east. Beams are numbered from west to east, 1 to 18. This is a one span bridge. Water flows from west to east.

ITEM 58 - DECK

Item 58.1 - Wearing surface
Minor wheel rutting in northbound roadway. Full width moderate transverse cracking over both south and north abutments. In the northbound roadway the bituminous has heaved for the entire length of the bridge at the fog line. See photo 1. The south half has heaving of roadway of 12' L x 1.5' W +/- x up to 3" H, at the east gutterline. See photo 2. The north half of roadway is 23' L x 2' W +/- x up to 6" H, at the east gutterline. See photo 3. The west side of these two areas have minor depression with light cracking. There are two large patches in the areas that have heaved, the south one measuring 4' W x 5' L and the north measuring 5' W x 10' L. There is light longitudinal cracking 3' on center in the southbound roadway.

Item 58.2 - Deck Condition
See Item 59.4.

Item 58.4 - Curbs
There is an 8" x 4" spall in the west curb near midspan.

Item 58.6 - Sidewalks
Spalling at northern half of west sidewalk adjacent to curb and at middle of sidewalk at midspan area. See photo 4. There are a few minor spalls in the east sidewalk adjacent to the curb.

Item 58.12 - Utilities
Drift debris in east and west utility lines below bridge. The utility on the west side of bridge has seven brackets. Bracket 1 and 7 are intact, brackets 2, 4 and 6 are missing, brackets 3 and 5 are missing straps. See photo 5.

APPROACHES

Approaches a - Appr. pavement condition
Moderate wheel rutting in all lanes in northbound roadway at both approaches. There is light map cracking in both directions of the south approach and moderate scaling by the manhole in the northbound roadway. In the southbound roadway there is a patch around a water utility in the south approach.

Approaches b - Appr. Roadway Settlement
Minor settlement at north approach northbound roadway approximately 13' from abutment. In the south approach of the southbound roadway there is some minor settlement along the fog line 13' from the bridge.

Approaches c - Appr. Sidewalk Settlement
Settlement at **southwes**t approach sidewalk, 5-1/2". See photo 6. Settlement at the **northwest** approach sidewalk, 1". Settlement at **northeast** approach sidewalk, 1-1/2" and settlement at the **southeast** approach sidewalk, 1-1/2".

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	34G	B-21-016	B21016-34G-DOT-NBI	OCT 8, 2014

REMARKS

ITEM 59 - SUPERSTRUCTURE

Item 59.4 - Girders or Beams

Beam 9 adjacent to beam 8 at south end by south breastwall has a new spall, 10" L x 8" W x up to 3/4" D with delamination and rust stains on the north side of spall. See photo 7. At midspan of beam 9 there is cracking with delamination and rust staining. See photo 8. There is a spall with rusted rebar exposed 3' 5" L x 18" W x up to 4-3/4" D near midspan of beam 16 adjacent to beam 17. See photo 9. In the side of beam 17 where this spall has exposed there is a 6" longitudingal crack with ruststaining. Also in beam 16 there is longitudinal cracking adjacent to beam 17 and longitudinal cracking and delamination from midspan spall, out 14' to the south. Minor water leakage between beams at random locations throughout, with the heaviest leakage at east end between last two beams 17 and 18. See photo 10. Intermittent longitudinal cracking and minor scaling in beam 18, adjacent to beam 17.

SuperStructure Load Vibration Notes

There is minor vibration felt under heavy truck loads.

ITEM 60 - SUBSTRUCTURE

Item 60.1 - Abutments

Item 60.1.b - Bridge Seats

Drift debris stuck below beams on south bridge seat.

Item 60.1.d - Breastwalls

South breastwall below beam 2 has a spall 1' W x 8" H x up to 4" D at the top. Just below spall, there are two rust stains with hairline cracks. Also, between rust stains, there is efflorescence with hairline cracking, see photo 11. The north breastwall has minor to moderate cracking with efflorescence and rust staining from the west end to beam 3, see photo 12. Both breastwalls have minor horizontal cracking approximately 1' under the deck beams. See photo 13 (along south breastwall).

Item 60.1.e - Wingwalls

The southwest corner, there is honey-combing/abrasion, 10-1/2" Diam. x 1-1/2" D near the waterline.

ITEM 61 - CHANNEL AND CHANNEL PROTECTION

Item 61.4 - Vegetation

There is vegetation growth at both upstream and downstream ends of channel, which is heavier at the upstream end.

Item 61.7 - Aggradation

There is aggradation at both upstream and downstream ends of channel. There is aggradation along the north abutment at both ends and at midspan, below beams 2 and 3, 6 to 8 and beam 15 to east end.

TRAFFIC SAFETY

Item 36a - Bridge Railing

Type AL-3 bridge railing, non standard. There are minor scrapes to both railings.

Item 36b - Transitions

Type "ss" guardrail ties into endpost at all four corners. There is improper spacing to posts and no rub rail below "ss" guardrail at transitions, non standard.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	34G	B-21-016	B21016-34G-DOT-NBI	OCT 8, 2014

REMARKS

Item 36c - Approach Guardrail

Type "ss" approach guardrail at all approaches. There is minor collision damage at southeast approach.

Item 36d - Approach Guardrail Ends

Southeast end is continuous. Remaining three corners have boxing glove ends.

Photo Log

Photo 1 : Bunched up bituminous in north travel lane with patches, just off of the east curb.
Photo 2 : Northbound roadway south half 1' out at fog line along east curb, bituminous is pushing up, 12' L x 1.5' W x up to 3" H.
Photo 3 : Northbound roadway north half just off the east curb, bituminous is pushing up for an area of 23' L x 2' W x up to 6" H.
Photo 4 : Numerous spalls at west sidewalk.
Photo 5 : Utility west side of bridge. Seven brackets, 1 and 7 intact, 2, 4 and 6 missing, 3 and 5 missing straps. Numbered south to north.
Photo 6 : Settlement 5-1/2" at southwest approach sidewalk.
Photo 7 : Beam 9 at bottom face by south breastwall new minor spall with rebar exposed, delamination with rust stains.
Photo 8 : Cracking with delamination and rust staining at the midspan of beam 9.
Photo 9 : Beam 16 adjacent to beam 17 at midspan, spall 3' 5" L x 18" W x up to 4-3/4" D with cracking and delamination.
Photo 10 : East end beneath last two beams 17 and 18 showing leakage.
Photo 11 : South breastwall, spall under beam 2, 1' H x 8" H x up to 4" D. Below spall, two rust stains with hairline cracks with efflo. between.
Photo 12 : North breastwall, west end. Typical cracking with rust staining and efflorescence at top of both breastwalls.
Photo 13 : Typical cracking at the top of the breastwalls aproximately 1' under the deck beams.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	34G	B-21-016	B21016-34G-DOT-NBI	OCT 8, 2014

PHOTOS

Photo 1: Bunched up bituminous in north travel lane with patches, just off of the east curb.

Photo 2: Northbound roadway south half 1' out at fog line along east curb, bituminous is pushing up, 12' L x 1.5' W x up to 3" H.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	34G	B-21-016	B21016-34G-DOT-NBI	OCT 8, 2014

PHOTOS

Photo 3: Northbound roadway north half just off the east curb, bituminous is pushing up for an area of 23' L x 2' W x up to 6" H.

Photo 4: Numerous spalls at west sidewalk.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	34G	B-21-016	B21016-34G-DOT-NBI	OCT 8, 2014

PHOTOS

Photo 5: Utility west side of bridge. Seven brackets, 1 and 7 intact, 2, 4 and 6 missing, 3 and 5 missing straps. Numbered south to north.

Photo 6: Settlement 5-1/2" at southwest approach sidewalk.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	34G	B-21-016	B21016-34G-DOT-NBI	OCT 8, 2014

PHOTOS

Photo 7: Beam 9 at bottom face by south breastwall new minor spall with rebar exposed, delamination with rust stains.

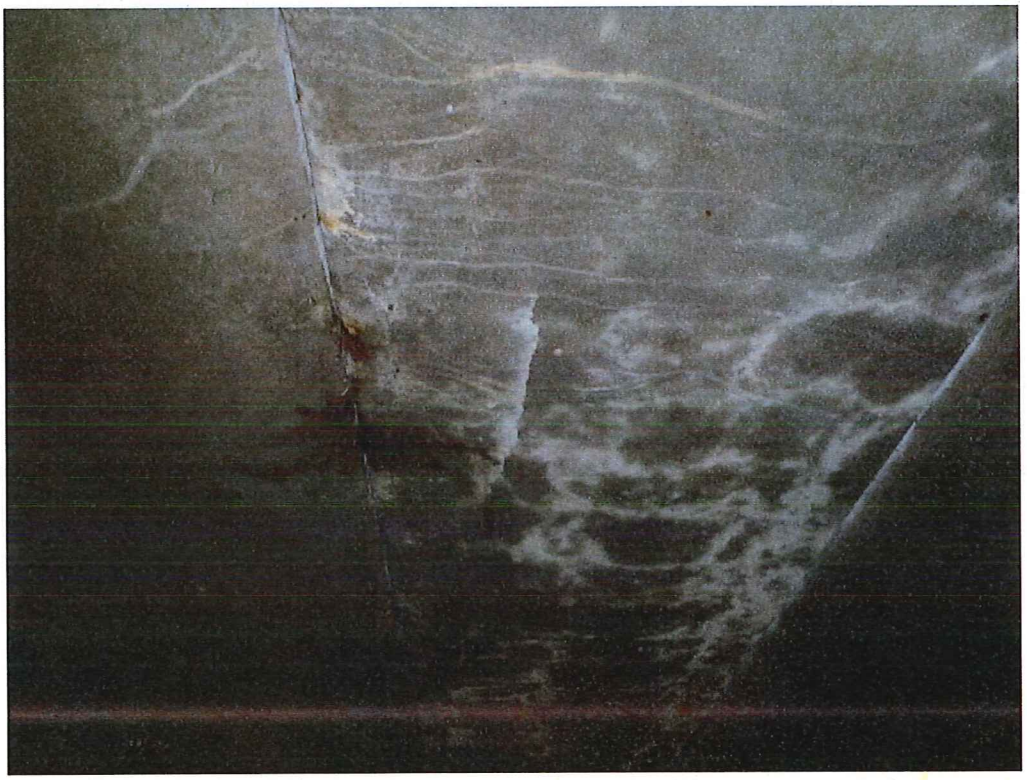


Photo 8: Cracking with delamination and rust staining at the midspan of beam 9.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	34G	B-21-016	B21016-34G-DOT-NBI	OCT 8, 2014

PHOTOS

Photo 9: Beam 16 adjacent to beam 17 at midspan, spall 3' 5" L x 18" W x up to 4-3/4" D with cracking and delamination.

Photo 10: East end beneath last two beams 17 and 18 showing leakage.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	34G	B-21-016	B21016-34G-DOT-NBI	OCT 8, 2014

PHOTOS

Photo 11: South breastwall, spall under beam 2, 1' H x 8" H x up to 4" D. Below spall, two rust stains with hairline cracks with efflo. between.

Photo 12: North breastwall, west end. Typical cracking with rust staining and efflorescence at top of both breastwalls.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	**34G**	**B-21-016**	**B21016-34G-DOT-NBI**	**OCT 8, 2014**

PHOTOS

Photo 13: **Typical cracking at the top of the breastwalls aproximately 1' under the deck beams.**

STRUCTURES INSPECTION FIELD REPORT

ROUTINE INSPECTION

2-DIST	B.I.N.	BR. DEPT. NO.
06	33R	B-21-054

CITY/TOWN	8.-STRUCTURE NO.	11-Kilo. POINT	41-STATUS	90-ROUTINE INSP. DATE
BRAINTREE	B21054-33R-MUN-NBI	000.805	A:OPEN	JUN 3, 2015

07-FACILITY CARRIED	MEMORIAL NAME/LOCAL NAME	27-YR BUILT	106-YR REBUILT	YR REHAB'D (NON 106)
HWY JEFFERSON ST	SGT H MACARTHUR	1955	0000	0000

06-FEATURES INTERSECTED	26-FUNCTIONAL CLASS	DIST. BRIDGE INSPECTION ENGINEER
WATER MONATIQUOT RIVER	Urban Local	J. O'Connor

43-STRUCTURE TYPE	22-OWNER	21-MAINTAINER	TEAM LEADER
101 : Concrete Slab	Town Agency	Town Agency	E. J. Ray

107-DECK TYPE	WEATHER	TEMP. (air)	TEAM MEMBERS
1 : Concrete Cast-in-Place	Sunny	14°C	J. P. HURTON

ITEM 58 — DECK: 7

		DEF
1.Wearing surface	7	-
2.Deck Condition	7	M-P
3.Stay in place forms	N	-
4.Curbs	6	M-P
5.Median	N	-
6.Sidewalks	6	M-P
7.Parapets	N	-
8.Railing	6	M-P
9.Anti Missile Fence	N	-
10.Drainage System	N	-
11.Lighting Standards	N	-
12.Utilities	7	-
13.Deck Joints	N	-
14.	N	-
15.	N	-
16.	N	-

CURB REVEAL (In millimeters)	N	S
	175	175

APPROACHES

		DEF
a. Appr. pavement condition	7	-
b. Appr. Roadway Settlement	7	-
c. Appr. Sidewalk Settlement	7	-
d.	N	-

OVERHEAD SIGNS (Attached to bridge) (Y/N): N

		DEF
a. Condition of Welds	N	-
b. Condition of Bolts	N	-
c. Condition of Signs	N	-

ITEM 59 — SUPERSTRUCTURE: 6

		DEF
1.Stringers	N	-
2.Floorbeams	N	-
3.Floor System Bracing	N	-
4.Girders or Beams	6	M-P
5.Trusses - General	N	-
a. Upper Chords	N	-
b. Lower Chords	N	-
c. Web Members	N	-
d. Lateral Bracing	N	-
e. Sway Bracings	N	-
f. Portals	N	-
g. End Posts	N	-
6.Pin & Hangers	N	-
7.Conn Plt's, Gussets & Angles	N	-
8.Cover Plates	N	-
9.Bearing Devices	H	-
10.Diaphragms/Cross Frames	N	-
11.Rivets & Bolts	N	-
12.Welds	N	-
13.Member Alignment	8	-
14.Paint/Coating	N	-
15.Slab	7	M-P

Year Painted	N

COLLISION DAMAGE: *Please explain*
None (X) Minor ( ) Moderate ( ) Severe ( )

LOAD DEFLECTION: *Please explain*
None (X) Minor ( ) Moderate ( ) Severe ( )

LOAD VIBRATION: *Please explain*
None (X) Minor ( ) Moderate ( ) Severe ( )

Any Fracture Critical Member: (Y/N) N

Any Cracks: (Y/N) N

ITEM 60 — SUBSTRUCTURE: 6

	Dive	Cur		DEF
1. Abutments			6	
a. Pedestals	N	N		-
b. Bridge Seats	N	H		-
c. Backwalls	N	H		-
d. Breastwalls	7	6		M-P
e. Wingwalls	7	6		M-P
f. Slope Paving/Rip-Rap	H	7		-
g. Pointing	N	N		-
h. Footings	H	H		-
i. Piles	N	N		-
j. Scour	7	H		-
k. Settlement	7	7		-
l.	N	N		-
m.	N	N		-
2. Piers or Bents			N	
a. Pedestals	N	N		-
b. Caps	N	N		-
c. Columns	N	N		-
d. Stems/Webs/Pierwalls	N	N		-
e. Pointing	N	N		-
f. Footing	N	N		-
g. Piles	N	N		-
h. Scour	N	N		-
i. Settlement	N	N		-
j.	N	N		-
k.	N	N		-
3. Pile Bents			N	
a. Pile Caps	N	N		-
b. Piles	N	N		-
c. Diagonal Bracing	N	N		-
d. Horizontal Bracing	N	N		-
e. Fasteners	N	N		-

UNDERMINING (Y/N) If YES please explain: N

COLLISION DAMAGE:
None (X) Minor ( ) Moderate ( ) Severe ( )

SCOUR: *Please explain*
None (X) Minor ( ) Moderate ( ) Severe ( )

I-60 (Dive Report): 7 *I-60 (This Report):* 6

93B-U/W (DIVE) Insp 03/08/2013

X=UNKNOWN N=NOT APPLICABLE H=HIDDEN/INACCESSIBLE R=REMOVED

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	33R	B-21-054	B21054-33R-MUN-NBI	JUN 3, 2015

ITEM 61 — CHANNEL & CHANNEL PROTECTION

7

	Dive	Cur	DEF
1.Channel Scour	7	H	-
2.Embankment Erosion	7	7	-
3.Debris	8	7	-
4.Vegetation	7	7	-
5.Utilities	N	N	-
6.Rip-Rap/Slope Protection	H	7	-
7.Aggradation	8	7	-
8.Fender System	N	N	-

STREAM FLOW VELOCITY:
Tidal ( )High ( ) Moderate ( )Low (X)None ( )

ITEM 61 (Dive Report): 7 *ITEM 61 (This Report):* 7

93b-U/W INSP. DATE: 03/08/2013

ITEM 36 — TRAFFIC SAFETY

	36	COND	DEF
A. Bridge Railing	0	6	M-P
B. Transitions	0	0	S-A
C. Approach Guardrail	0	0	S-A
D. Approach Guardrail Ends	0	0	S-A

WEIGHT POSTING

Not Applicable X

	H	3	3S2	Single
Actual Posting	N	N	N	N
Recommended Posting	N	N	N	N

Waived Date: 00/00/00 EJDMT Date: 00/00/00

Signs In Place (Y=Yes,N=No, NR=NotRequired) Legibility/ Visibility	At bridge E	At bridge W	Other Advance E	Other Advance W

CLEARANCE POSTING

Not Applicable X

	N ft	N in	S ft	S in	meter
Actual Field Measurement		0		0	
Posted Clearance		0		0	

Signs In Place (Y=Yes,N=No, NR=Not Required) Legibility/ Visibility	At bridge N	At bridge S	Advance N	Advance S

ACCESSIBILITY (Y/N/P)

	Needed	Used
Lift Bucket	N	N
Ladder	N	N
Boat	N	N
Waders	Y	Y
Inspector 50	N	N
Rigging	N	N
Staging	N	N
Traffic Control	N	N
RR Flagger	N	N
Police	N	N
Other:		
	N	N

TOTAL HOURS 10

PLANS (Y/N): Y

(V.C.R.) (Y/N): N

TAPE#: _____

List of field tests performed:

RATING

Rating Report (Y/N): Y

Date: 03/01/1988

Inspection data at time of existing rating

I 58: 7 I 59: 7 I 60: 7 Date :03/30/1988

(To be filled out by DBIE)

Request for Rating or Rerating (Y/N): N

If YES please give priority: HIGH ( ) MEDIUM ( ) LOW ( )

REASON: _____

CONDITION RATING GUIDE (For Items 58, 59, 60 and 61)

	CODE	CONDITION	DEFECTS
	N	NOT APPLICABLE	
G	9	EXCELLENT	Excellent condition.
G	8	VERY GOOD	No problem noted.
G	7	GOOD	Some minor problems.
F	6	SATISFACTORY	Structural elements show some minor deterioration.
F	5	FAIR	All primary structural elements are sound but may have minor section loss, cracking, spalling or scour.
P	4	POOR	Advance section loss, deterioration, spalling or scour.
P	3	SERIOUS	Loss of section, deterioration, spalling or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.
C	2	CRITICAL	Advance deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.
C	1	"IMMINENT" FAILURE	Major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic but corrective action may put it back in light service.
	0	FAILED	Out of service - beyond corrective action.

DEFICIENCY REPORTING GUIDE

DEFICIENCY: A defect in a structure that requires corrective action.

CATEGORIES OF DEFICIENCIES:

M= Minor Deficiency - Deficiencies which are minor in nature, generally do not impact the structural integrity of the bridge and could easily be repaired. Examples include but are not limited to: Spalled concrete, Minor pot holes, Minor corrosion of steel, Minor scouring, Clogged drainage, etc.

S= Severe/Major Deficiency - Deficiencies which are more extensive in nature and need more planning and effort to repair. Examples include but are not limited to: Moderate to major deterioration in concrete, Exposed and corroded rebars, Considerable settlement, Considerable scouring or undermining, Moderate to extensive corrosion to structural steel with measurable loss of section, etc.

C-S= Critical Structural Deficiency - A deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge.

C-H= Critical Hazard Deficiency - A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples include but are not limited to: Loose concrete hanging down over traffic or pedestrians, A hole in a sidewalk that may cause injuries to pedestrians, Missing section of bridge railing, etc.

URGENCY OF REPAIR:

I = Immediate- [Inspector(s) immediately contact District Bridge Inspection Engineer (DBIE) to report the Deficiency and to receive further instruction from him/her].

A = ASAP- [Action/Repair should be initiated by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) upon receipt of the Inspection Report].

P = Prioritize- [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available].

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	33R	B-21-054	B21054-33R-MUN-NBI	JUN 3, 2015

REMARKS

BRIDGE ORIENTATION
For this report, approaches are west and east and elevations south and north. This single span slab bridge has south and north fascia beams below the sidewalks. The river flows from north to south.

ITEM 58 - DECK

Item 58.2 - Deck Condition
See Item 59.15.

Item 58.4 - Curbs
North Curb
There is a minor spall with rusted rebar starting to show on the south face at the top corner 2' in from the west end. See sidewalk photo #2. There is a minor spall on the south face adjacent to the wearing surface 2' in from the east end. See approach photo #6.

Item 58.6 - Sidewalks
South Sidewalk
The underside west and east side of midspan has numerous popouts with rusted rebar exposed due to insufficient cover and minor delamination between spalls at midspan. See photo #1.
North Sidewalk
There are two (2) minor spalls with rusted rebar exposed due to insufficient cover at the west end adjacent to the curb. See photo #2.
The underside has a minor spall with rebar exposed due to insufficient cover and a small area of minor delamination by the east abutment. See photo #3.

Item 58.8 - Railing
North Railing
The center post has three minor spalls with rusted rebar exposed due to insufficient cover. See photo #4.

APPROACHES

Approaches a - Appr. pavement condition
West approach, full width 1/8" transverse crack over the west abutment. See photo #5. West approach, 15' and 24' off west abutment, full width 1/8" transverse cracks.
East approach, adjacent to the east abutment and north approach curb, 6' x 7' bituminous patch.
See photo #6.

ITEM 59 - SUPERSTRUCTURE

Item 59.4 - Girders or Beams
South Fascia Beam
South fascia beam south face top corner east half, three (3) minor spalls with no rebar exposed. See photo #7. The bottom face has a minor spall with rusted rebar exposed due to insufficient cover approximately 9' from the east abutment. See photo #8. There are numerous minor spalls due to insufficient cover and minor delamination on the north face at the eastern half of the beam. See photo #9.
North Fascia Beam
There are two two hairline full height vertical cracks, one at west end, and one at midspan area on the north face. There is moss covering the north face. Minor spall with rebar due to insufficient cover at the bottom face 7' from the west abutment.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	33R	B-21-054	B21054-33R-MUN-NBI	JUN 3, 2015

REMARKS

Item 59.15 - Slab
The underside of the slab has a 9" +/- long hairline crack with heavy efflorescence and stalactite at the southeast and northeast corner approximately 5-1/2' from the east abutment and 2-1/2' from the south and north edge of the slab.

ITEM 60 - SUBSTRUCTURE

Item 60.1 - Abutments
Item 60.1.d - Breastwalls
There is abrasion at the waterline at both breastwalls. The abrasion begins approximately 3' below the slab and gets heavier by the waterline.
East Breastwall
There is a full-height vertical crack at south end of the slab. The crack ranges between 1/8" wide (at top) to nearly 1/4" wide (at the waterline). See photo #10. The crack travels to the mudline. There is a hairline vertical crack nearly 3' high at the top near the north end of the slab. There is a hairline diagonal crack just below the north fascia beam.

Item 60.1.e - Wingwalls
All four wings have abrasion at the waterline.

TRAFFIC SAFETY

Item 36a - Bridge Railing
Concrete type "E" railing. See Item 58.8.

Item 36b - Transitions
There are no transitions. There is chain link fencing abutting bridge railing at the southwest, northwest, and northeast transitions.

Item 36c - Approach Guardrail
There are no approach guardrails. Chain link fencing abuts bridge railing at the southwest, northwest, and northeast approaches. There is no fencing at the southeast approach.

Item 36d - Approach Guardrail Ends
There are no approach guardrail ends.

Photo Log
Photo 1 : Sidewalks - Underside of south sidewalk along the south fascia looking west, spalling and delamination.
Photo 2 : Sidewalks - Top side north sidewalk west end and adjacent to curb, three minor spalls with rusted rebar exposed.
Photo 3 : Sidewalks - Underside of the north sidewalk by the east abutment, two minor spalls with rusted rebar exposed with delamination.
Photo 4 : Railing - North railing middle post, three (3) minor spalls with rusted rebar exposed due to insufficient cover.
Photo 5 : Approaches - West approach, full width transverse 1/8" crack over the west abutment.
Photo 6 : Approaches - East approach westbound roadway adjacent to east abutment just off north approach curb, 6' x 7' bituminous patch.
Photo 7 : Beams - South fascia beam south face top corner east half, three (3) minor spalls.
Photo 8 : Beams - South fascia beam underside face, minor spall with rusted rebar exposed approximately 9' from the east abutment.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	33R	B-21-054	B21054-33R-MUN-NBI	JUN 3, 2015

REMARKS

Photo Log (Cont'd)

Photo 9 : Beams - South fascia beam north face east half, minor spalls with rusted rebar exposed.
Photo 10 : Breastwalls - Full-height vertical crack at the east breastwall below the south end of the slab

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	33R	B-21-054	B21054-33R-MUN-NBI	JUN 3, 2015

PHOTOS

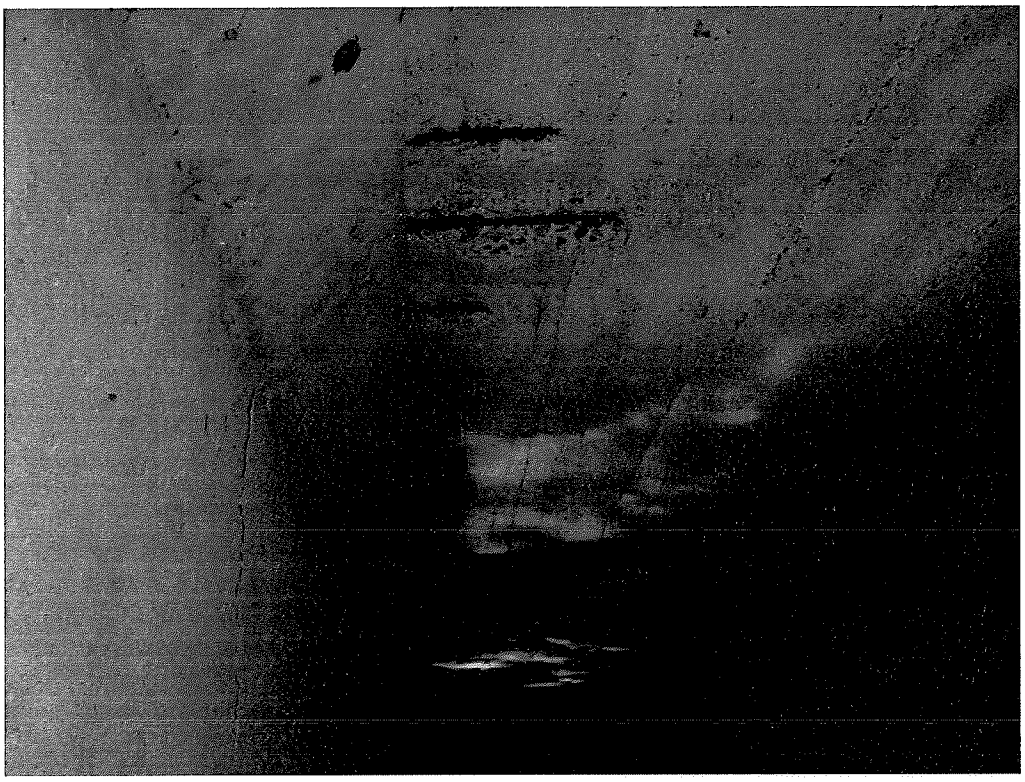


Photo 1: Sidewalks - Underside of south sidewalk along the south fascia looking west, spalling and delamination.

Photo 2: Sidewalks - Top side north sidewalk west end and adjacent to curb, three minor spalls with rusted rebar exposed.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	33R	B-21-054	B21054-33R-MUN-NBI	JUN 3, 2015

PHOTOS

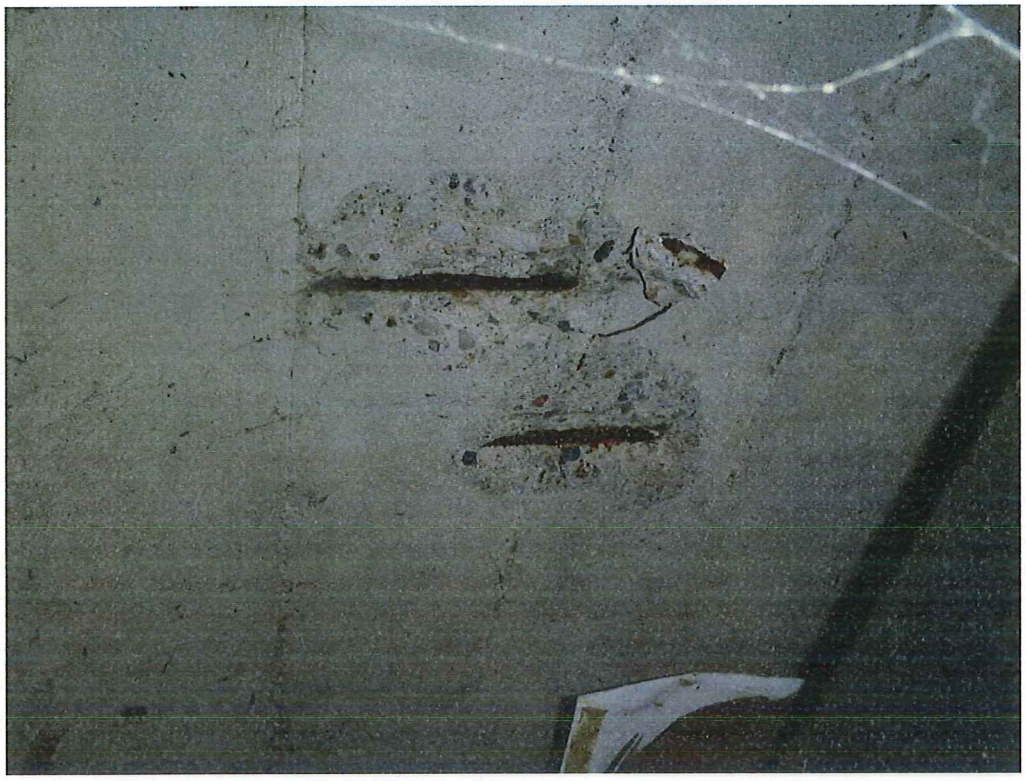


Photo 3: Sidewalks - Underside of the north sidewalk by the east abutment, two minor spalls with rusted rebar exposed with delamination.

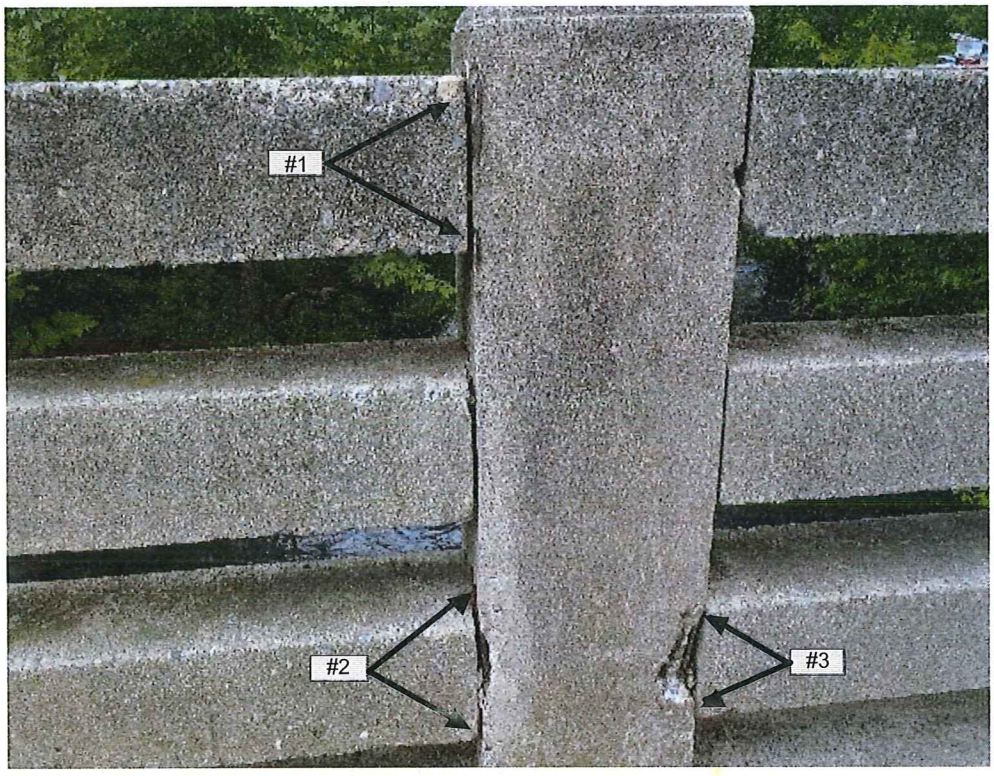


Photo 4: Railing - North railing middle post, three (3) minor spalls with rusted rebar exposed due to insufficient cover.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	33R	B-21-054	B21054-33R-MUN-NBI	JUN 3, 2015

PHOTOS

Photo 5: Approaches - West approach, full width transverse 1/8" crack over the west abutment.

Photo 6: Approaches - East approach westbound roadway adjacent to east abutment just off north approach curb, 6' x 7' bituminous patch.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	33R	B-21-054	B21054-33R-MUN-NBI	JUN 3, 2015

PHOTOS

Photo 7: Beams - South fascia beam south face top corner east half, three (3) minor spalls.

Photo 8: Beams - South fascia beam underside face, minor spall with rusted rebar exposed approximately 9' from the east abutment.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	33R	B-21-054	B21054-33R-MUN-NBI	JUN 3, 2015

PHOTOS

Photo 9: Beams - South fascia beam north face east half, minor spalls with rusted rebar exposed.

Photo 10: Breastwalls - Full-height vertical crack at the east breastwall below the south end of the slab

MASSACHUSETTS BAY COMMUTER RAILROAD
UNDERWATER BRIDGE INSPECTION

PLYMOUTH LINE
OVER MONTITIQUOT RIVER
PLYMOUTH, MA

BRIDGE NO:	**B-21-041**
BIN NO:	**B45**
MILE POST:	**11.667**
STRUCTURE NO:	**B21041B45MBTRRO**
STRUCTURE AGE:	**113 YEARS**
STRUCTURE COMP:	**MASONRY ARCH**
NUMBER OF TRACKS:	**2 TRACKS**
STRUCTURE SIZE:	**1 SPAN**

Prepared by:

BCE
Bourne Consulting Engineering
3 Bent St.
Franklin, MA 02038

CITY/TOWN	BR#/M.M.	B.I.N.	BR. DEPT. NO.	STRUCTURE NO.	INSPECTION DATE
PLYMOUTH, MA	11.667	B45	B-21-041	B21041B45MBTRRO	April 4, 2013

UNDERWATER BRIDGE INSPECTION RECORD

BRIDGE NAME: **PLYMOUTH LINE** **OVER MONTITIQUOT RIVER**
BRIDGE NO: **B45**

TABLE OF CONTENTS

CITY/TOWN	BR#/M.M.	B.I.N.	BR. DEPT. NO.	STRUCTURE NO.	INSPECTION DATE
PLYMOUTH, MA	11.667	B45	B-21-041	B21041B45MBTRRO	April 4, 2013

UNDERWATER BRIDGE INSPECTION RECORD

BOOK 1 OF 1

BRIDGE NAME: **PLYMOUTH LINE** **OVER MONTITIQUOT RIVER**

BRIDGE NUMBER: **B-21-041**

BIN NO: **B45**

MILE POST: **11.667**

STRUCTURE NO: **B21041B45MBTRRO**

STRUCTURE AGE: **113 YEARS**

STRUCTURE COMP: **MASONRY ARCH**

NUMBER OF TRACKS: **2 TRACKS**

STRUCTURE SIZE: **1 SPAN**

ROUTE CARRIED: **PLYMOUTH LINE**

WATERWAY CROSSED: **MONTITIQUOT RIVER**

LOCATION:

CITY AND STATE: **PLYMOUTH, MA**

COUNTY: **PLYMOUTH COUNTY**

OTHER: _____

_____

DATE OF INSPECTION: April 4, 2013

INSPECTION PERSONNEL:

DPIC: JACKIE LI

NO. 2: KEVIN BURUCHIAN

NO. 3: ROBERT CAULK

OTHER: _____

WEATHER: CLOUDY - 40F

CONTRACT NO: _____

JOB NO.: **BCE#** 32910

CITY/TOWN	BR#/M.M.	B.I.N.	BR. DEPT. NO.	STRUCTURE NO.	INSPECTION DATE
PLYMOUTH, MA	11.667	B45	B-21-041	B21041B45MBTRRO	April 4, 2013

INSPECTION FINDINGS / RECOMMENDATIONS

DPIC: JL DIVER: RAC DIVER: _____ ENGINEER: KDB NOTES: KDB

GENERAL

The inspection findings are based on an underwater inspection performed on April 4, 2013 of the Plymouth Line over the Montitiquot River in Plymouth, MA. The bridge consisted of a granite block arch with 4 wingwalls. The channel flowed from west to east with a moderate current (~1 knot) with a bottom condition of sandy gravel and medium to large rocks. The scope of the inspection involved visual and tactile inspection of bridge and channel components below the highwater mark, approximately one foot above the waterline at time of inspection .The item numbers refer to the MBTA Underwater Operation Team, Divers Activity Report, which is attached.

ITEM NO.60 SUBSTRUCTURE

1. ABUTMENTS

60.1d (Breastwalls):The breast walls were in satisfactory condition with missing mortar typical throughout (see Photo 1). Additionally two voids were noted along the north wall: at east corner of arch - 6”H x 4”W corner, 20' from east corner of arch - 2'D x 2' W x 5” H (see Photo 2).

60.1e (Wingwalls): The wingwalls were in satisfactory condition with missing mortar typical throughout (see Photo 1). Undermining was noted at the mudline at two areas along the length of the northeast wingwall: 3' from the east corner - 8'Wx 3”Hx <2'D (see Photo 3), 24' from the east corner 3'W x 1'D x 4” H. Additionally the end stone of the NW wingwall was undermined 1'D x 1'W x 3”H (see Exhibit 4).

60.1g (Pointing): The pointing was in fair condition. Mortar was missing typically (see Photo 1).

60.1h (Footings):The footing of the south abutment consisted of bedrock in satisfactory condition. Fractures were noted throughout the rock face measuring 3-4” wide (see Photo 4). A large vertical fracture was noted 1' from the west corner measuring 1.7' wide and extended to mudline (see Photo 5). Iron staining was noted throughout the rock face (see Photo 6).

60.1j (Scour): The scour was in satisfactory condition. Minor scour was noted along the toe of the north breastwall/ wingwalls causing undermining as noted above.

ITEM NO.61 CHANNEL & CHANNEL PROTECTION

61.1 (Channel Scour): Scour was in satisfactory condition. Minor scour was noted along the toe of the north breastwall/ wingwalls.

61.2 (Embankment Erosion): Embankment erosion was in good condition. Minimal erosion was noted downstream of the bridge (see Photo 7).

61.4 (Vegetation): The embankment vegetation was in good condition and consisted of trees and low growth.

61.9 (Debris in Channel): Debris was in satisfactory condition. Large timber debris was noted against the NW face but was not restricting flow.

CITY/TOWN	BR#/M.M.	B.I.N.	BR. DEPT. NO.	STRUCTURE NO.	INSPECTION DATE
PLYMOUTH, MA	11.667	B45	B-21-041	B21041B45MBTRRO	April 4, 2013

INSPECTION FINDINGS / RECOMMENDATIONS

DPIC: JL DIVER: RAC DIVER: _____ ENGINEER: KDB NOTES: KDB

RECOMMENDATIONS

Repair missing mortar and monitor undermining. Perform regularly scheduled underwater inspections.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

UNDERWATER OPERATIONS TEAM

DIVERS ACTIVITY REPORT

2-DIST	B.I.N.	BR. DEPT. NO.
	B45	B-21-041

4-CITY/TOWN	8-STRUCTURE NO.	LEVEL OF INSP.	93b-INSPECTION DATE
PLYMOUTH, MA	B21041B45MBTRRO	LEVEL I & II	April 4, 2013

7-FACILITY CARRIED	ACCESS TO BRIDGE	UNDERWATER OPERATIONS ENGINEER
PLYMOUTH LINE	BANK	RONALD BOURNE, PE

06-FEATURES INTERSECTED	DEPTH	VISIBILITY	TEAM LEADER (DIVE MASTER)	*Report submitted by:*
MONTITIQUOT RIVER	4'	3'	ALAN PEPIN	BCE

BOTTOM CONDITION	CURRENT	TEAM MEMBERS
ROCKY	1 KNOT	KEVIN BURUCHIAN ROBERT CAULK JACKIE LI

ITEM 60 (Underwater) *SUBSTRUCTURE* — **6**

		DEF
1. Abutments		
a. Pedestals	N	
b. Bridge Seats	N	
c. Backwalls	N	
d. Breastwalls	6	M/P
e. Wingwalls	6	M/P
f. Slope Paving/Rip-Rap	N	
g. Pointing	5	M/P
h. Footings	6	M/P
i. Piles	N	
j. Scour	6	M/P
k. Settlement	N	
l.		
2. Piers or Bents		
a. Pedestals	N	
b. Caps	N	
c. Columns	N	
d. Stems/Webs/Pierwalls	N	
e. Pointing	N	
f. Footing	N	
g. Piles	N	
h. Scour	N	
i. Settlement	N	
j.		
k.		
3. Pile Bents		
a. Pile Caps	N	
b. Piles	N	
c. Diagonal Bracing	N	
d. Horizontal Bracing	N	
e. Fasteners	N	

UNDERMINING (Y=Yes / N=No) — Y

ITEM 61 *CHANNEL & CHANNEL PROTECTION* — **6**

		DEF
1. Channel Scour	6	
2. Embankment Erosion	7	
3. Drift	N	
4. Vegetation	7	
5. Utilities	N	
6. Rip-Rap/Slope Protection	N	
7. Aggradation	N	
8. Fender System	N	
a. Piles	N	
b. Diagonal Bracing	N	
c. Horizontal Bracing	N	
d. Wales	N	
e. Fasteners	N	
f. Ladders	N	
9. DEBRIS	6	

ITEM 59 *SUPERSTRUCTURE* (if any part done by divers)

ITEM 62 *CULVERTS* — **N**

		DEF
1. Roof	N	
2. Floor	N	
3. Walls	N	
4. Headwall	N	
5. Wingwall	N	
6. Pipe	N	
7. Protective Coating	N	
8. Embankment	N	
9. Wearing Surface	N	
10. Railing	N	
11. Sidewalks	N	
12. Utilities	N	
13. Member Alignment	N	
14. Deformation	N	
15. Scour	N	
16. Settlement	N	

UNDERMINING (Y=Yes / N=No) — N

DEFICIENCY REPORTING GUIDE

DEFICIENCY: A defect in a structure that requires corrective action.

CATEGORIES OF DEFICIENCIES:

M= Minor Deficiency - Deficiencies which are minor in nature, generally do not impact the structural integrity of the bridge and could easily be repaired. Examples include but are not limited to: Spalled concrete, Minor scouring, etc.

S= Severe/Major Deficiency - Deficiencies which are more extensive in nature and need more planning and effort to repair. Examples include but are not limited to: Moderate to major deterioration in concrete, Exposed and corroding rebars, Deteriorated timber piles, Considerable settlement, Considerable scouring or undermining, etc.

C-S= Critical-Structural Deficiency - A deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge.

C-H= Critical-Hazard Deficiency - A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples include but are not limited to: Any part of piles or fender system which are projecting outward and may become a safety hazard for the navigational traffic, etc.

URGENCY OF REPAIR:

I= Immediate - [Inspector(s) immediately contact District Bridge Inspection Engineer (DBIE) to report the Deficiency and to receive further instruction from him/her].

A= As soon as possible - [Action/Repair should be initiated by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) upon receipt of the Inspection Report].

P= Prioritize - [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available].

X=UNKNOWN N=NOT APPLICABLE H=HIDDEN/INACCESSIBLE R=REMOVED

CITY/TOWN	BR#/M.M.	B.I.N.	BR. DEPT. NO.	STRUCTURE NO.	INSPECTION DATE
PLYMOUTH, MA	11.667	B45	B-21-041	B21041B45MBTRRO	April 4, 2013

PHOTOGRAPHS

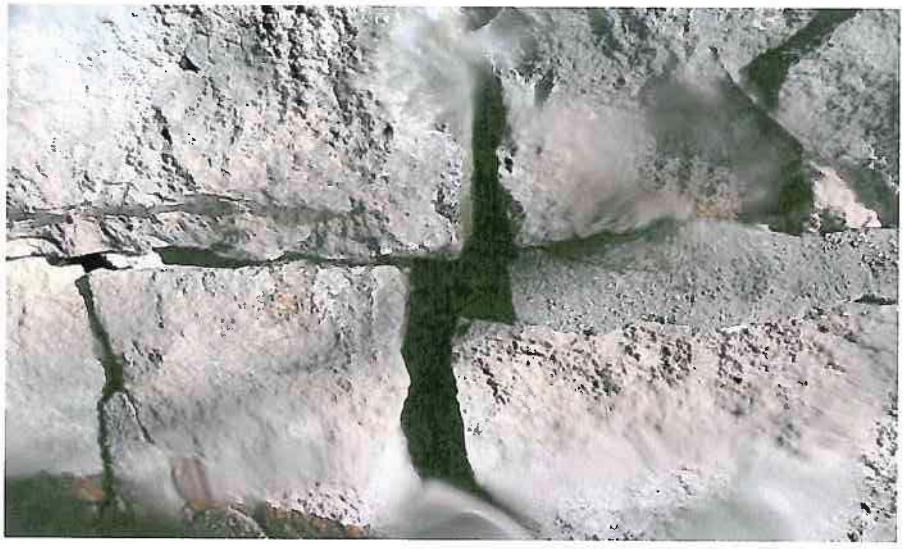


Photo 001

North Abutment - missing mortar (typ)

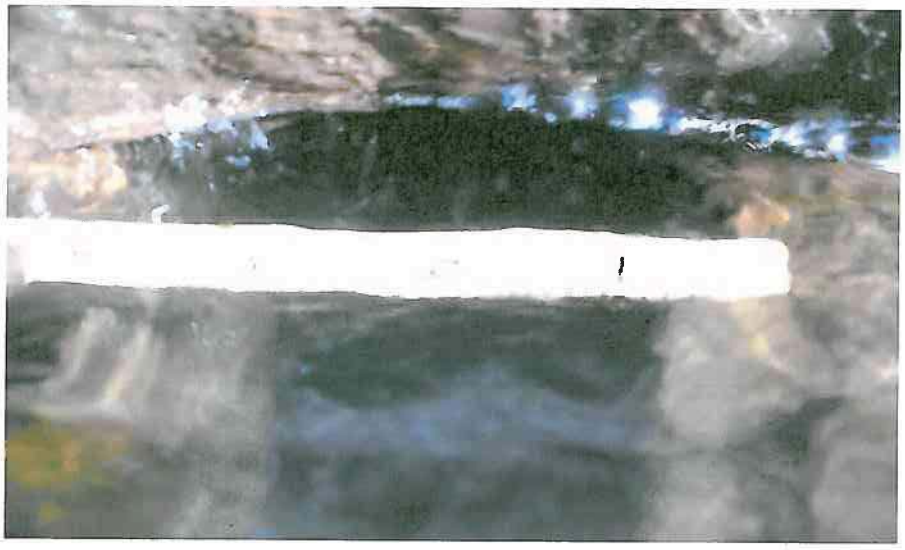


Photo 002

North breastwall - void 6"H x 4"W

CITY/TOWN	BR#/M.M.	B.I.N.	BR. DEPT. NO.	STRUCTURE NO.	INSPECTION DATE
PLYMOUTH, MA	11.667	B45	B-21-041	B21041B45MBTRRO	April 4, 2013

PHOTOGRAPHS

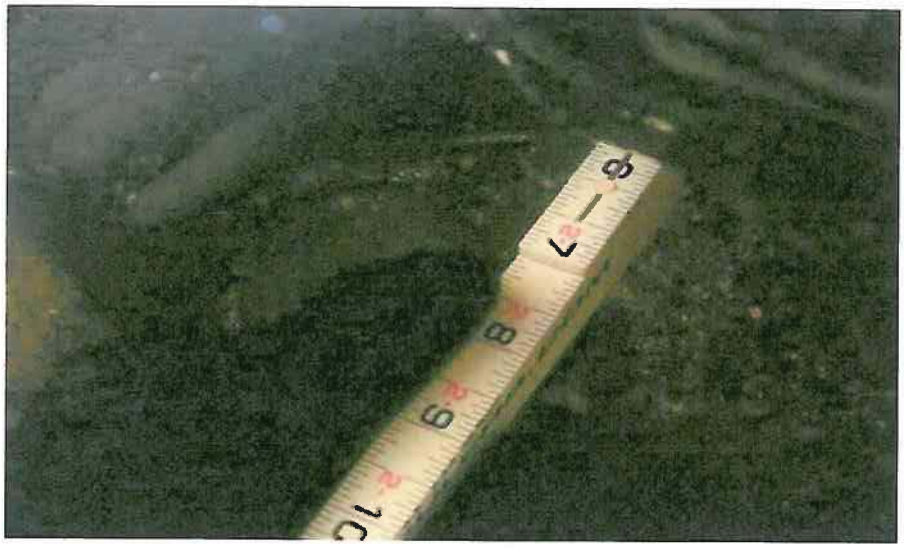


Photo 003

North east wingwall - undermining 2'+ deep

Photo 004

South Footing - 3-4" wide fractures throughout bedrock

CITY/TOWN	BR#/M.M.	B.I.N.	BR. DEPT. NO.	STRUCTURE NO.	INSPECTION DATE
PLYMOUTH, MA	11.667	B45	B-21-041	B21041B45MBTRRO	April 4, 2013

PHOTOGRAPHS

Photo 005

South Footing - 1.7' wide fracture and loose stone on top.

Photo 006

South Footing - iron staining (typ)

CITY/TOWN	BR#/M.M.	B.I.N.	BR. DEPT. NO.	STRUCTURE NO.	INSPECTION DATE
PLYMOUTH, MA	11.667	B45	B-21-041	B21041B45MBTRRO	April 4, 2013

PHOTOGRAPHS

Photo 007

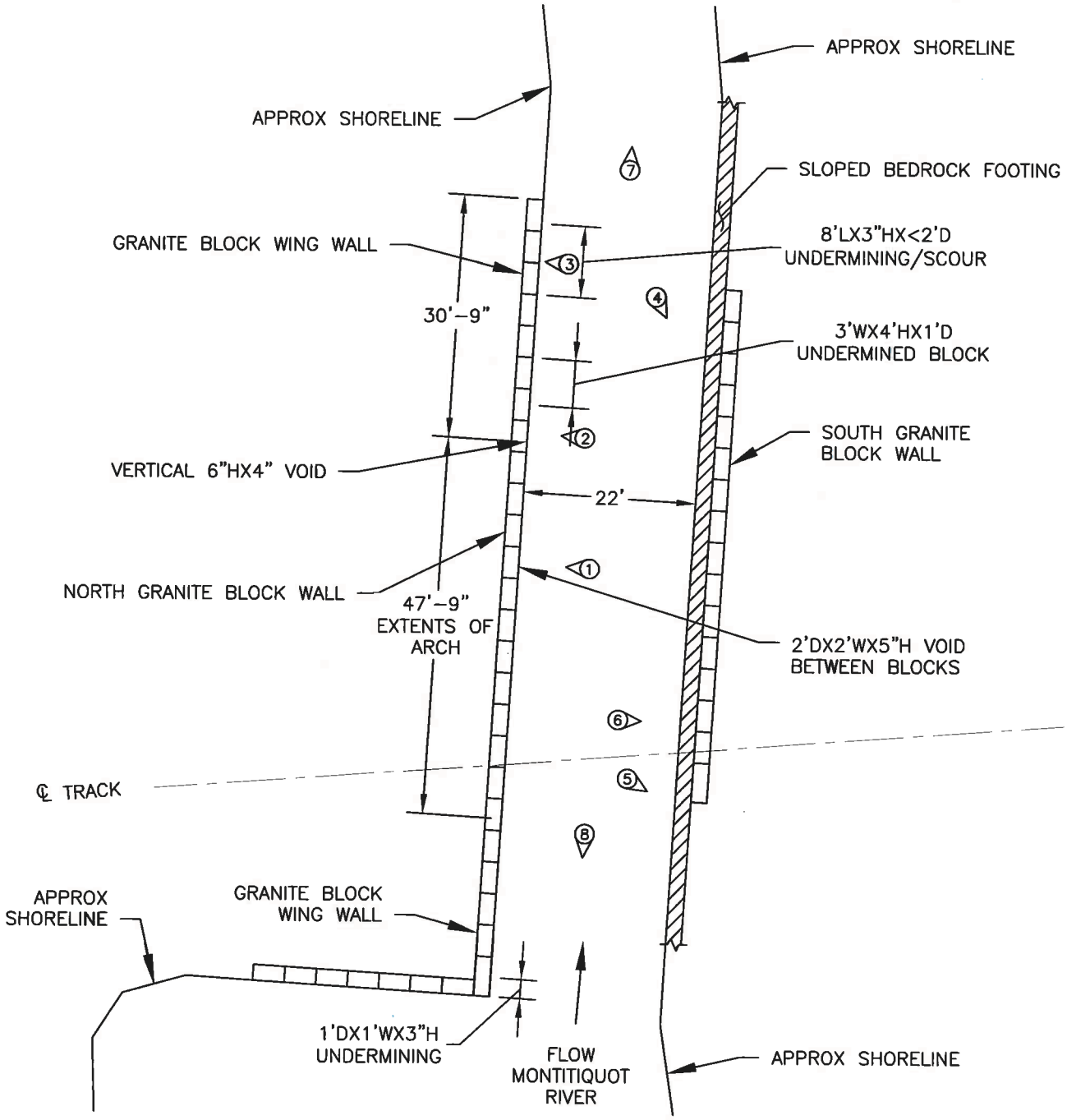
View downstream (looking east)

Photo 008

View upstream (looking west)

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.–STRUCTURE NO.	INSPECTION DATE
BRAINTREE, MA				March 28, 2013

STRUCTURE PLAN VIEW



A/1 PLAN VIEW

SCALE: 1"=20'-0"

0 20

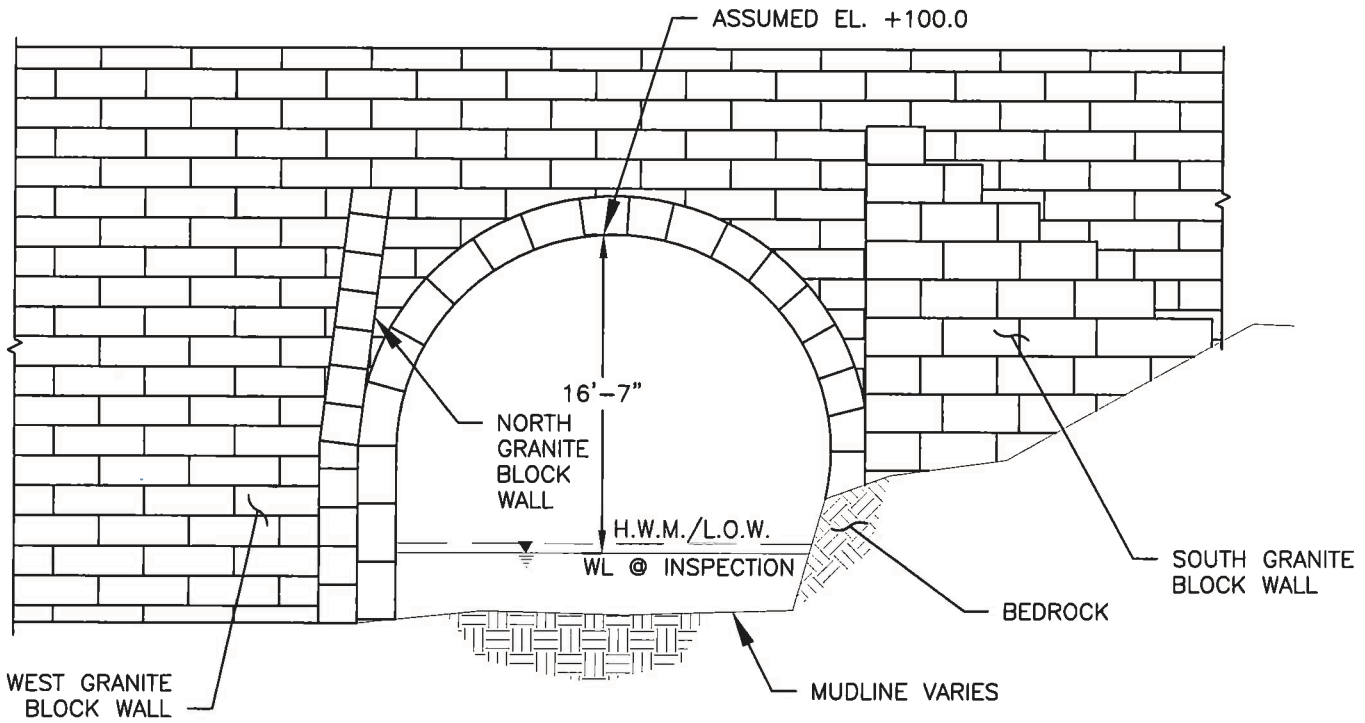
SCALE: 1"=20'-0"

BCE Bourne Consulting Engineering
3 Bent Street
Franklin, MA 02038
TEL. (508) 533-8666 FAX (508) 533-8669

EXHIBIT 1

File: X:\32867-\32910\South Shore\Plymouth Line\Bridge #11.667\Draft\Bridge inspection.dwg

File: x:\32867-\32910\South Shore\Plymouth Line\Bridge #11.667\Draft\Bridge Inspection.dwg



A/2 ELEVATION (TYP.)

SCALE: 1"=10'-0"

0 10

SCALE: 1"=10'-0"

H.W.M.-HIGH WATER MARK
L.O.W.-LIMIT OF WORK

CITY/TOWN BRAINTREE, MA

B.I.N.

BR. DEPT. NO.

8.-STRUCTURE NO.

INSPECTION DATE March 28, 2013

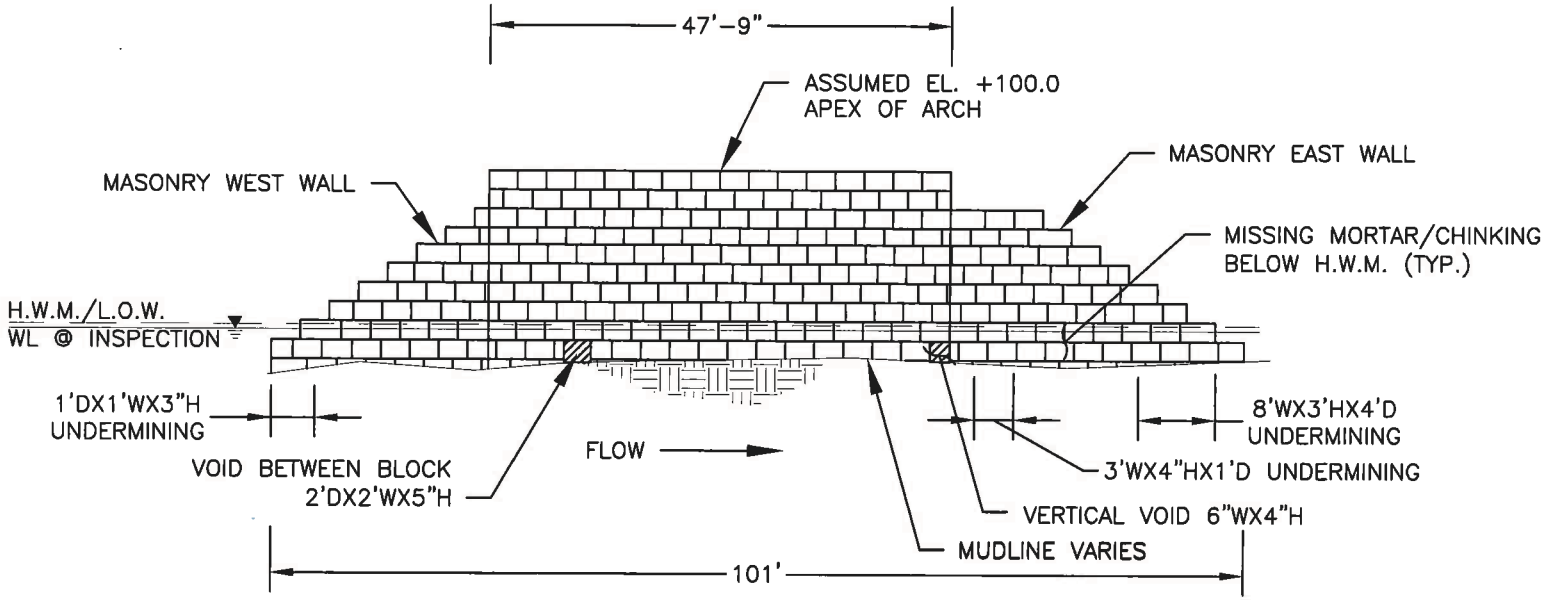
STRUCTURE ELEVATION

PAGE 10 OF 12

BCE Bourne Consulting Engineering

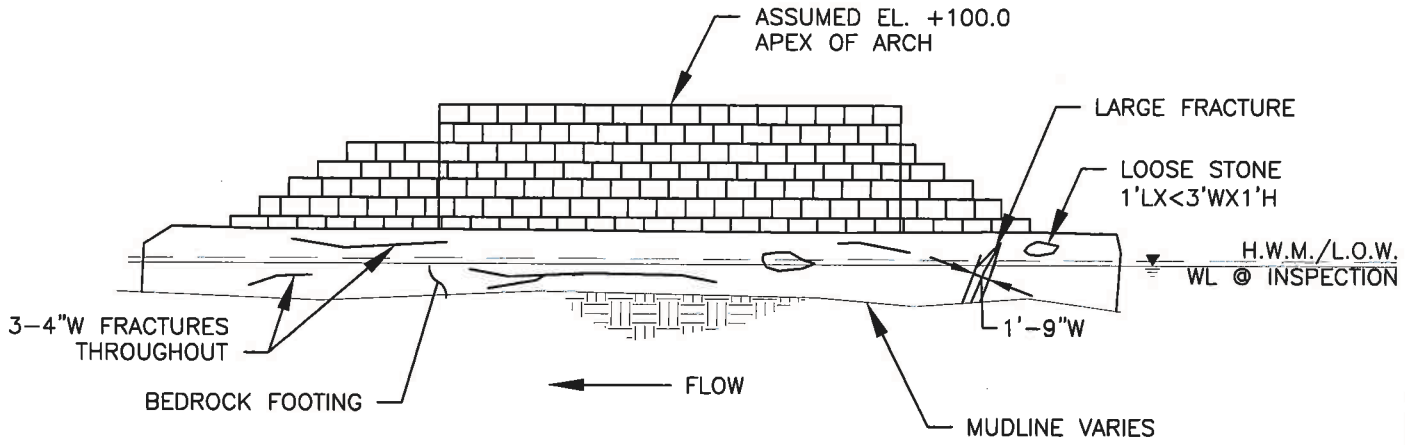
EXHIBIT 2

File: X:\32867-\32910\South Shore\Plymouth Line\Bridge #11.667\Draft\Bridge Inspection.dwg



A/3 NORTH WALL ELEVATION

SCALE: 1"=20'-0"



B/3 SOUTH WALL ELEVATION

SCALE: 1"=20'-0"

0 20

SCALE: 1"=20'-0"

H.W.M.-HIGH WATER MARK
L.O.W.-LIMIT OF WORK

BCE Bourne Consulting Engineering

EXHIBIT 3

CITY/TOWN BRAINTREE, MA

B.I.N.

BR. DEPT. NO.

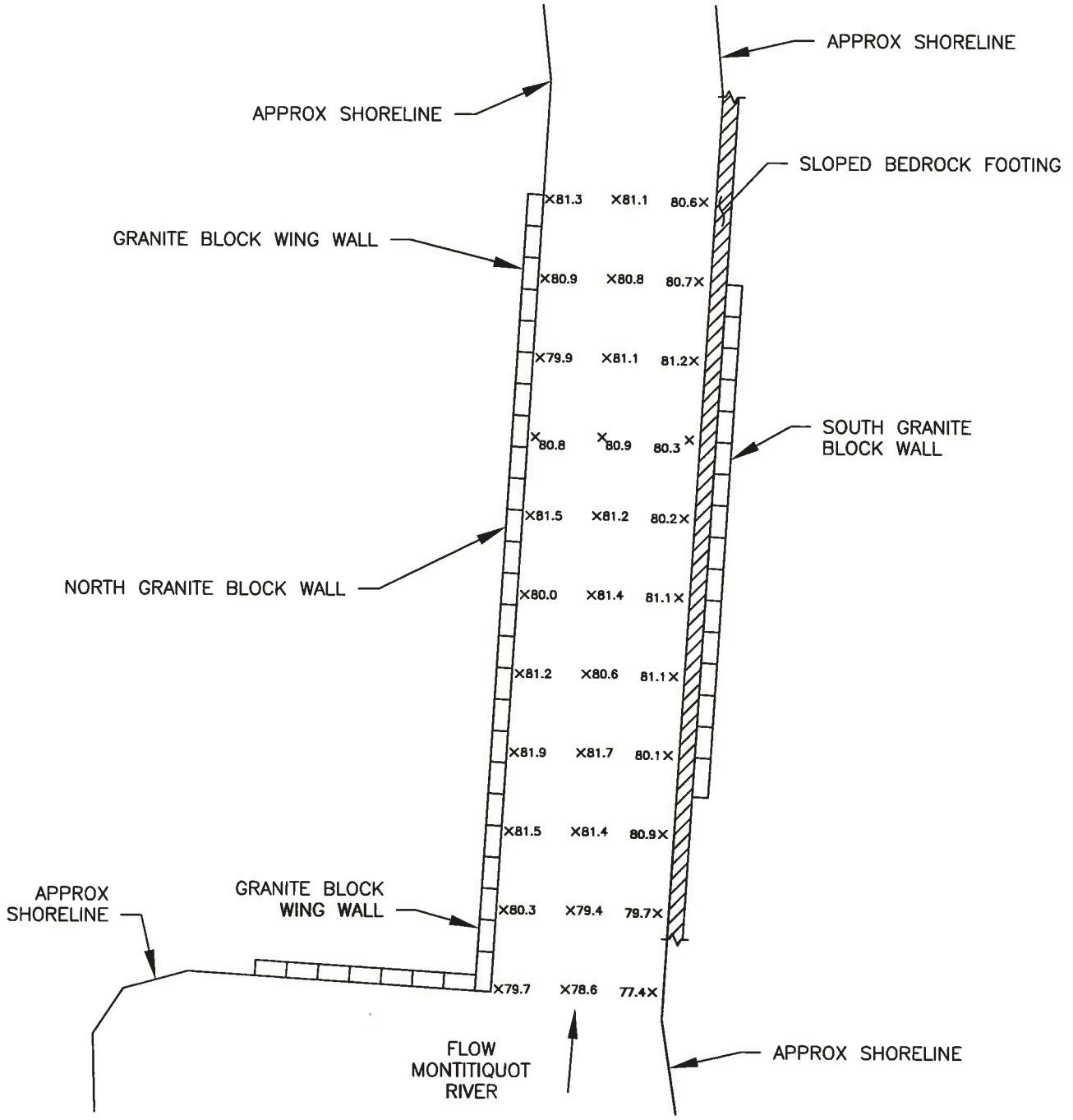
8.-STRUCTURE NO.

INSPECTION DATE March 28, 2013

STRUCTURE ELEVATION

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.–STRUCTURE NO.	INSPECTION DATE
BRAINTREE, MA				March 28, 2013

WATERWAYS
SOUNDINGS



A/4 SOUNDINGS PLAN

SCALE: 1"=20'-0"

0 20

SCALE: 1"=20'-0"

BCE Bourne Consulting Engineering
3 Beal Street
Franklin, MA 02038
TEL. (508) 533-8600 FAX. (508) 533-8660

EXHIBIT 4

File: X:\32867-\32910\South Shore\Plymouth Line\Bridge #11.667\Draft\Bridge Inspection.dwg

2-DIST	B.I.N.
06	361

UNDERWATER OPERATIONS TEAM
ROUTINE UNDERWATER INSPECTION REPORT

BR. DEPT. NO.
B-21-014

CITY/TOWN	8-STRUCTURE NO.	LEVEL OF INSPECTION	93B-DATE INSPECTED
BRAINTREE	B21014-361-DOT-NBI	II	AUG 18, 2015

07-FACILITY CARRIED	ACCESS TO BRIDGE	UNDERWATER OPERATIONS ENGINEER
HWY PLAIN ST	EMBANKMENT	RANDI E. BONICA

06-FEATURES INTERSECTED	DEPTH	VISIBILITY	TEAM LEADER (DIVE MASTER)	*Report submitted by:*
WATER MONATIQUOT RIVER	1 m	0.5 m	WILLIAM J. COLLERAN	

BOTTOM CONDITION	CURRENT	TEAM MEMBERS
BOULDERS, GRAVEL, SILT	SLIGHT	R. E. BONICA, J. A. MANKOWSKY, G. BROZ, B. FITZGERALD

ITEM 60 *SUBSTRUCTURE*

		DEF
1. Abutments	5	
a. Pedestals	N	-
b. Bridge Seats	N	-
c. Backwalls	N	-
d. Breastwalls	5	M-P
e. Wingwalls	5	-
f. Slope Paving/Rip-Rap	7	-
g. Pointing	N	-
h. Footings	H	-
i. Piles	N	-
j. Scour	6	-
k. Settlement	7	-
l. Gunite	5	-
2. Piers or Bents	N	
a. Pedestals	N	-
b. Caps	N	-
c. Columns	N	-
d. Stems/Webs/Pierwalls	N	-
e. Pointing	N	-
f. Footing	N	-
g. Piles	N	-
h. Scour	N	-
i. Settlement	N	-
j.	N	-
k.	N	-
3. Pile Bents	N	
a. Pile Caps	N	-
b. Piles	N	-
c. Diagonal Bracing	N	-
d. Horizontal Bracing	N	-
e. Fasteners	N	-
UNDERMINING (Y/N)		N

ITEM 61 *CHANNEL & CHANNEL PROTECTION*

		DEF
1. Channel Scour	6	-
2. Embankment Erosion	7	-
3. Debris	7	-
4. Vegetation	7	-
5. Utilities	N	-
6. Rip-Rap/Slope Protection	7	-
7. Aggradation	7	-
8. Fender System	N	-
a. Piles	N	-
b. Diagonal Bracing	N	-
c. Horizontal Bracing	N	-
d. Wales	N	-
e. Fasteners	N	-
f. Ladders	N	-
9.	N	-

ITEM 59 *SUPERSTRUCTURE*

		DEF
	N	-
	N	-
	N	-

ITEM 62 *CULVERTS*

		DEF
1. Roof	N	-
2. Floor	N	-
3. Walls	N	-
4. Headwall	N	-
5. Wingwall	N	-
6. Pipe	N	-
7. Protective Coating	N	-
8. Embankment	N	-
9. Wearing Surface	N	-
10. Railing	N	-
11. Sidewalks	N	-
12. Utilities	N	-
13. Member Alignment	N	-
14. Deformation	N	-
15. Scour	N	-
16. Settlement	N	-
17.	N	-
18.	N	-
UNDERMINING (Y/N)		N

DEFICIENCY REPORTING GUIDE

DEFICIENCY: A defect in a structure that requires corrective action.

CATEGORIES OF DEFICIENCIES:

M= Minor Deficiency- Deficiencies which are minor in nature, generally do not impact the structural integrity of the bridge and could easily be repaired. Examples include but are not limited to: Spalled concrete, Minor scouring, etc.

S= Severe/Major Deficiency- Deficiencies which are more extensive in nature and need more planning and effort to repair. Examples include but are not limited to: Moderate to major deterioration in concrete, Exposed and corroding rebars, Deteriorated timber piles, Considerable settlement, Considerable scouring or undermining, etc.

C-S= Critical Structural Deficiency- A deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge.

C-H= Critical Hazard Deficiency- A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples include but are not limited to: Any part of piles or fender system which are projecting outward and may become a safety hazard for the navigational traffic, etc.

URGENCY OF REPAIR:

I=Immediate- [Inspector(s) immediately contact District Bridge Inspection Engineer (DBIE) to report the Deficiency and to receive further instruction from him/her.]

A=ASAP- [Action/Repair should be initiated by District Maintenance Engineer or the responsible party (if not a State owned bridge) upon receipt of the Inspection Report.]

P=Prioritize- [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available.]

X=UNKNOWN **N=NOT APPLICABLE** **H=HIDDEN/INACCESSIBLE** **R=REMOVED**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	361	B-21-014	B21014-361-DOT-NBI	AUG 18, 2015

REMARKS

ITEM 60 - SUBSTRUCTURE

Item 60.1 - Abutments
Item 60.1.d - Breastwalls
Left Abutment:
The upstream left breastwall is deteriorated for a length 0.7', height of 2.5' and penetration of 0.3'. This deterioration continues along the wingwall for a length of 2.0'.
The gunite below the waterline has random areas of deterioration exposing fieldstones. There are isolated penetrations between fieldstones up to 1.4'. There are intermittent areas of gunite overpour at the mudline.
From Sta 1+34 to Sta 1+39 there is a formed concrete area, possibly a curtain wall, with a toe width of 2.5' and a height of 1.0'. This area has a deteriorated vertical face. The formed concrete area is undermined from Sta 1+35 to Sta 1+39 (4.0' long, 0.5' high, 0.6' penetration).
There is an irregular concrete spall at the downstream end located 2' above the water, approximately 10' long beginning at a horizontal pour joint below the waterline, for a height of 3.0'. Maximum penetration is 0.4'.

Right Abutment:
There are two voids in the fieldstone breastwall at the mudline, measured in areas of gunite deterioration. Voids are due to missing fieldstones.
Sta 1+07 - 4.2' long, 1.5' high, 4.8' penetration
Sta 1+15 - 3.0' long, 0.8' high, 2.2' penetration
The gunite below the waterline has random areas of deterioration exposing fieldstones. There are isolated penetrations between fieldstones up to 2.2'. There are random spalls with maximum penetrations of 0.8'.

Item 60.1.e - Wingwalls
There is concrete deterioration in the upstream wingwalls starting at the corners of the abutments, above the waterline. The upstream left wingwall is deteriorated for a length along the wingwall of 2.0', height of 2.5' and penetration of 0.3'. This deterioration continues for a length of 0.7' along the breastwall. The upstream right wingwall is deteriorated for a length of 1.5', height of 1.5' and penetration of 0.3'.

Item 60.1.f - Slope Paving/Rip-Rap
The riprap at the embankments is partially covered.

Item 60.1.h - Footings
No footings are exposed. Plans show concrete footings at the concrete extensions with a height of 2' 0" and a toe width of 18". Footings are located 8.2' below the bridge seat.

Item 60.1.i - Piles
Plans for concrete extensions show no piles at bridge.

Item 60.1.j - Scour
No footing is exposed. There are remnants of wood sheeting at random locations along the face of the breastwalls.

Item 60.1.l - Gunite
The gunite below the waterline has random areas of deterioration exposing fieldstones. There are intermittent areas of gunite overpour at the mudline. The gunite overpour has undermining.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	361	B-21-014	B21014-361-DOT-NBI	AUG 18, 2015

REMARKS

ITEM 61 - CHANNEL AND CHANNEL PROTECTION

Item 61.1 - Channel Scour

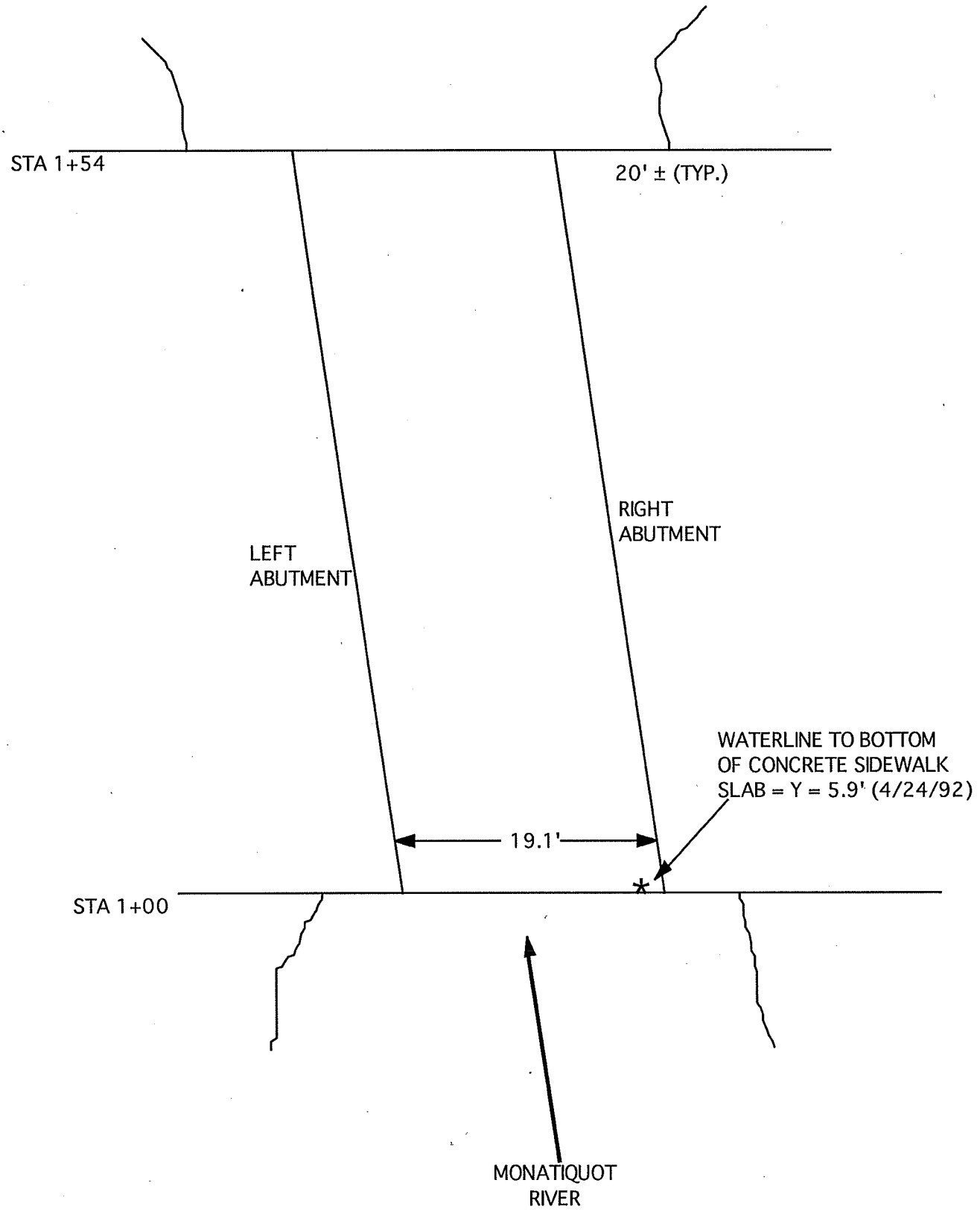
No footings are exposed. There are remnants of wood sheeting at random locations along the face of the breastwalls.

Sketch / Chart Log

Sketch 1 : PLAN VIEW - NOT TO SCALE
Chart 1 : SCOUR MONITORING CHART AT UPSTREAM END

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	361	B-21-014	B21014-361-DOT-NBI	AUG 18, 2015

SKETCHES



Sketch 1: PLAN VIEW - NOT TO SCALE

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	361	B-21-014	B21014-361-DOT-NBI	AUG 18, 2015

CHARTS

	4/24/92	4/11/95	3/5/98	3/14/01	3/11/04	12/12/06	8/14/09	8/20/12
LEFT ABUTMENT	3.3'	3.1'	3.0'	3.0'	3.0'	3.0'	3.1'	4.1'
C/L SPAN	4.1'	4.3'	3.9'	4.3'	3.9'	4.1'	4.1'	4.2'
RIGHT ABUTMENT	2.9'	2.0'	3.6'	2.3'	3.0'	2.4'	2.3'	4.5'
Y	5.9'	5.5'	4.9'	4.9'	5.3'	4.5'	4.5'	6.9'
CORRECTION FACTOR	---	-0.4'	-1.0'	-1.0'	-0.6'	-1.4'	-1.4'	+1.0'

	8/18/15							
LEFT ABUTMENT	4.0'							
C/L SPAN	4.2'							
RIGHT ABUTMENT	4.6'							
Y	7.2'							
CORRECTION FACTOR	+1.3'							

NOTES:
1. Y=WATERLINE TO BOTTOM OF CONCRETE SIDEWALK SLAB AT UPSTREAM END OF RIGHT ABUTMENT.
2. SOUNDINGS ADJUSTED TO 4/24/92 WATERLINE WITH CORRECTION FACTOR.
3. STA 1+00 IS AT THE UPSTREAM END.

Chart 1: SCOUR MONITORING CHART AT UPSTREAM END

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

UNDERWATER BRIDGE INSPECTION

OLD COLONY LINE
MIDDLEBORO BRANCH over the MONATIQUOT RIVER
BRAINTREE, MA
BRIDGE NO. B-21-042
BIN NO. B48
MILE POST 11.98
STRUCTURE NO. B21042B48MBTRRO

Prepared By: CHILDS ENGINEERING CORPORATION
34 William Way
Bellingham, MA 02019

In Affiliation With: THE LOUIS BERGER GROUP, INC.
117 Kendrick Street, Suite 400
Needham, MA 02494

August 2011

MBTA Bridge Inspection

TABLE OF CONTENTS

MBTA Bridge Inspection

Introduction

The following report was prepared by Childs Engineering Corporation under an agreement with the Louis Berger Group, Inc. As required by this agreement, Childs Engineering performed an underwater inspection on the submerged bridge components on the 13 MBTA bridges. The inspections were performed from June 29th to July 13th 2011. The inspections were performed in accordance with NBI and FWH inspection standards for in-service bridges.

A team of engineer/ divers performed the underwater inspections according to current OSHA and ADC diving guidelines. Divers utilized SCUBA equipment for the underwater inspections. The underwater inspections included visual observation of all exposed, accessible components of the bridges or culverts and/or abutments and piers as well as exposed pilings on pile supported structures.

Concrete structures were checked for soundness by regularly striking with a chipping hammer. Timber members received a close visual inspection and when appropriate were probed with a pick to determine internal conditions. Exposed portions of all underwater fasteners were inspected and any deficiencies were noted. Steel structures were cleaned at regular intervals to allow close visual inspection. When deemed appropriate steel thickness measurements were taken with an ultrasonic thickness gauge. The river bottom immediately adjacent to the inspected structures was probed to determine relative soil density and visually inspected for undermining and scour. The river channels were inspected for drift, scour, aggradation, bank erosion and vegetation. Photos were taken above and below the existing waterline to document conditions and logged in a weather proof field book along with conditions notes.

MBTA Bridge Inspection

Bridge No. B-21-042

Observed Conditions

The original structure is reported to have been built in 1895, and then reconstructed in 1994. The bridge is located in Braintree, Massachusetts at mile marker 11.981 and is used as part of the MBTA Old Colony Middleboro Branch Line crossing the Monatiquot River in a north to south direction. The bridge is composed of two abutments and two piers supporting a single set of tracks. The abutments and piers are composed of multiple courses of mortar field stone with one to two courses of a granite block cap (see photos 1-2). The modifications made in 1994 include new cast-in-place concrete noses added to the upstream end of each pier, new cast-in place concrete back walls constructed for the abutments, and the granite blocks and field stones were re-pointed. Observed deficiencies and soundings are shown on drawing X-108.

Assessment

The abutments and piers are generally in good condition. The mortared field stone joints, although re-pointed in 1994, are in fair to poor condition. The field stone of the north and south abutments and wingwalls has numerous missing, loose and cracked joints with vegetation growth in the joints (see photo 3). The granite block joints on the abutments have minor mortar loss. The corrugated drain pipe on the south abutment has a 2 foot long corrosion hole in the bottom of the pipe. This condition has caused the pipe to become undermined. Erosion of the surrounding material continues (see photo 4).

The north and south faces of Piers 1 and 2 have numerous missing, loose and cracked joints in the field stone base courses. The majority of these joints are deteriorated and separated allowing the chink stones to become loose and dislodge (see photo 5-7). At Pier 2 there is a minor crack in the granite block cap along the north face. The crack runs diagonally between beams B and C and is 10” long. The southwest side of Pier 1 has a 6 foot long section of failed mortar with loose/missing chink stones (see photo 8).The east ends of the piers have vegetation growth between the granite blocks.

The channel and channel protection are in satisfactory condition with no signs of undermining or erosion. Piers 1 and 2 have minor scour along the pier faces. This condition is consistent with a previous report dated July 2005. A debris pile was observed between Piers 1 and 2 on the west side of the bridge (see photo 9). The river bed is composed of silt, sand and gravel with some stones.

Recommendations

The voids and the loose, missing, cracked mortar joints of the abutments, wingwalls, and piers should be repaired to prevent further deterioration. These areas can be repaired by chipping away at the deteriorated mortar, cleaning and repointing. The corrugated drain pipe should be repaired to prevent further fill material loss from behind the abutment. The pipe can be sleeved and the voids filled with a non-shrink grout. The vegetation and undergrowth on the abutments should be removed to prevent further deterioration and separation of the mortar joints. The debris pile should be removed and riprap should be placed along the pier faces to prevent further scouring along the pier faces.

Photo 1- Overall, west end of piers

Photo 2- Overall, looking downstream

Photo 3-North abutment loose/missing mortar and chink stones with vegetation growth

Photo 4- South abutment, corroded and undermined the drainage pipe.

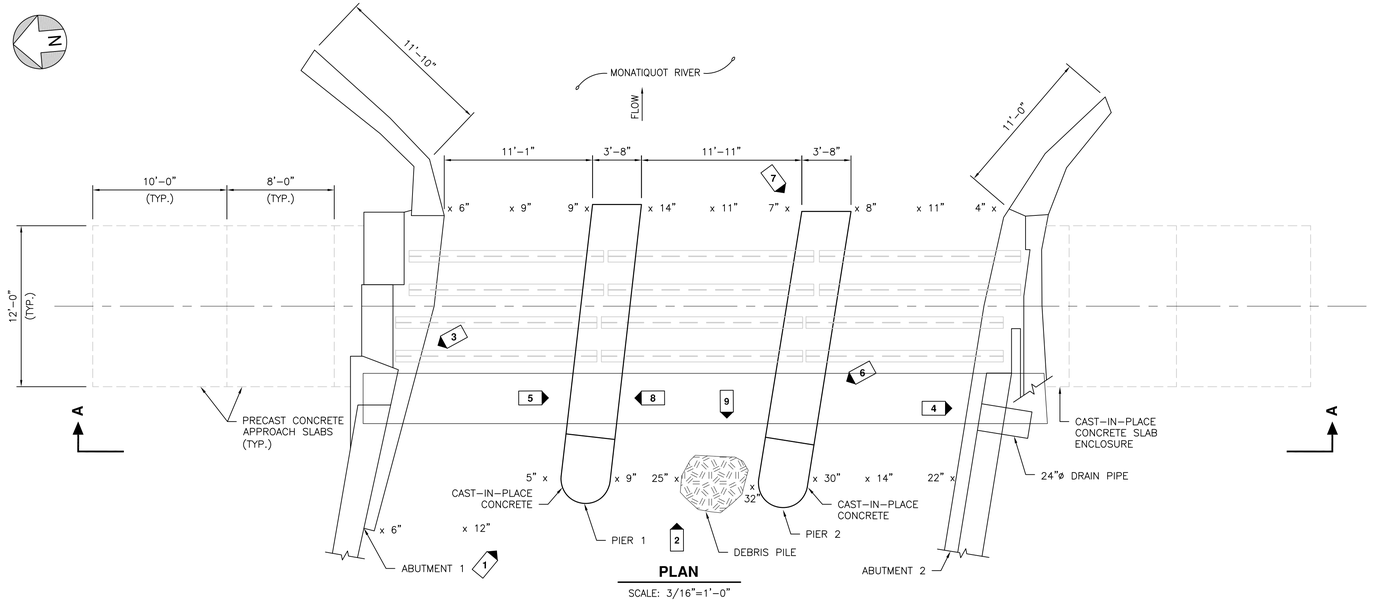
Photo 5- Pier 1, North face, failed and missing mortar

Photo 6- Pier 2, south face, failed and missing mortar

Photo 7- Pier 2, east end

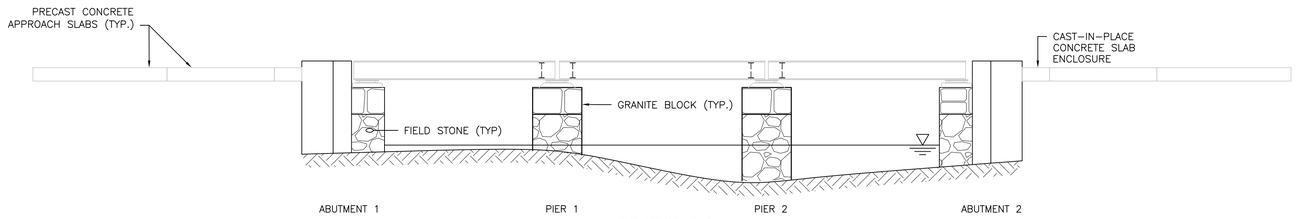
Photo 8- Pier 1**,** southwest side, 6’ L x 14” D section of missing mortar and loose chink stones

Photo 9- Debris pile between Piers



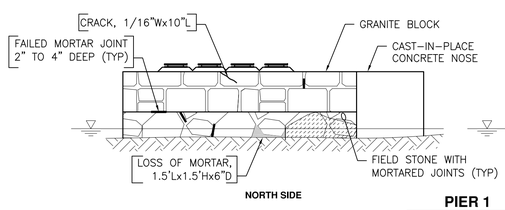
PLAN

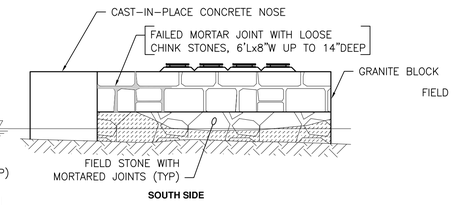
SCALE: 3/16"=1'-0"



SECTION A-A

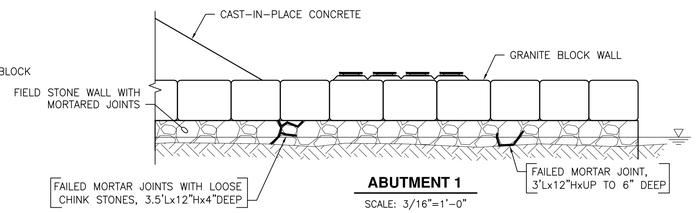
SCALE: 3/16"=1'-0"





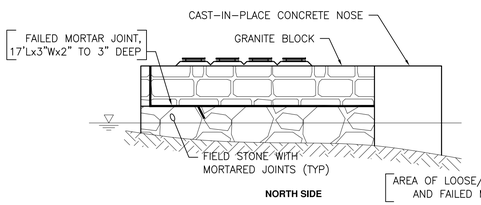
PIER 1

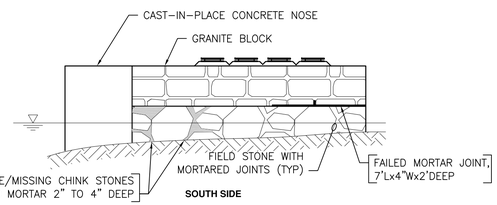
SCALE: 3/16"=1'-0"



ABUTMENT 1

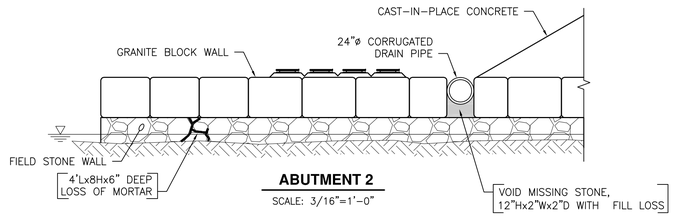
SCALE: 3/16"=1'-0"





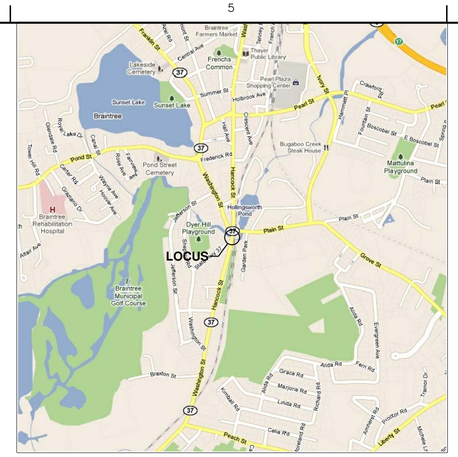
PIER 2

SCALE: 3/16"=1'-0"



ABUTMENT 2

SCALE: 3/16"=1'-0"



LOCUS MAP

SCALE: NONE

LEGEND

- AREA OF MISSING OR LOOSE CHINK STONES
- APPROXIMATE AREA WITH FAILED MORTAR JOINTS
- CONDITION NOTES
- MUDLINE ADJACENT TO STRUCTURE
- 2 — LOCATION AND NUMBER OF PHOTO
- STA. 0+00 — STATIONING IN FEET
- 5"x — SOUNDINGS BELOW WATERLINE
- BEDROCK LINE ADJACENT TO STRUCTURE

NOTE:

1. SOUNDINGS INDICATE WATER LEVEL AT TIME OF INSPECTION. POSITIVE VALUES REPRESENTS AN ELEVATION BELOW THAT PLANE.
2. CONDITIONS SHOWN ON THIS PLAN ARE PART OF CHILDS ENGINEERING UNDERWATER INSPECTION.

CHILDS ENGINEERING CORPORATION
BOX 333 MEDFIELD, MASSACHUSETTS 02052 U.S.A.
Phone: (508) 359-8945 Fax: (508) 359-2751
E-mail: mail@childseng.com

Mark	Description	Date	Appr.

Designed by: PDI	Check by: PDI	Date: 09/30/11	
Drawn by: RGP	Checked by: DLP	Design file no.: 228711-08	Scale: AS NOTED

MBTA BRIDGE INSPECTION
OLD COLONY LINE OVER MONATIQUOT RIVER
BRAINTREE, MA

BRIDGE No. B-21-042
EXISTING CONDITIONS
PLAN AND SECTIONS

Sheet reference number:
X-108
Sheet 8 of 14

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
UNDERWATER OPERATIONS TEAM
DIVERS ACTIVITY REPORT

2-DIST	B.I.N.	BR. DEPT. NO.
04	B48	B-21-042

4-CITY/TOWN	8-STRUCTURE NO.	LEVEL OF INSP.	93b-INSPECTION DATE
Braintree	B21042-B48-MBTRRO	In-Depth	07/08/2011

7-FACILITY CARRIED	ACCESS TO BRIDGE	UNDERWATER OPERATIONS ENGINEER
Old Colony Line	Monatiquot River	Philip D. Iantosca, Jr.

06-FEATURES INTERSECTED	DEPTH	VISIBILITY	TEAM LEADER (DIVE MASTER)	*Report submitted by:*
Monatiquot River	1.5 ft.	1 ft.	Philip D. Iantosca, Jr.	David L. Porter

BOTTOM CONDITION	CURRENT	TEAM MEMBERS
Silt and Stones	Low	Philip D. Iantosca, Jr., Fred Radcliffe, Andrew R. Nilson

ITEM 60 (Underwater) *SUBSTRUCTURE* — 6

		DEF
1. Abutments		
a. Pedestals		
b. Bridge Seats		
c. Backwalls		
d. Breastwalls	6	M/P
e. Wingwalls	6	M/P
f. Slope Paving/Rip-Rap	7	
g. Pointing	5	M/P
h. Footings	N	
i. Piles	N	
j. Scour	6	
k. Settlement	8	
l. Erosion	6	
2. Piers or Bents		
a. Pedestals		
b. Caps	N	
c. Columns		
d. Stems/Webs/Pierwalls	6	
e. Pointing	5	M/P
f. Footing	N	
g. Piles	N	
h. Scour	6	
i. Settlement	N	
j.		
k.		
3. Pile Bents		
a. Pile Caps	N	
b. Piles	N	
c. Diagonal Bracing	N	
d. Horizontal Bracing	N	
e. Fasteners	N	

UNDERMINING (Y=Yes / N=No)	N

ITEM 61 *CHANNEL & CHANNEL PROTECTION* — 7

		DEF
1. Channel Scour	6	
2. Embankment Erosion	7	
3. Drift	7	
4. Vegetation	7	
5. Utilities		
6. Rip-Rap/Slope Protection	7	
7. Aggradation	8	
8. Fender System	N	
a. Piles		
b. Diagonal Bracing		
c. Horizontal Bracing		
d. Wales		
e. Fasteners		
f. Ladders		

ITEM 59 *SUPERSTRUCTURE* (If any part done by divers.)

ITEM 62 *CULVERTS*

		DEF
1. Roof		
2. Floor		
3. Walls		
4. Headwall		
5. Wingwall		
6. Pipe		
7. Protective Coating		
8. Embankment		
9. Wearing Surface		
10. Railing		
11. Sidewalks		
12. Utilities		
13. Member Alignment		
14. Deformation		
15. Scour		
16. Settlement		

UNDERMINING (Y=Yes / N=No)	

DEFICIENCY REPORTING GUIDE

DEFICIENCY: A defect in a structure that requires corrective action.

CATEGORIES OF DEFICIENCIES:

M= Minor Deficiency - Deficiencies which are minor in nature, generally do not impact the structural integrity of the bridge and could easily be repaired. Examples include but are not limited to: Spalled concrete, Minor scouring, etc.

S= Severe/Major Deficiency - Deficiencies which are more extensive in nature and need more planning and effort to repair. Examples include but are not limited to: Moderate to major deterioration in concrete, Exposed and corroding rebars, Deteriorated timber piles, Considerable settlement, Considerable scouring or undermining, etc.

C-S= Critical-Structural Deficiency - A deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge.

C-H= Critical-Hazard Deficiency - A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples include but are not limited to: Any part of piles or fender system which are projecting outward and may become a safety hazard for the navigational traffic, etc.

URGENCY OF REPAIR:

I= Immediate - [Inspector(s) immediately contact District Bridge Inspection Engineer (DBIE) to report the Deficiency and to receive further instruction from him/her].

A= As soon as possible - [Action/Repair should be initiated by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) upon receipt of the Inspection Report].

P= Prioritize - [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available].

X=UNKNOWN **N=NOT APPLICABLE** **H=HIDDEN/INACCESSIBLE** **R=REMOVED**

2-DIST	B.I.N.
06	34G

UNDERWATER OPERATIONS TEAM
ROUTINE UNDERWATER INSPECTION REPORT

BR. DEPT. NO.
B-21-016

CITY/TOWN	8-STRUCTURE NO.	LEVEL OF INSPECTION	93B-DATE INSPECTED
BRAINTREE	B21016-34G-DOT-NBI	II	NOV 12, 2013

07-FACILITY CARRIED	ACCESS TO BRIDGE	UNDERWATER OPERATIONS ENGINEER
ST 37 WASHNGTON ST	EMBANKMENT	RANDI E. BONICA

06-FEATURES INTERSECTED	DEPTH	VISIBILITY	TEAM LEADER (DIVE MASTER)	*Report submitted by:*
WATER MONATIQUOT RIVER	1.5 m	0.5 m	WILLIAM J. COLLERAN	

BOTTOM CONDITION	CURRENT	TEAM MEMBERS
SILT, SAND, PAVING STONES	SLIGHT	R. E. BONICA, J. A. MANKOWSKY, E. P. TERNOSKY

ITEM 60 *SUBSTRUCTURE* — 7

		DEF
1. Abutments	7	
a. Pedestals	N	-
b. Bridge Seats	N	-
c. Backwalls	N	-
d. Breastwalls	7	-
e. Wingwalls	7	-
f. Slope Paving/Rip-Rap	7	-
g. Pointing	N	-
h. Footings	H	-
i. Piles	N	-
j. Scour	8	-
k. Settlement	8	-
l.	N	-
2. Piers or Bents	N	
a. Pedestals	N	-
b. Caps	N	-
c. Columns	N	-
d. Stems/Webs/Pierwalls	N	-
e. Pointing	N	-
f. Footing	N	-
g. Piles	N	-
h. Scour	N	-
i. Settlement	N	-
j.	N	-
k.	N	-
3. Pile Bents	N	
a. Pile Caps	N	-
b. Piles	N	-
c. Diagonal Bracing	N	-
d. Horizontal Bracing	N	-
e. Fasteners	N	-
UNDERMINING (Y/N)		N

ITEM 61 *CHANNEL & CHANNEL PROTECTION* — 6

		DEF
1. Channel Scour	8	-
2. Embankment Erosion	7	-
3. Debris	4	S-A
4. Vegetation	6	-
5. Utilities	N	-
6. Rip-Rap/Slope Protection	7	-
7. Aggradation	6	-
8. Fender System	N	-
a. Piles	N	-
b. Diagonal Bracing	N	-
c. Horizontal Bracing	N	-
d. Wales	N	-
e. Fasteners	N	-
f. Ladders	N	-
9.	N	-

ITEM 59 *SUPERSTRUCTURE*

		DEF
	N	-
	N	-
	N	-

ITEM 62 *CULVERTS* — N

		DEF
1. Roof	N	-
2. Floor	N	-
3. Walls	N	-
4. Headwall	N	-
5. Wingwall	N	-
6. Pipe	N	-
7. Protective Coating	N	-
8. Embankment	N	-
9. Wearing Surface	N	-
10. Railing	N	-
11. Sidewalks	N	-
12. Utilities	N	-
13. Member Alignment	N	-
14. Deformation	N	-
15. Scour	N	-
16. Settlement	N	-
17.	N	-
18.	N	-
UNDERMINING (Y/N)		N

DEFICIENCY REPORTING GUIDE

DEFICIENCY: A defect in a structure that requires corrective action.

CATEGORIES OF DEFICIENCIES:

M= Minor Deficiency- Deficiencies which are minor in nature, generally do not impact the structural integrity of the bridge and could easily be repaired. Examples include but are not limited to: Spalled concrete, Minor scouring, etc.

S= Severe/Major Deficiency- Deficiencies which are more extensive in nature and need more planning and effort to repair. Examples include but are not limited to: Moderate to major deterioration in concrete, Exposed and corroding rebars, Deteriorated timber piles, Considerable settlement, Considerable scouring or undermining, etc.

C-S= Critical Structural Deficiency- A deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge.

C-H= Critical Hazard Deficiency- A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples include but are not limited to: Any part of piles or fender system which are projecting outward and may become a safety hazard for the navigational traffic, etc.

URGENCY OF REPAIR:

I=Immediate- [Inspector(s) immediately contact District Bridge Inspection Engineer (DBIE) to report the Deficiency and to receive further instruction from him/her.]

A=ASAP- [Action/Repair should be initiated by District Maintenance Engineer or the responsible party (if not a State owned bridge) upon receipt of the Inspection Report.]

P=Prioritize- [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available.]

X=UNKNOWN **N=NOT APPLICABLE** **H=HIDDEN/INACCESSIBLE** **R=REMOVED**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	34G	B-21-016	B21016-34G-DOT-NBI	NOV 12, 2013

REMARKS

GENERAL REMARKS

This bridge is a single span structure with concrete abutments, dated 1982.
Concrete abutments are labeled left and right, looking downstream. Sta 10+00 is at the upstream end.
Warning to Divers: There are nails sticking out of the abutments at various locations.

ITEM 60 - SUBSTRUCTURE

Item 60.1 - Abutments

Item 60.1.d - Breastwalls

There is minor concrete abrasion along both abutments approximately 2' high, in the vicinity of the waterline.

Item 60.1.i - Piles

According to plans, bridge is not pile supported.

Item 60.1.j - Scour

The waterway is paved with stones, about 1.5' to 3' in diameter.

ITEM 61 - CHANNEL AND CHANNEL PROTECTION

Item 61.3 - Debris

The downstream right half of the channel is blocked by tree debris that is trapped against piers for the railroad bridge (see sketch). Divers removed a large amount of tree debris, but several trees and branches remain.

Item 61.4 - Vegetation

There is aggradation with vegetation upstream of the bridge at both sides of the channel. It extends approximately 5' into the channel at the right side and 10' into the channel on the left side.

Item 61.7 - Aggradation

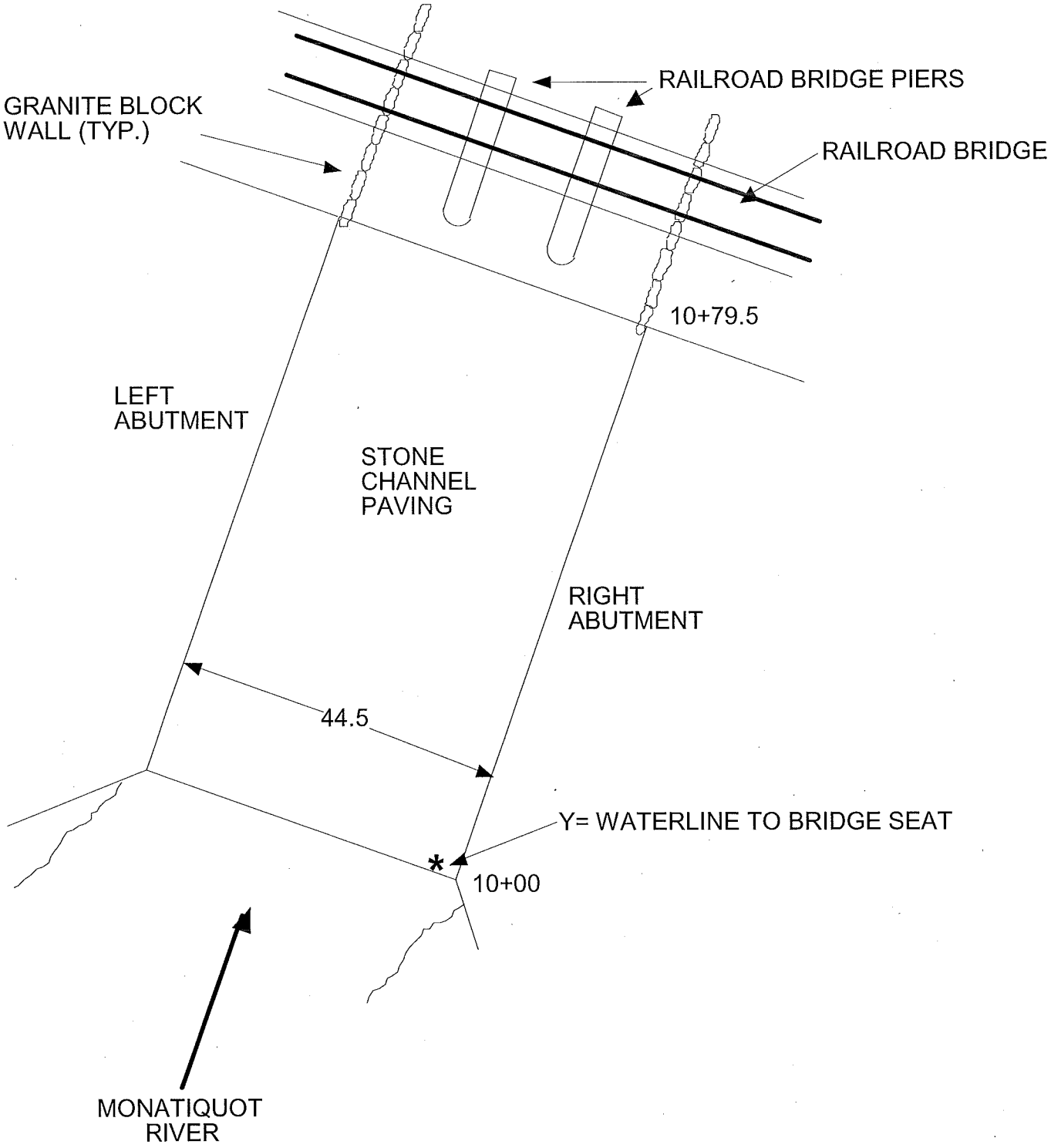
There is aggradation with vegetation upstream of the bridge at both sides of the channel. It extends approximately 5' into the channel at the right side and 10' into the channel on the left side.

Sketch / Chart Log

Sketch 1 : PLAN VIEW - NOT TO SCALE
Chart 1 : SCOUR MONITORING CHART AT STA 10+30

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	34G	B-21-016	B21016-34G-DOT-NBI	NOV 12, 2013

SKETCHES



Sketch 1: PLAN VIEW - NOT TO SCALE

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	**34G**	**B-21-016**	**B21016-34G-DOT-NBI**	**NOV 12, 2013**

CHARTS

	12/14/90	8/24/94	3/5/98	3/8/02	2/17/06
LEFT ABUTMENT	2.5'	1.9'	2.3'	2.3'	2.1'
10' OFF LEFT ABUTMENT	1.6'	0.8'	1.3'	1.3'	1.1'
20' OFF LEFT ABUTMENT	2.4'	2.4'	2.6'	2.3'	2.3'
30' OFF LEFT ABUTMENT	2.2'	2.3'	2.6'	2.3'	2.2'
RIGHT ABUTMENT	2.2'	2.2'	2.3'	2.0'	2.3'
Y	4.4'	3.5'	3.2'	3.7'	2.8'
CORRECTION FACTOR	-	-0.9'	-1.2'	-0.7'	-1.6'

	11/18/09	11/12/13			
LEFT ABUTMENT	3.1'	1.6'			
10' OFF LEFT ABUTMENT	1.9'	1.5'			
20' OFF LEFT ABUTMENT	2.0'	2.5'			
30' OFF LEFT ABUTMENT	2.8'	2.4'			
RIGHT ABUTMENT	2.7'	2.3'			
Y	3.8'	5.5'			
CORRECTION FACTOR	-0.6'	+1.1'			

Notes

1. Water control shot (Y) = Waterline to bridge seat at upstream end of Right Abutment.
2. For comparison all soundings are adjusted to 1990 water level.
3. Sta 10+00 is at the upstream end.

Chart 1: SCOUR MONITORING CHART AT STA 10+30

2-DIST	B.I.N.
06	33R

UNDERWATER OPERATIONS TEAM
ROUTINE UNDERWATER INSPECTION REPORT

BR. DEPT. NO.
B-21-054

CITY/TOWN	8-STRUCTURE NO.	LEVEL OF INSPECTION	93B-DATE INSPECTED
BRAINTREE	B21054-33R-MUN-NBI	II	MAR 8, 2013

07-FACILITY CARRIED	ACCESS TO BRIDGE	UNDERWATER OPERATIONS ENGINEER
HWY JEFFERSON ST	EMBANKMENT	RANDI E. BONICA

06-FEATURES INTERSECTED	DEPTH	VISIBILITY	TEAM LEADER (DIVE MASTER)	*Report submitted by:*
WATER MONATIQUOT RIVER	1.5 m	2 m	WILLIAM J. COLLERAN	

BOTTOM CONDITION	CURRENT	TEAM MEMBERS
BOULDERS, GRAVEL	SWIFT	R. E. BONICA, G. BROZ, W. FERRY

ITEM 60 *SUBSTRUCTURE*

		DEF
1. Abutments	7	
a. Pedestals	N	-
b. Bridge Seats	N	-
c. Backwalls	N	-
d. Breastwalls	7	-
e. Wingwalls	7	-
f. Slope Paving/Rip-Rap	H	-
g. Pointing	N	-
h. Footings	H	-
i. Piles	N	-
j. Scour	7	-
k. Settlement	7	-
l.	N	-
2. Piers or Bents	N	
a. Pedestals	N	-
b. Caps	N	-
c. Columns	N	-
d. Stems/Webs/Pierwalls	N	-
e. Pointing	N	-
f. Footing	N	-
g. Piles	N	-
h. Scour	N	-
i. Settlement	N	-
j.	N	-
k.	N	-
3. Pile Bents	N	
a. Pile Caps	N	-
b. Piles	N	-
c. Diagonal Bracing	N	-
d. Horizontal Bracing	N	-
e. Fasteners	N	-
UNDERMINING (Y/N)		N

ITEM 61 *CHANNEL & CHANNEL PROTECTION*

		DEF
1. Channel Scour	7	-
2. Embankment Erosion	7	-
3. Debris	8	-
4. Vegetation	7	-
5. Utilities	N	-
6. Rip-Rap/Slope Protection	H	-
7. Aggradation	8	-
8. Fender System	N	-
a. Piles	N	-
b. Diagonal Bracing	N	-
c. Horizontal Bracing	N	-
d. Wales	N	-
e. Fasteners	N	-
f. Ladders	N	-
9.	N	-

ITEM 59 *SUPERSTRUCTURE*

		DEF
	N	-
	N	-
	N	-

ITEM 62 *CULVERTS*

		DEF
1. Roof	N	-
2. Floor	N	-
3. Walls	N	-
4. Headwall	N	-
5. Wingwall	N	-
6. Pipe	N	-
7. Protective Coating	N	-
8. Embankment	N	-
9. Wearing Surface	N	-
10. Railing	N	-
11. Sidewalks	N	-
12. Utilities	N	-
13. Member Alignment	N	-
14. Deformation	N	-
15. Scour	N	-
16. Settlement	N	-
17.	N	-
18.	N	-
UNDERMINING (Y/N)		N

DEFICIENCY REPORTING GUIDE

DEFICIENCY: A defect in a structure that requires corrective action.

CATEGORIES OF DEFICIENCIES:

M= Minor Deficiency- Deficiencies which are minor in nature, generally do not impact the structural integrity of the bridge and could easily be repaired. Examples include but are not limited to: Spalled concrete, Minor scouring, etc.

S= Severe/Major Deficiency- Deficiencies which are more extensive in nature and need more planning and effort to repair. Examples include but are not limited to: Moderate to major deterioration in concrete, Exposed and corroding rebars, Deteriorated timber piles, Considerable settlement, Considerable scouring or undermining, etc.

C-S= Critical Structural Deficiency- A deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge.

C-H= Critical Hazard Deficiency- A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples include but are not limited to: Any part of piles or fender system which are projecting outward and may become a safety hazard for the navigational traffic, etc.

URGENCY OF REPAIR:

I=Immediate- [Inspector(s) immediately contact District Bridge Inspection Engineer (DBIE) to report the Deficiency and to receive further instruction from him/her.]

A=ASAP- [Action/Repair should be initiated by District Maintenance Engineer or the responsible party (if not a State owned bridge) upon receipt of the Inspection Report.]

P=Prioritize- [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available.]

X=UNKNOWN **N=NOT APPLICABLE** **H=HIDDEN/INACCESSIBLE** **R=REMOVED**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	33R	B-21-054	B21054-33R-MUN-NBI	MAR 8, 2013

REMARKS

GENERAL REMARKS

This bridge is a single span structure with concrete abutments and a deck slab dated 1955. According to plans bridge is not pile supported.
1) Orientation - Abutments are labeled left and right when facing downstream.
2) Sta 10+00 is at the downstream end.

ITEM 60 - SUBSTRUCTURE

Item 60.1 - Abutments

Item 60.1.d - Breastwalls

Left Abutment:
There is minor abrasion measuring 2' high in the vicinity of the waterline.
There is a 1/8" vertical crack with minor spalling and efflorescence at the waterline from the bridge seat to the mudline at Sta 10+07.
Right Abutment:
There is minor abrasion measuring 2' in the vicinity of the waterline.

Item 60.1.e - Wingwalls

There is minor abrasion measuring 2' high in the vicinity of the waterline.

Item 60.1.f - Slope Paving/Rip-Rap

At the upstream and downstream ends there is rip rap that was previoulsy reported as partially displaced. At the time of this inspection it was covered by snow.
Right Abutment:
At the upstream end there is rip rap that was previously reported as partially displaced. At the time of this inspection it was covered by snow.

Item 60.1.j - Scour

There was wood sheeting previously reported as exposed 1' off the right abutment from Sta 10+30 to Sta 10+32 with a maximum exposed height of 0.2'. It was not found during this inspection.

ITEM 61 - CHANNEL AND CHANNEL PROTECTION

Item 61.6 - Rip-Rap/Slope Protection

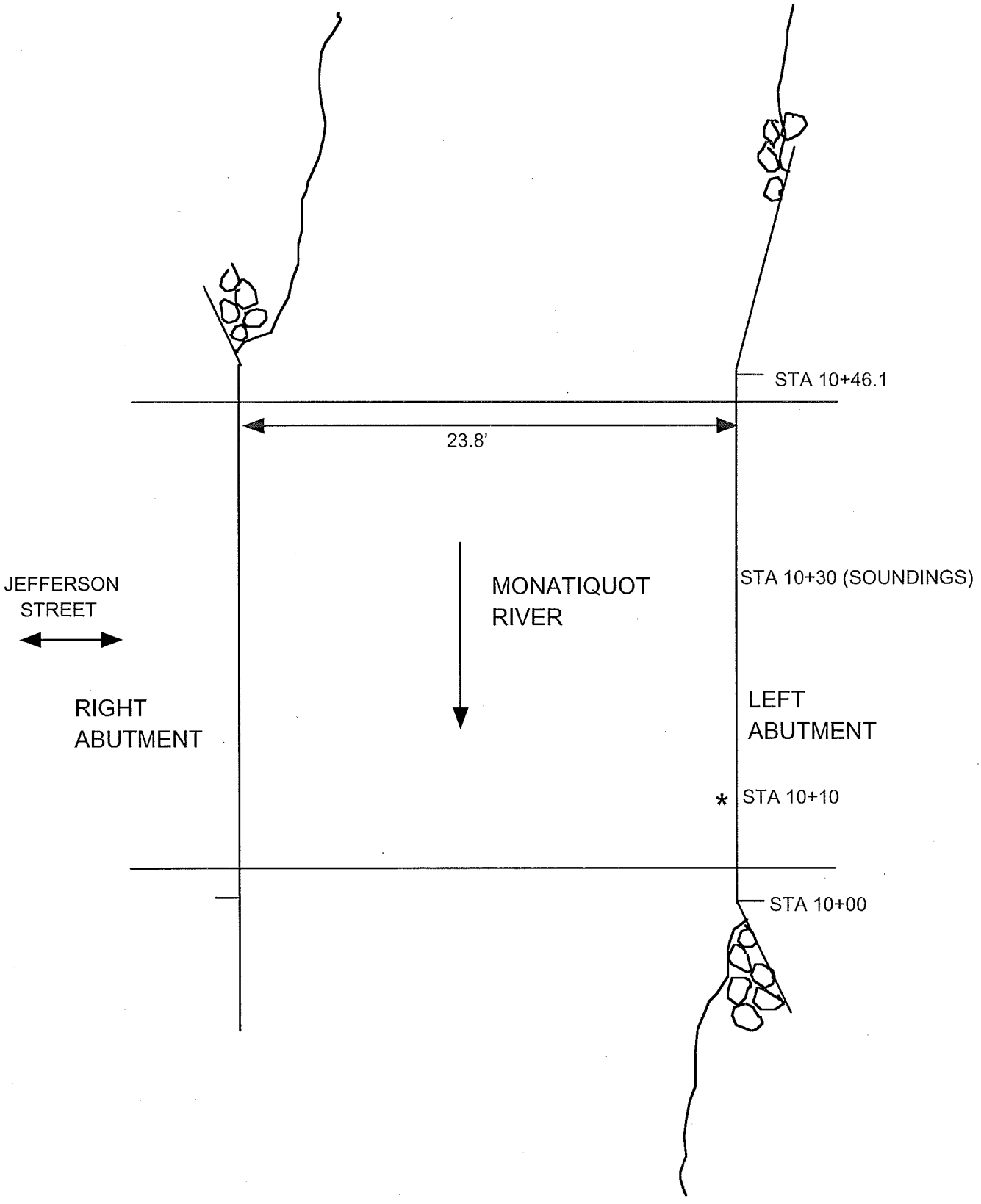
At the upstream and downstream ends there is rip rap that was previoulsy reported as partially displaced. At the time of this inspection it was covered by snow.
Right Abutment:
At the upstream end there is rip rap that was previously reported as partially displaced. At the time of this inspection it was covered by snow.

Sketch / Chart Log

Sketch 1 : PLAN VIEW - NOT TO SCALE
Chart 1 : SCOUR MONITORING CHART AT STA 10+30

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	33R	B-21-054	B21054-33R-MUN-NBI	MAR 8, 2013

SKETCHES



Sketch 1: PLAN VIEW - NOT TO SCALE

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
BRAINTREE	**33R**	**B-21-054**	**B21054-33R-MUN-NBI**	**MAR 8, 2013**

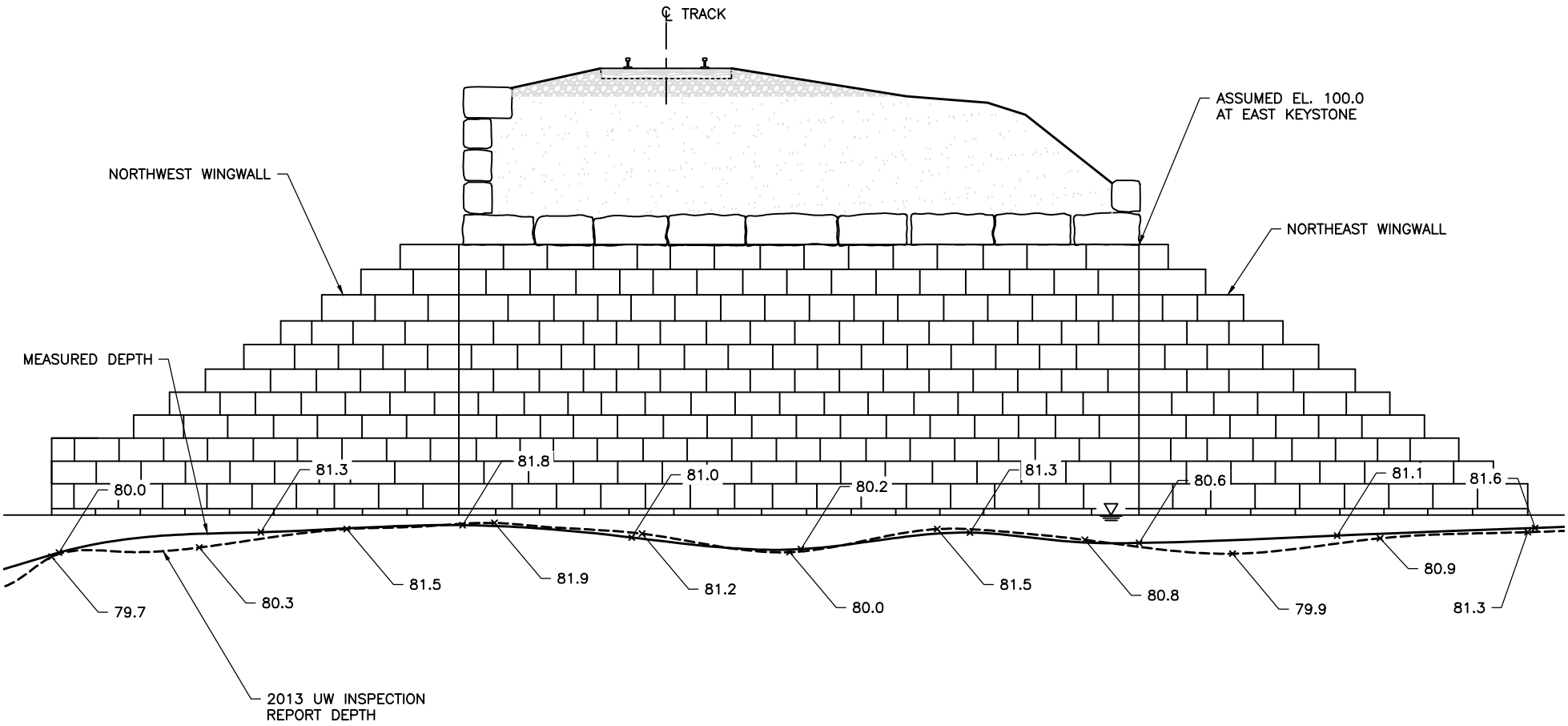
CHARTS

	11/21/90	8/24/94	3/5/98	6/5/01	6/20/05	4/14/09	3/8/13
LEFT ABUTMENT	2.4'	2.5'	2.9'	3.0'	2.5'	2.2'	1.5'
CENTERLINE	4.0'	3.8'	3.3'	4.3'	3.7'	3.6'	2.7'
RIGHT ABUTMENT	3.0'	3.2'	2.0'	3.6'	3.1'	4.0'	2.0'
Y	4.6'	3.6'	3.0'	4.3'	4.8'	3.0'	2.9'
CORRECTION	-	-1.0'	-1.6'	-0.3'	+0.2'	-1.6'	-1.7'

Notes

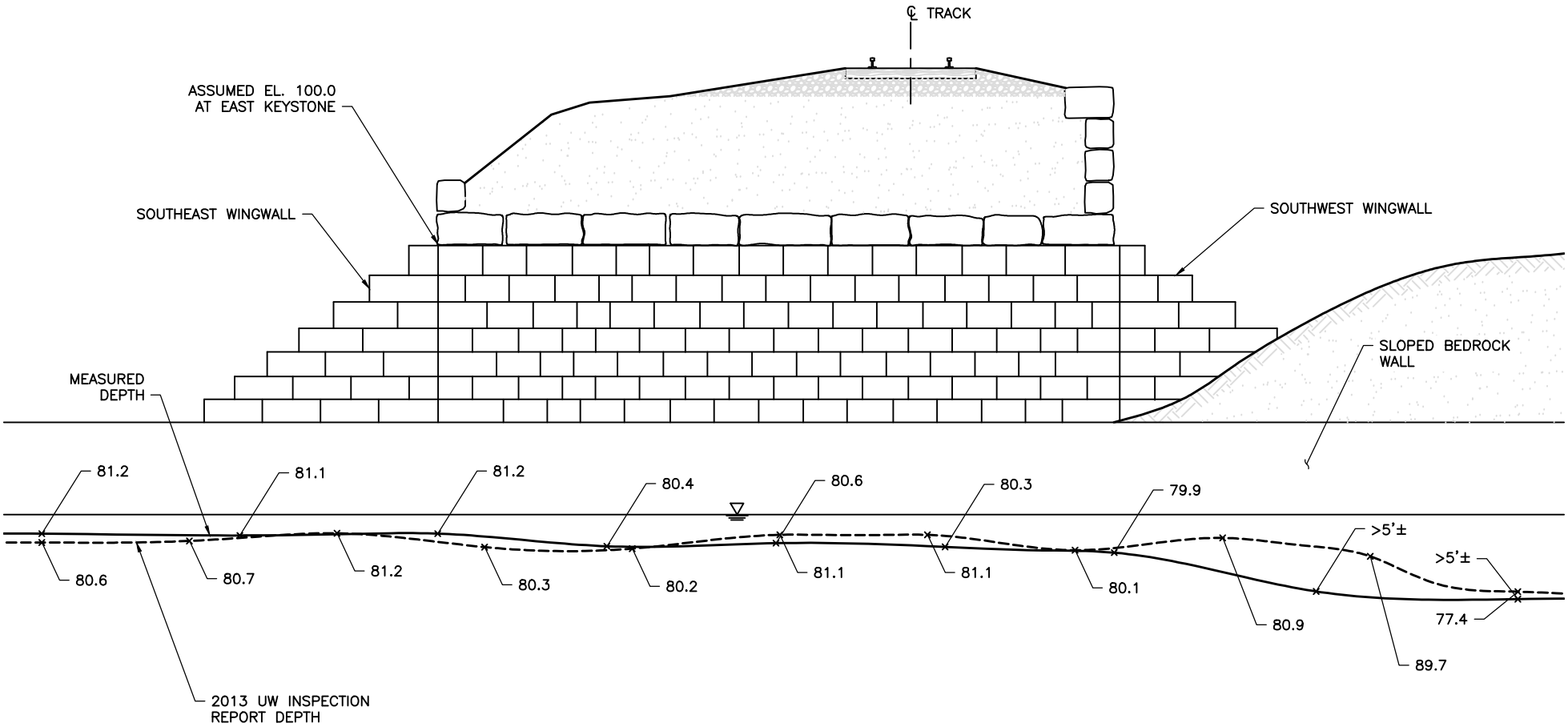
1. Water control shot (Y) = Bottom of concrete deck to waterline at Sta 10+10 at Left Abutment.
2. For comparison all soundings are adjusted to 1990 water level.
3. Station 10+00 is located at the downstream end.

Chart 1: SCOUR MONITORING CHART AT STA 10+30



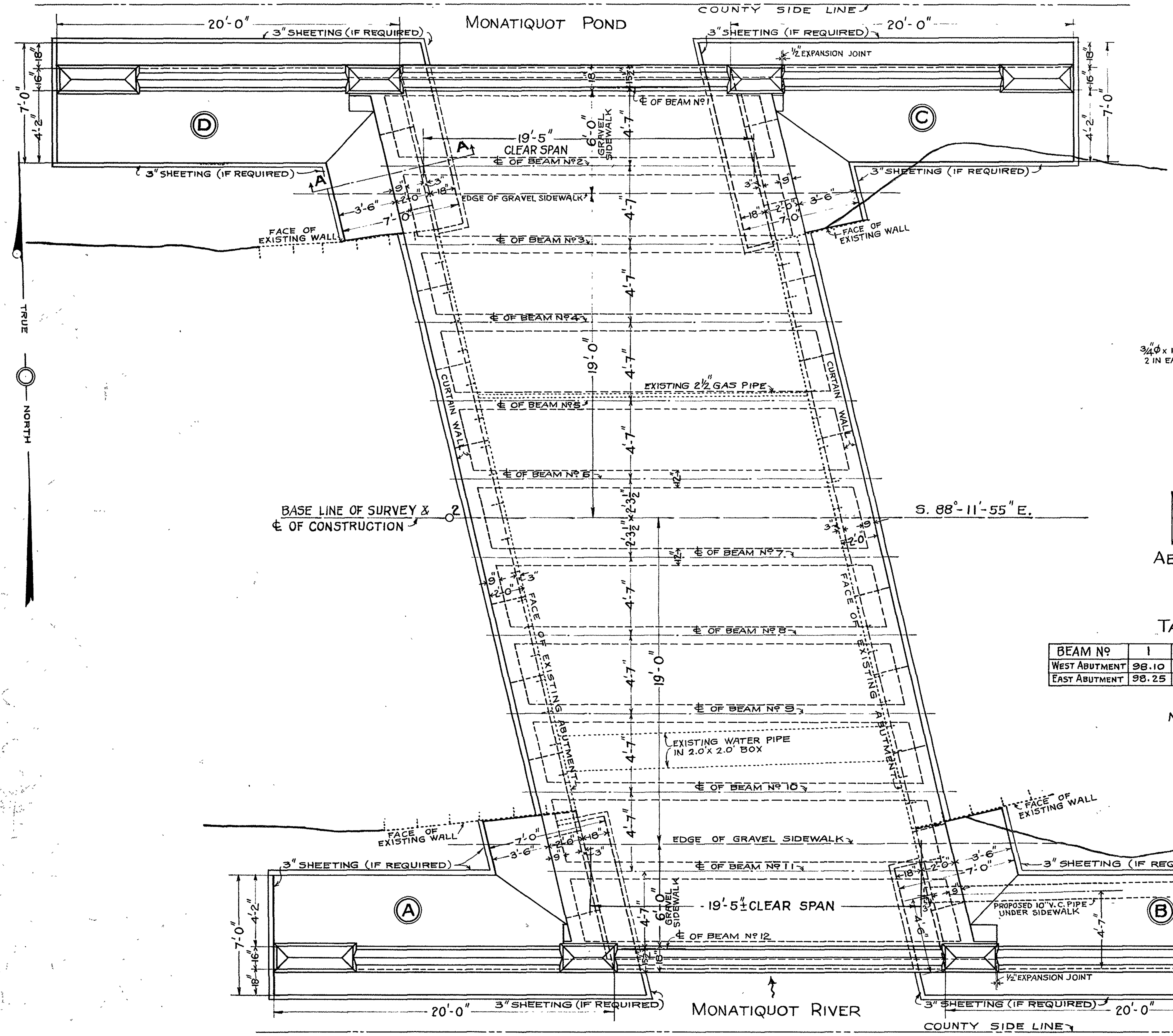
NORTH ABUTMENT STREAMBED ELEVATION

NOT TO SCALE

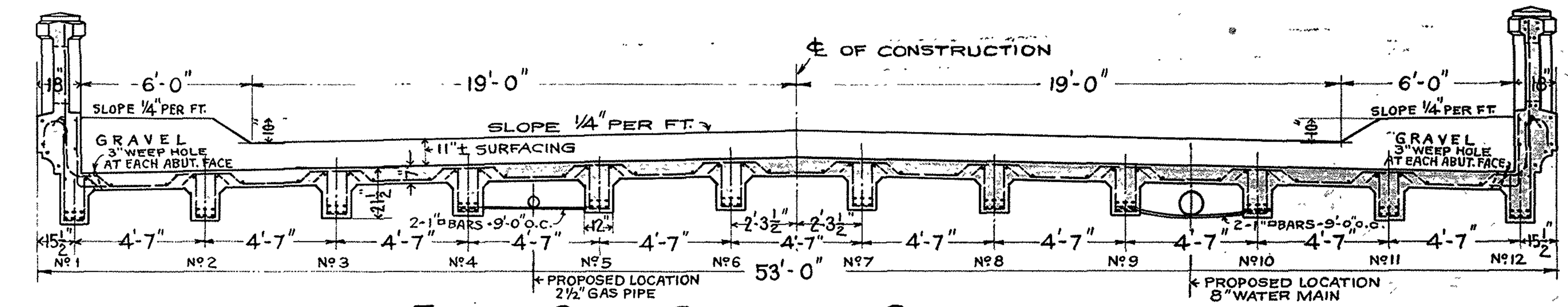


SOUTH ABUTMENT STREAMBED ELEVATION

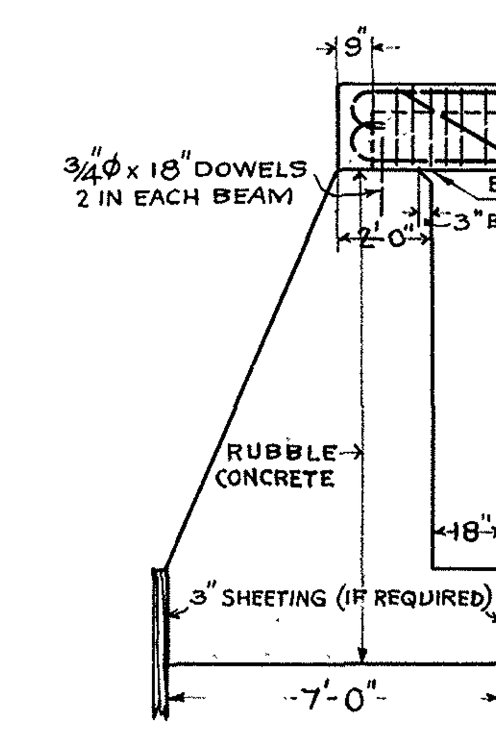
NOT TO SCALE



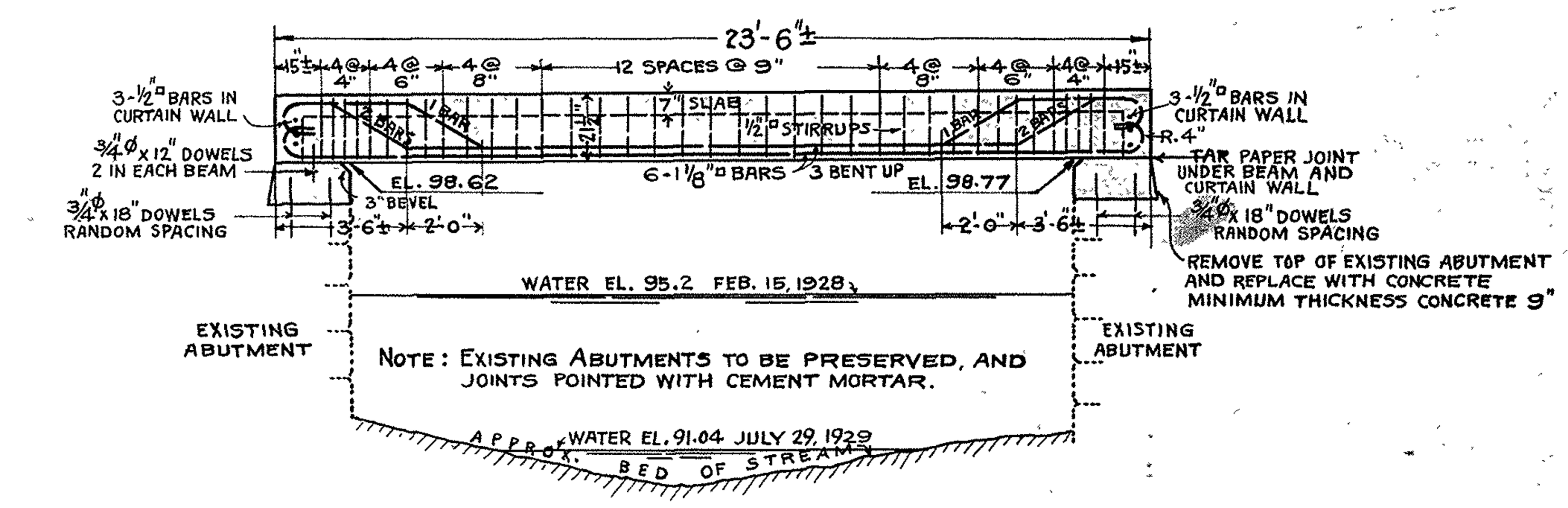
PLAN VIEW



TYPICAL CROSS SECTION OF SUPERSTRUCTURE



ABUTMENT SECTION A-A



LONGITUDINAL SECTION ON ℄ BEAM Nº 6

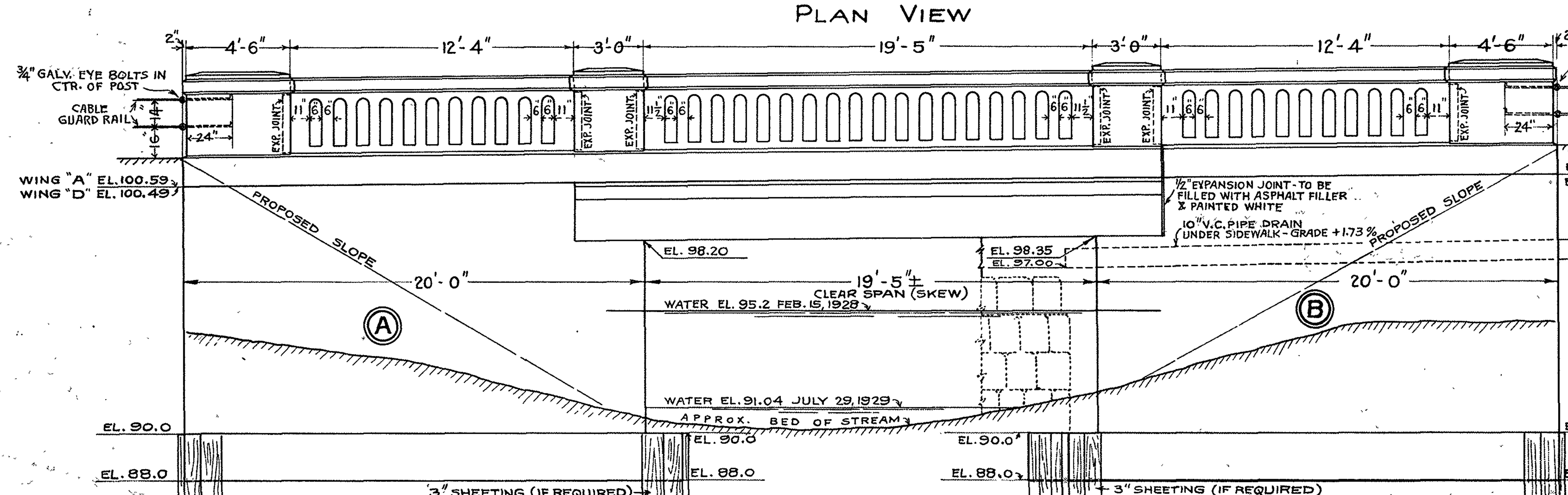
TABLE OF BEAM SEAT ELEVATIONS

BEAM Nº	1	2	3	4	5	6	7	8	9	10	11	12
WEST ABUTMENT	98.10	98.20	98.30	98.41	98.51	98.62	98.62	98.54	98.45	98.37	98.28	98.20
EAST ABUTMENT	98.25	98.35	98.45	98.56	98.66	98.77	98.77	98.69	98.60	98.52	98.43	98.35

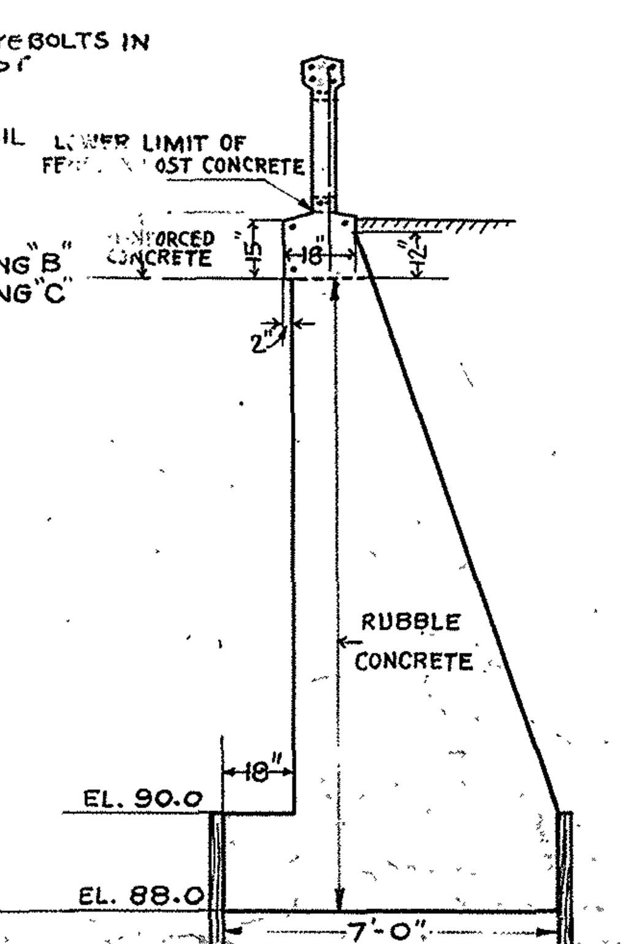
NOTE: EXISTING STRUCTURE SHOWN IN LIGHT DOTTED LINES THUS ....

ESTIMATED QUANTITIES
(NOT GUARANTEED)

EXCAVATION (LEDGE)	3	CU. YDS.
EXCAVATION (BRIDGE)	190	CU. YDS.
BORROW (GRAVEL)	130	CU. YDS.
CONCRETE 1:2:4 (TO BE REINFORCED)	10.6	CU. YDS.
CONCRETE (RUBBLE)	187	CU. YDS.
CONCRETE 1:2:4 REINF. (FENCE & POST)	9.6	CU. YDS.
RIP RAP	25	CU. YDS.
REINFORCING STEEL	16000	POUNDS
MOPPING BRIDGE FLOOR	65	GALS.
REMOVAL PRESENT BRIDGE		LUMP SUM
3" SHEETING (IF REQUIRED)	4.0	M. FT. B.M.
CEMENT (POINTING AND GROUTING)	5	BBLS.
SPECIAL REINFORCED CONCRETE 1:2:4	51.2	CU. YDS.



SOUTHERLY ELEVATION
NORTHERLY ELEVATION SIMILAR



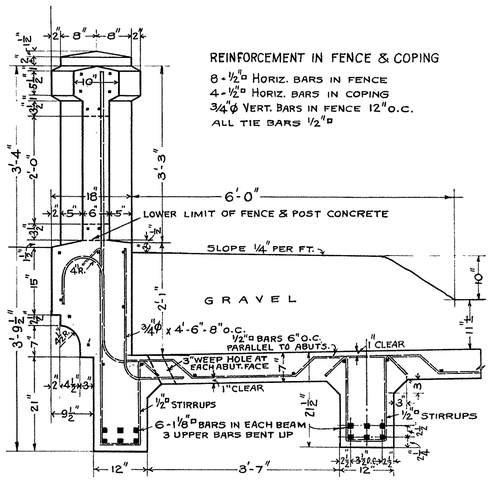
TYPICAL WING SECTION

THE COMMONWEALTH OF MASSACHUSETTS
PROPOSED BRIDGE
BRAINTREE
PLAIN ST.
OVER MONATIQUOT RIVER
SCALE: FOUR FEET TO THE INCH UNLESS OTHERWISE NOTED
OFFICE OF
DEPARTMENT OF PUBLIC WORKS
STATE HOUSE — BOSTON, MASS.
AUGUST 1929

G. E. Harkins — BRIDGE ENGINEER
A. W. [illegible] — CHIEF ENGINEER

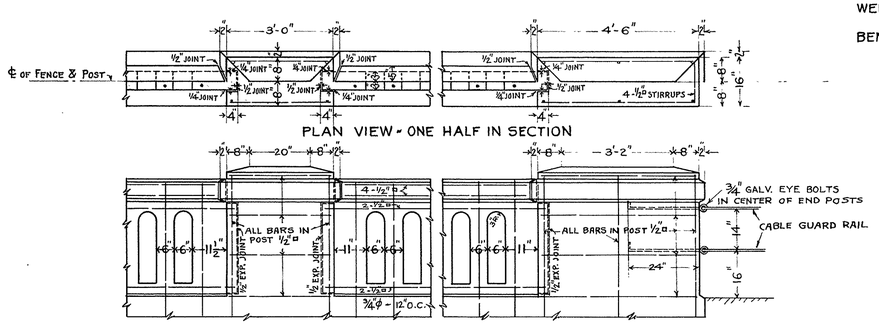
DESIGNED BY L.G.C. TRACED BY D.F.D. CHECKED BY J.H.O'C.

SHEET 1 OF 2 SHEETS BRIDGE Nº B-21-14



DETAIL CROSS SECTION OF SUPERSTRUCTURE

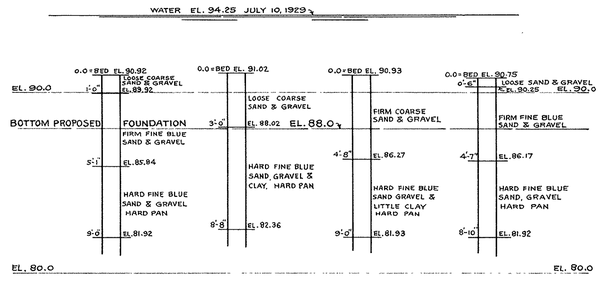
SCALE: ¾" = 1'-0"



NOTE: EXPANSION JOINTS TO BE MADE OF COTTON CLOTH, SATURATED AND MOPPED WITH ASPHALT.

DETAIL OF FENCE AND POSTS SHOWING EXPANSION JOINTS

SCALE: ½" = 1'-0"



BORING Nº 1 BORING Nº 2 BORING Nº 3 BORING Nº 4

BORING DATA

BORING NOTES

LOCATION OF BORINGS SHOWN ON KEY PLAN THUS ◉
BORINGS TAKEN FOR PURPOSE OF DESIGN AND SHOW CONDITIONS AT BORING POINTS ONLY AND DO NOT NECESSARILY SHOW NATURE OF MATERIAL TO BE ENCOUNTERED IN CONNECTION WITH THE CONSTRUCTION OF THE BRIDGE.

GENERAL NOTES

FINISH: ALL EXPOSED SURFACES TO BE RUBBED SMOOTH WITH CORUNDUM BRICK, AND LEFT FREE FROM ALL FORM MARKS AND IMPERFECTIONS.

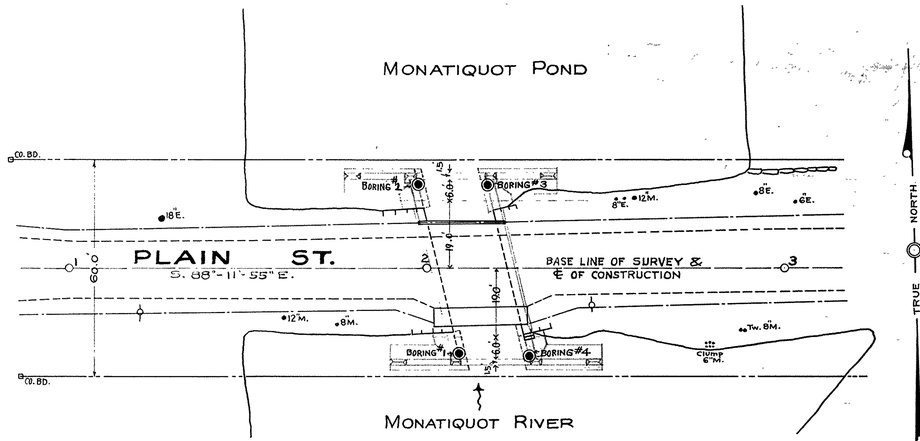
DATE: TO BE PLACED IN CENTER OF INSIDE FACE OF NORTHEASTERLY AND SOUTHWESTERLY END POSTS. FOR SIZE AND CHARACTER OF NUMERALS, SEE DETAILS ON ANOTHER SHEET.

FOUNDATIONS: MAY BE ALTERED IF NECESSARY TO SUIT CONDITIONS OF CONSTRUCTION.

STEEL: ALL REINFORCEMENT TO BE DEFORMED BARS.

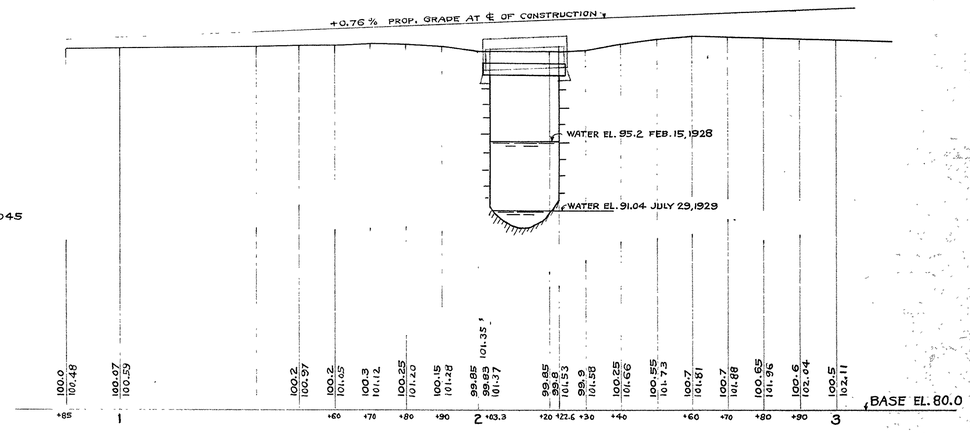
WEEP HOLES: TO BE PROVIDED IN SLAB AS SHOWN AND IN ABUTMENTS AND WING WALLS AS DIRECTED BY ENGINEER.

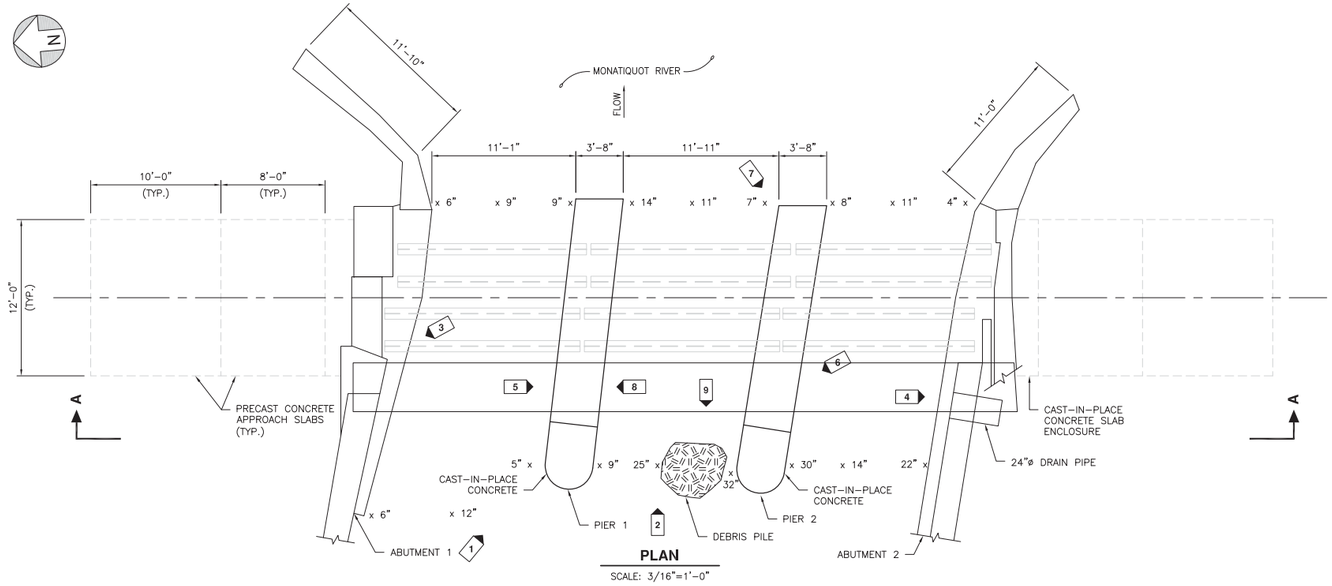
BENCH MARK: BRIDGE ON WASHINGTON ST. WEST SIDE.
CTR. TOP OF NORTHERLY POST = EL. 104.53
STA. 7+20 - 30 FT. RIGHT - BROKEN SPIKE IN 40" OAK = EL. 119.045



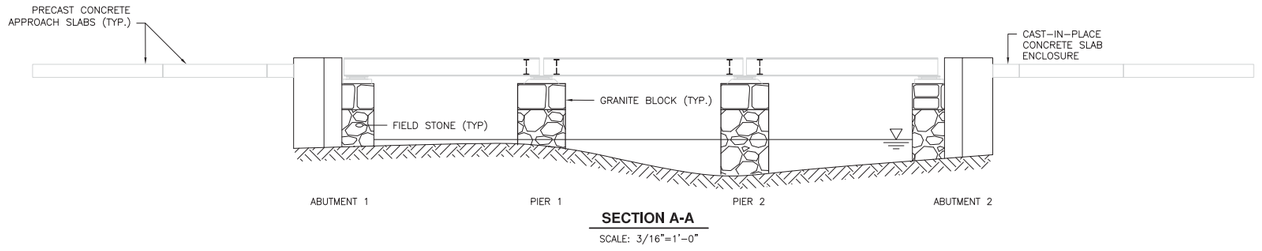
KEY PLAN AND PROFILE

HORIZ. SCALE: 1" = 20'-0"
VERT. SCALE: 1" = 4'-0"

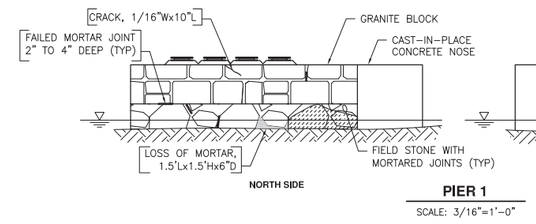


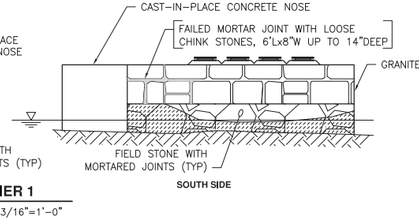


PLAN
SCALE: 3/16"=1'-0"

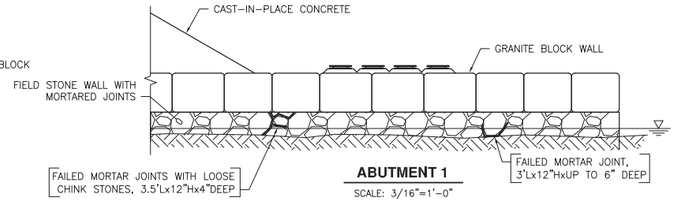


SECTION A-A
SCALE: 3/16"=1'-0"

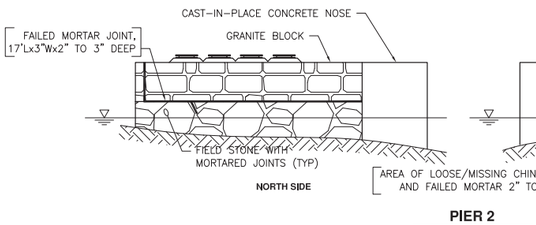


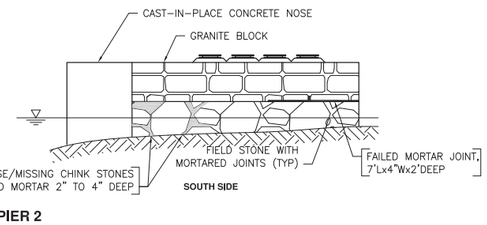


PIER 1
SCALE: 3/16"=1'-0"

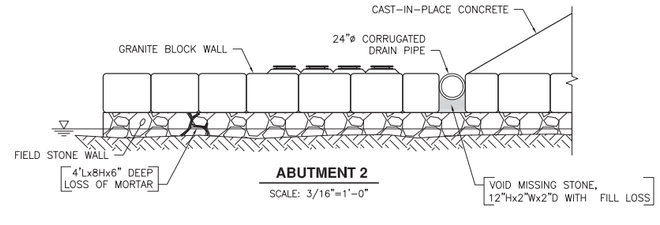


ABUTMENT 1
SCALE: 3/16"=1'-0"

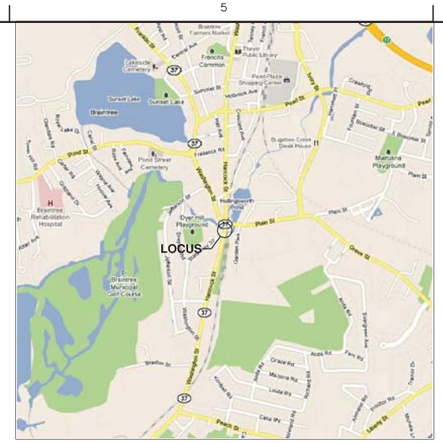




PIER 2
SCALE: 3/16"=1'-0"



ABUTMENT 2
SCALE: 3/16"=1'-0"



LOCUS MAP
SCALE: NONE

LEGEND

- AREA OF MISSING OR LOOSE CHINK STONES
- APPROXIMATE AREA WITH FAILED MORTAR JOINTS
- [ ] CONDITION NOTES
- MUDLINE ADJACENT TO STRUCTURE
- 2 — LOCATION AND NUMBER OF PHOTO
- STA. 0+00 — STATIONING IN FEET
- 5"x — SOUNDINGS BELOW WATERLINE
- BEDROCK LINE ADJACENT TO STRUCTURE

NOTE:

1. SOUNDINGS INDICATE WATER LEVEL AT TIME OF INSPECTION. POSITIVE VALUES REPRESENTS AN ELEVATION BELOW THAT PLANE.
2. CONDITIONS SHOWN ON THIS PLAN ARE PART OF CHILDS ENGINEERING UNDERWATER INSPECTION.

CHILDS ENGINEERING CORPORATION
BOX 333 MEDFIELD, MASSACHUSETTS 02052 U.S.A.
Phone: (508) 359-8945 Fax: (508) 359-2751
E-mail: mail@childseng.com

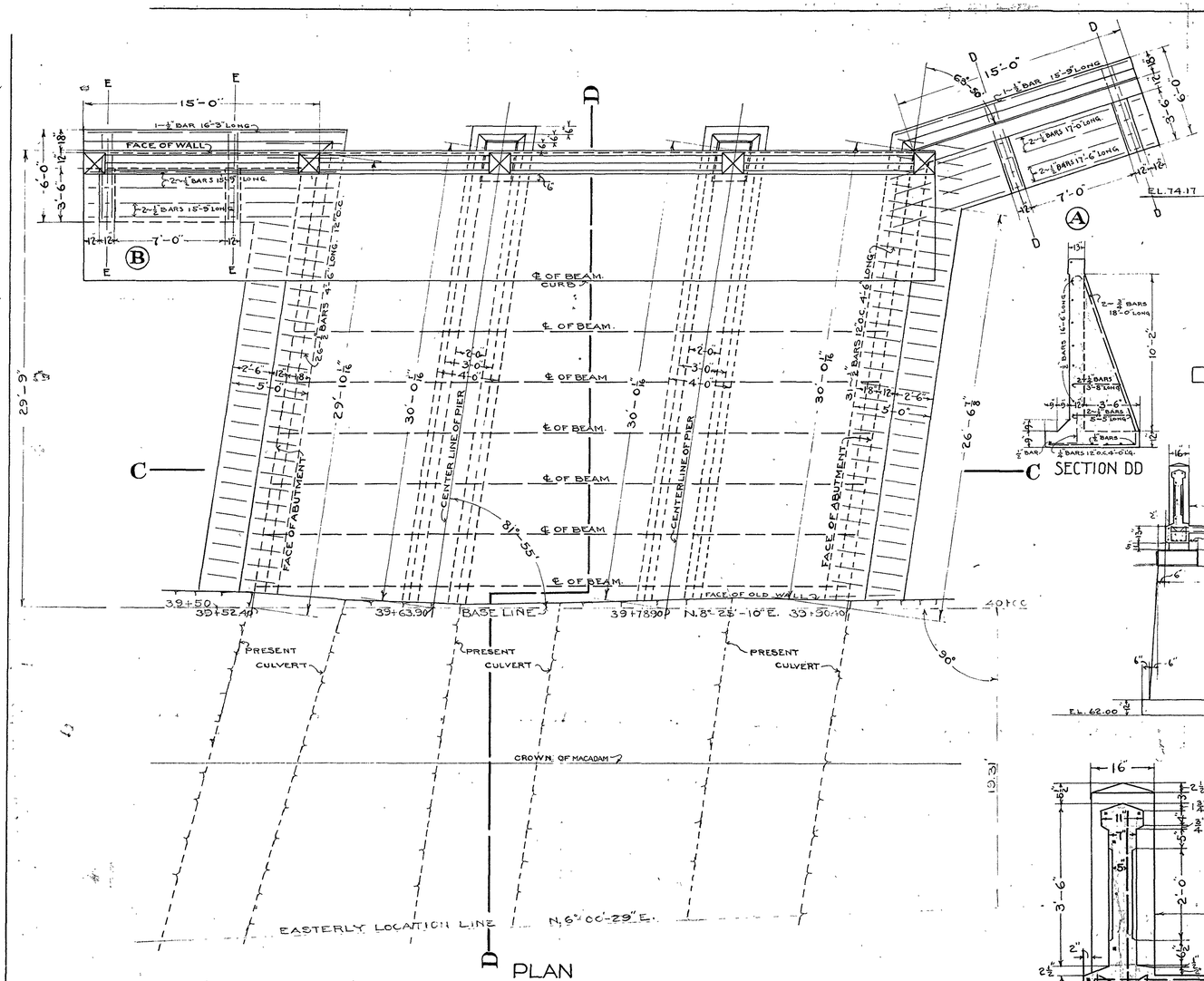
Mark	Description	Date	Appr.

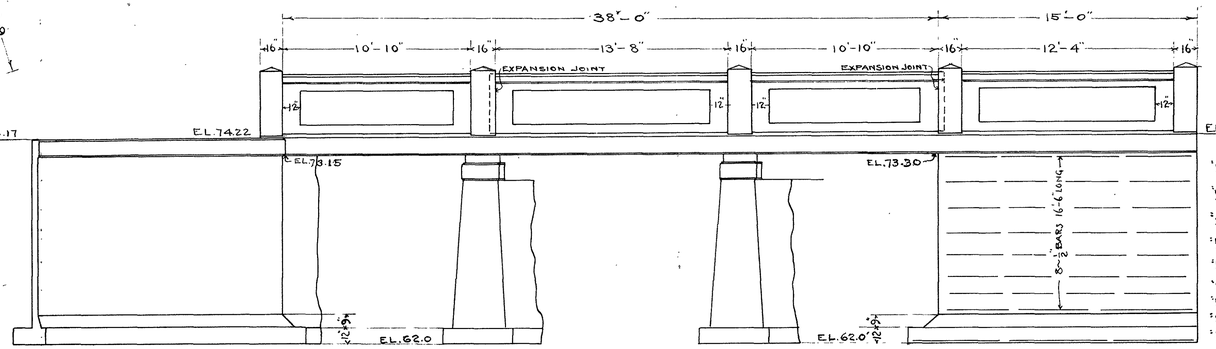
Designed by: PDI	Design file no. 228711-08	Date: 09/30/11	
Det. by RGP	Chkd by PDI	Scale: AS NOTED	
	Reviewed by: DLP		

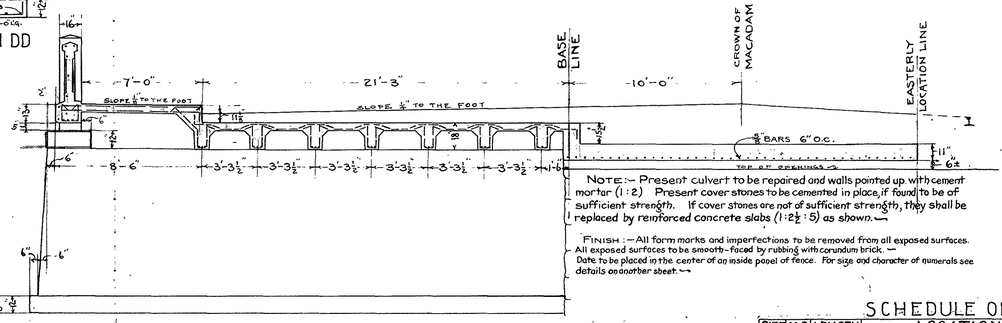
MBTA BRIDGE INSPECTION
OLD COLONY LINE OVER MONATIQUOT RIVER
BRAINTREE, MA

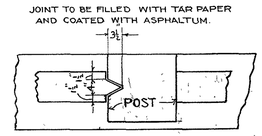
BRIDGE No. B-21-042
EXISTING CONDITIONS
PLAN AND SECTIONS

Sheet reference number:
X-108
Sheet 8 of 14





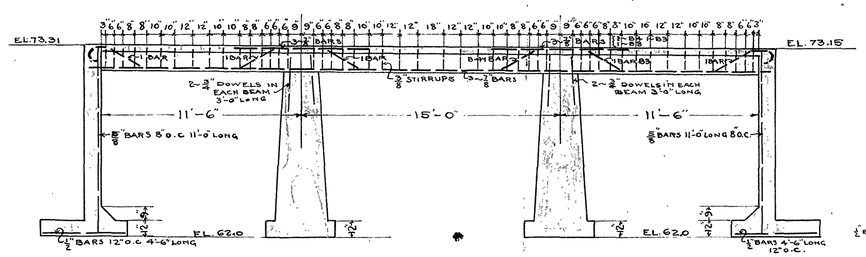


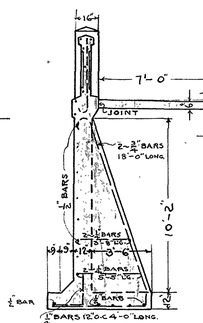


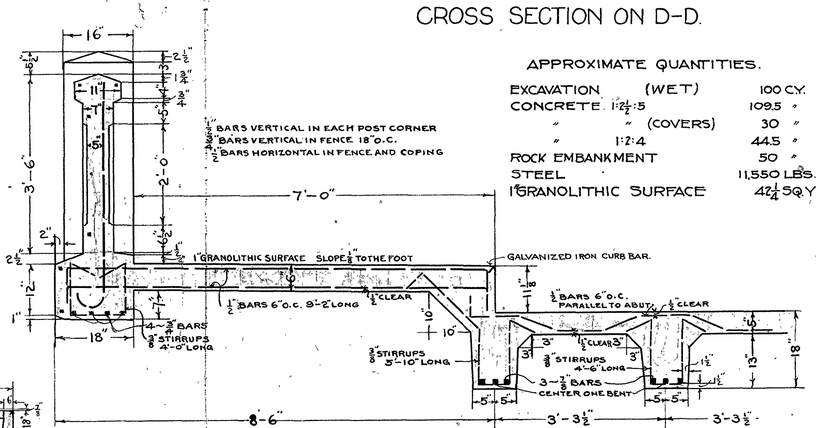
EXPANSION JOINT IN FENCE
SCALE: ¾ TO 1 FT.

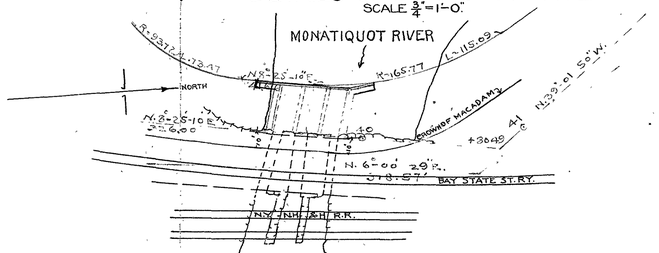
SCHEDULE OF STEEL BARS.

SIZE	NO	LENGTH	LOCATION	MARK	BENDING DIAGRAM
⅞"	4	13'-10"	BARS IN OUTER BEAMS	B1	
	4	23'-0"	" " "	B2	
	14	13'-0"	" " INNER "	B1	
	14	23'-10"	" " " "	B2	
	14	17'-6"	" " " " END SPANS	B3	
	7	23'-8"	" " " " CENTER SPAN	B4	
	7	8'-0"	" " " " OVER PIERS	B3	
	8	18'-0"	WING COUNTERFORTS	C1	
¾"	33	5'-2"	FENCE VERTICALS	P1	
	28	3'-0"	PIER DOWELS	D1	
⅝"	92	11'-0"	ABUTMENT VERTICALS	A1	
	46	7'-6"	TO BE USED IN ROOF SLABS ONLY		
	42	8'-0"	IF COVER STONES ARE NOT OF	S4	
	42	9'-0"	SUFFICIENT STRENGTH		
1½"	57	4'-6"	ABUTMENT FOUNDATIONS	F1	
	1	15'-9"			
	2	17'-0"	WING "A" "	F2	
	2	16'-9"			
	2	18'-9"	" "B" "	F3	
	8	16'-6"	HORIZONTALS IN WING "A"	W1	
	8	15'-6"	" " " "B"	W2	
	2	14'-6"	" " " COPING	W3	
	1	16'-6"	" " "A" COPING	W1	
	2	32'-0"	" " COPING	P5	
	6	23'-8"	" "	P5	
	56	18'-9"	FLOOR BARS W'LY SIDE	S1	
	56	15'-9"	" " E'LY "	S2	
	182	9'-2"	SIDEWALK BARS	S3	
	8	13'-0"			
	19	2'-8"	HORIZONTALS IN FENCE	P2	
	8	14'-10"			
	20	4'-9"	VERTICALS IN EACH POST CORNER	P4	
⅝"	50	4'-0"	STIRRUPS IN OUTER BEAMS	B5	
	300	4'-8"	" " INNER "	B7	
	50	3'-8"	" " CURB "	B6	
½"	27	4'-0"	FOUNDATION TIES	F4	
¼"	8	3'-8"	HORIZONTAL TIES IN COUNTERFT	C2	
	8	5'-5"	" " " "	C2	
	4	12'-0"	GALVANIZED CURB BAR	G1	
	1	6'-4"	" " "	G1	









PLAN OF PROPOSED REINFORCED CONCRETE BRIDGE OVER MONATIQUOT RIVER AT STATION 39+75 OF THE 1917 STATE HIGHWAY LAYOUT IN THE

TOWN OF BRAINTREE

SCALE 4 FEET TO THE INCH UNLESS OTHERWISE NOTED.
SEPTEMBER 15, 1917.

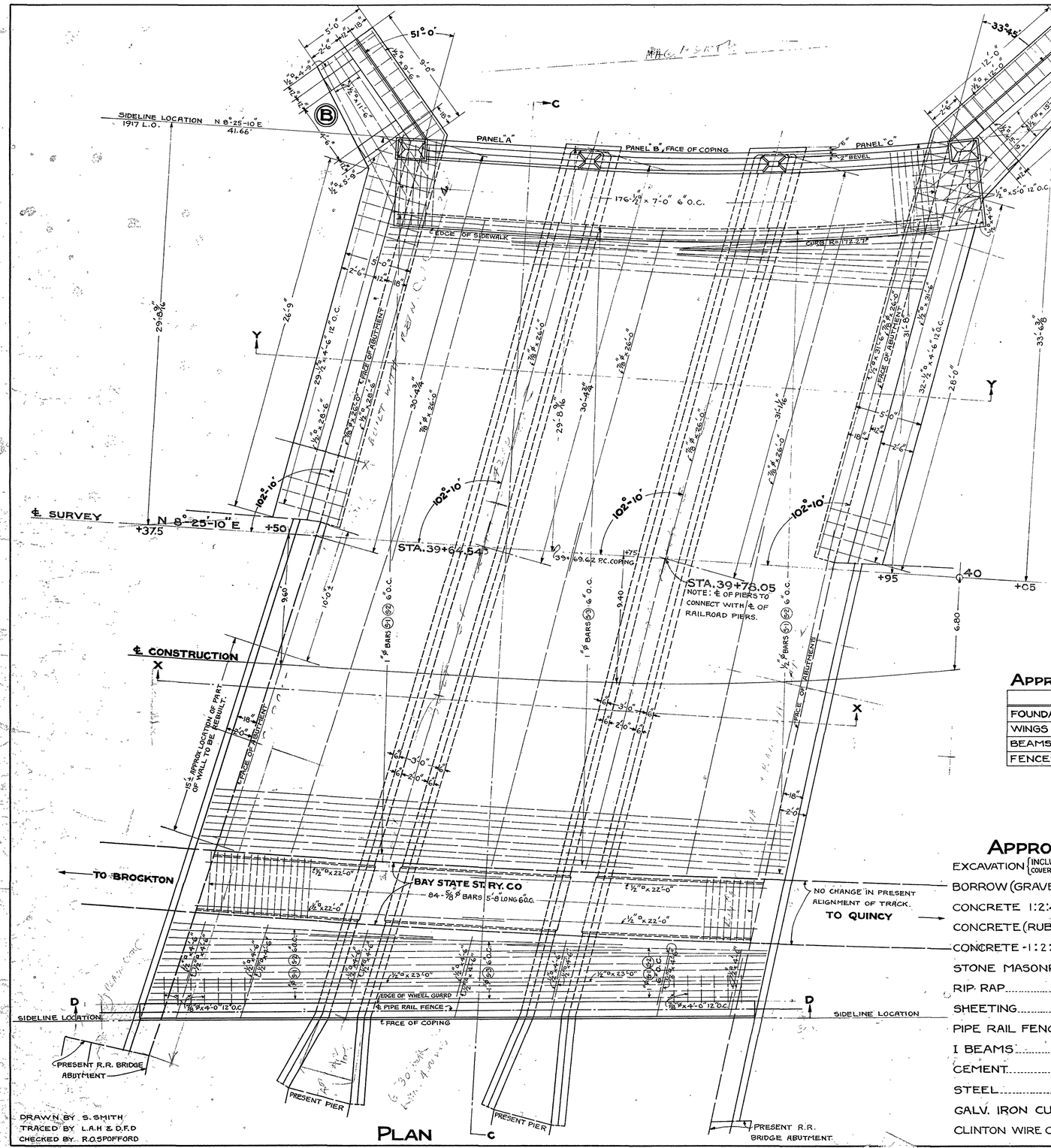
Office of the Massachusetts Highway Commission
State House, Boston, Mass.

CHIEF ENGINEER.

MADE BY
CHECKED

RECONSTRUCTED IN 1923

B-21-16



DRAWN BY S. SMITH
TRACED BY L.A.H & D.F.D
CHECKED BY R.O.SPOFFORD

PLAN

APPROXIMATE FORM AREAS

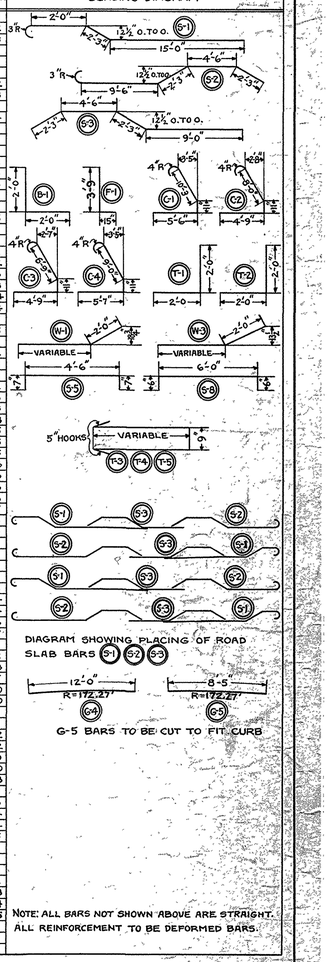
LOCATION	SQ.FT.
FOUNDATION	620
WINGS & ABUTMENTS	4100
BEAMS, SLABS COPINGS ETC.	3000
FENCES & POSTS	400

APPROXIMATE QUANTITIES

EXCAVATION (INCLUDES REMOVAL OF OLD PIERS, COVERSTONES, + 15'-0" ± OF OLD ABUT.)	650	CU. YDS.
BORROW (GRAVEL)	65	CU. YDS.
CONCRETE 1:2:4	180.5	CU. YDS.
CONCRETE (RUBBLE)	130	CU. YDS.
CONCRETE 1:2:4 (FENCES & POSTS)	3.8	CU. YDS.
STONE MASONRY	25	CU. YDS.
RIP RAP	25	CU. YDS.
SHEETING	8000	BD. FT.
PIPE RAIL FENCE	45	LIN. FT.
I BEAMS	4677	POUNDS
CEMENT	6	BARRELS
STEEL	24550	POUNDS.
GALV. IRON CURB BARS	90-2"	LIN. FT.
CLINTON WIRE CLOTH (1" MESH #14 WIRE)	130	SQ. FT.

SCHEDULE OF STEEL BARS

SIZE	NO	LENGTH	LOCATION	MARK
1" ϕ	120	20'-1"	SLAB BARS	S-1
	120	19-4	" "	S-2
	120	18-0	" "	S-3
	46	4'-0"	BARS IN EASTERLY COPING BEAM	B-1
	3	19-0	" " SIDEWALK " " (STRAIGHT)	B-2
	3	28-0	" " " " " "	B-3
	29	5-0	VERT. BARS IN FENCE	F-1
⅞" ϕ	22	26-0	TIE BARS IN SLAB (STRAIGHT)	S-4
	2	17-9	COUNTERFORT BARS SECT. B2-B2	C-1
	2	14'-9"	COUNTERFORT BARS SECT. B1-B1	C-2
	2	13-6	" " " " A1-A1	C-3
¾" ϕ	2	16-7	" " " " A2-A2	C-4
⅝" ϕ	84	5'-8"	BARS IN ST. RY. SLAB	S-5
	4	11'-6"	HOR. BARS IN FOUNDATION WING B	F-2
	1	9-6	" " " " " B (IN TOE)	F-2
	4	15-0	" " " " " A	F-3
	1	12-0	" " " " " A (IN TOE)	F-3
	1	4-9	" TIE BARS " " B	F-4
	1	5-9	" " " " " B	F-4
	1	4-9	" " " " " A	F-5
	1	5-9	" " " " " A	F-5
	9	4-0	TOE BARS IN FOOTING WING B	T-1
	12	4-0	" " " " A	T-2
	8	10-10	HOR. " " WING WALL B	W-1
	1	8-8	" " " " B	W-1
	1	5-6	" " " " B	W-1
	6	13-10	" " " " A	W-3
	1	11-2	" " " " A	W-3
	1	6-9	" " " " A	W-3
	1	11-4	VERT. " " " " B	W-5
	1	10-0	" " " " B	W-5
	1	8-6	" " " " B	W-5
	1	9-9	" " " " A	W-6
	1	8-6	" " " " A	W-6
	1	7-0	" " " " A	W-6
	32	4-6	HOR. " " ABUTMENT FOOTING (NORTHERLY)	F-6
	29	4-6	" " " " " (SOUTHERLY)	F-7
½" ϕ	2	28-6	" " " " "	F-8
	2	31-6	" " " " " (NORTHERLY)	F-9
	26	9-0	VERT. " " NORTHERLY ABUTMENT WALL	A-1
	6	10-6	" " " " B "	A-1
	24	10-6	" " " SOUTHERLY " "	A-2
	5	12-0	" " " " " "	A-2
	2	31-6	HOR. " " NORTHERLY " "	A-3
	2	28-6	" " " SOUTHERLY " "	A-4
	4	23-0	" " " EASTERLY PARAPET BEAM	B-4
	22	4-6	" " " " SLAB	S-6
	4	22-0	" BARS IN ST. RY. SLAB TIE BARS	S-7
	8	4-6	VERT. BARS IN INTERMEDIATE POSTS	P-1
	8	5-0	" " " END POSTS	P-2
	176	7-0	SIDEWALK SLAB BARS	S-8
	14	22-6	" TIE BARS & COPING BARS	S-7
	5	11-8	HOR. BARS IN FENCE PANEL "A"	F-10
	4	11-0	" " " " " "A"	F-10
	5	12-0	" " " " " "B"	F-11
	4	11-8	" " " " " "B"	F-11
	5	12-6	" " " " " "C"	F-12
	4	11-8	" " " " " "C"	F-12
	5	5-0	" " " SIDEWALK	S-9
	1	4-6	" " " "	S-10
	1	5-0	" " " WING A	W-3
	1	4-0	" " " B	W-1
⅜" ϕ	1	7-7	COUNTERFORT TIE BARS SECT. B1-B1	T-3
	1	7-7	" " " " B2-B2	T-4
	1	9-1	" " " " B2-B2	T-4
	1	8-9	" " " " A2-A2	T-5
	3	12-0"	GALV. IRON CURB BARS (EASTERLY CURB) STRAIGHT	G-1
CURB BARS	1	9-9	" " " " (" ") "	G-2
	1	12-0	" " " " (WESTERLY ") "	G-3
	2	12-0	" " " " (WESTERLY ") CURVED	G-4
	1	8-5	" " " " (" ") "	G-5
I BEAMS	6	14-3	18"-54.7 # I BEAMS	



NOTE: ALL BARS NOT SHOWN ABOVE ARE STRAIGHT. ALL REINFORCEMENT TO BE DEFORMED BARS.

NOTES

FINISH: ALL EXPOSED SURFACES TO BE RUBBED SMOOTH WITH CORUNDUM BRICK, AND LEFT FREE FROM ALL FORM MARKS AND IMPERFECTIONS.

DATE & SEAL: DATE AND SEAL TO BE PLACED IN CENTER OF INSIDE CENTER PANEL OF W. FENCE FOR SIZE AND CHARACTER OF NUMERALS, SEE DETAILS ON ANOTHER SHEET.

FOUNDATIONS: FOUNDATIONS MAY BE ALTERED TO SUIT CONDITIONS OF CONSTRUCTION.

BENCH MARK: TOP OF HYDRANT STA 37+45 ± L. EL. 76.86

PROPOSED RECONSTRUCTION AND REINFORCED CONCRETE EXTENSION OF BRIDGE OVER MONATIQUOT RIVER IN

TOWN OF BRAINTREE

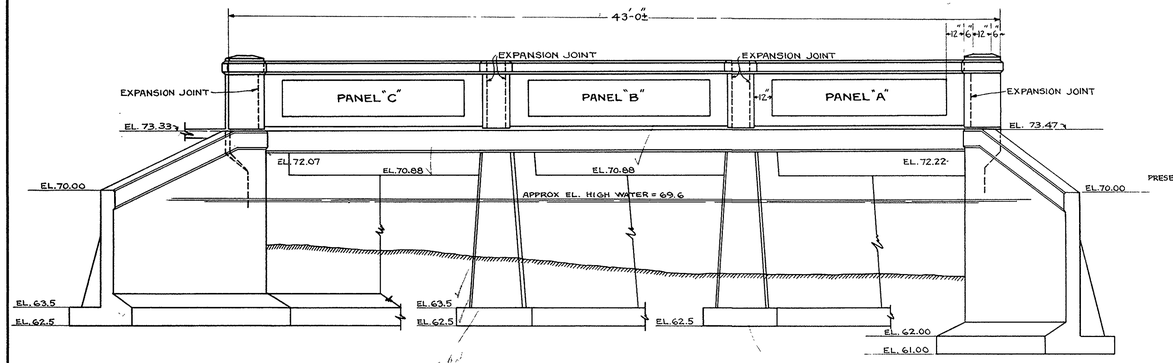
AT STATION 39+71.3

SCALE: FOUR FEET TO THE INCH UNLESS OTHERWISE NOTED

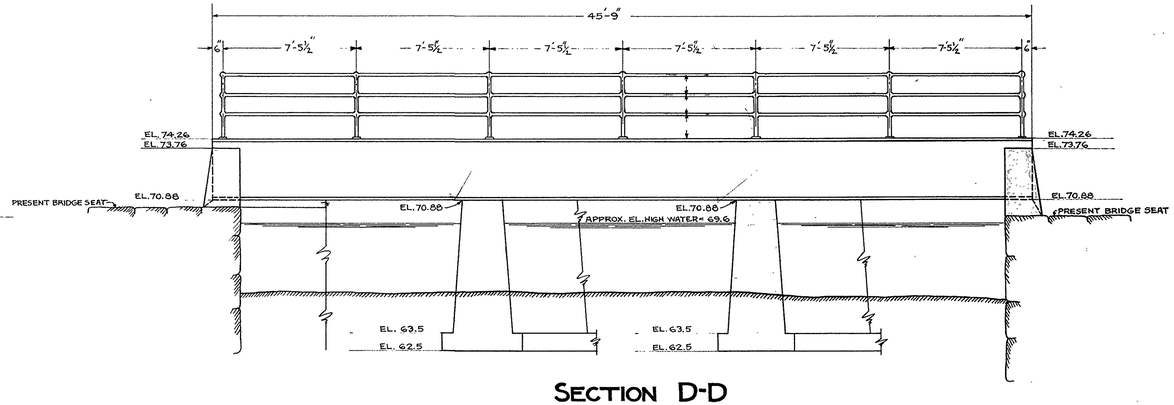
OFFICE OF
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS
STATE HOUSE — BOSTON, MASS.
SEPT. 1923

A. W. Dean
CHIEF ENGINEER

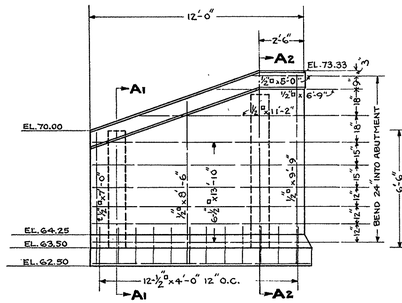
B-21-16 S-24



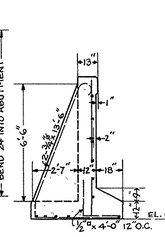
WESTERLY ELEVATION



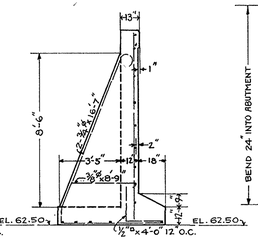
SECTION D-D



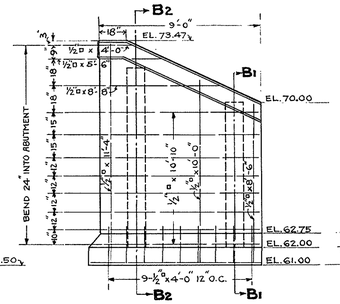
ELEVATION WING A



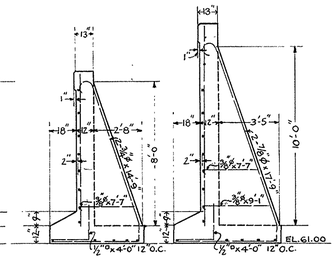
SECT. A1-A1



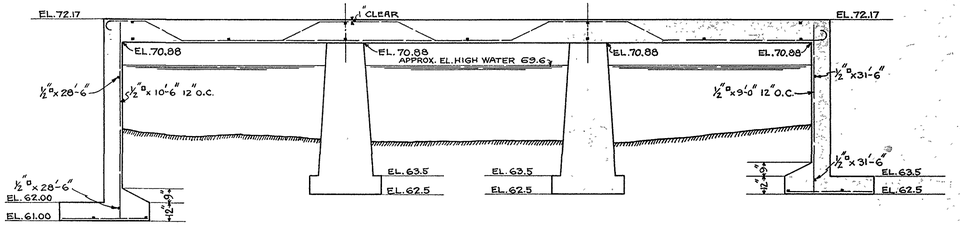
SECT. A2-A2



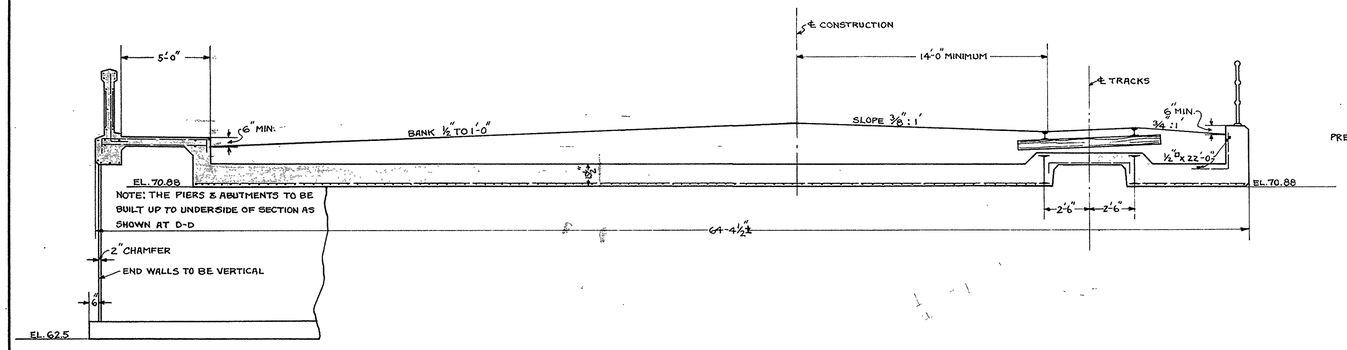
ELEVATION WING B



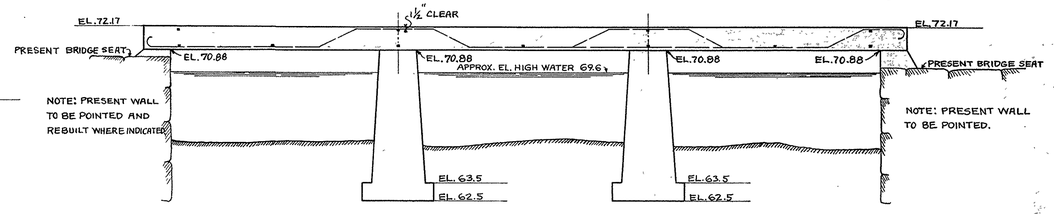
SECT. B1-B1 SECT. B2-B2



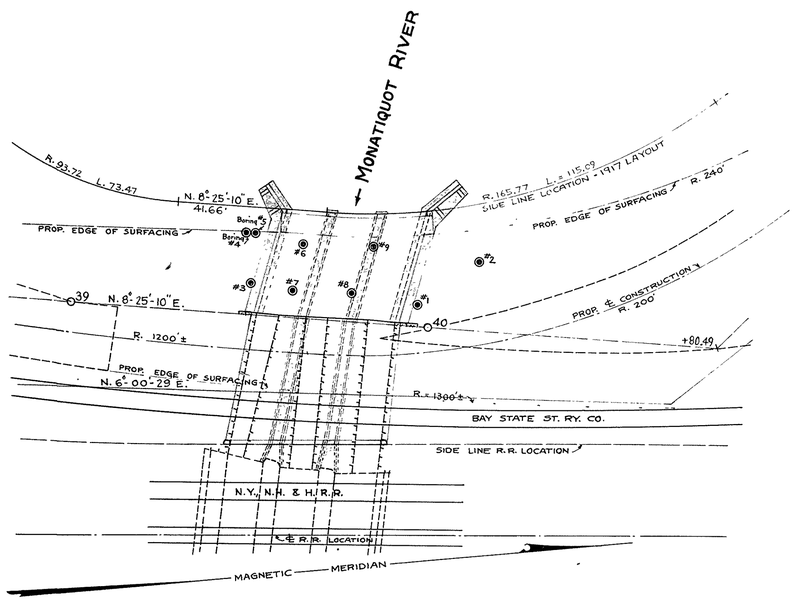
SECTION Y-Y

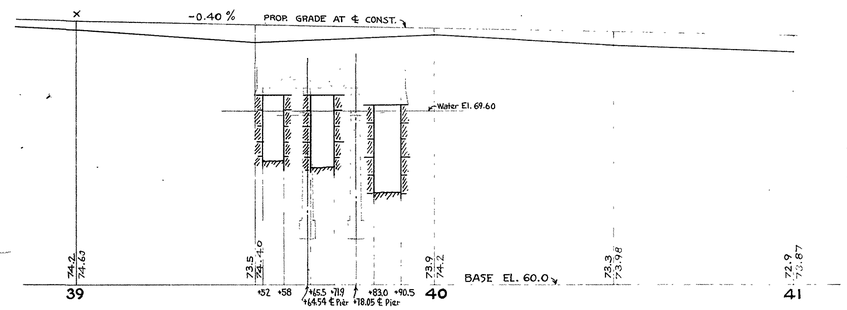


SECTION C-C



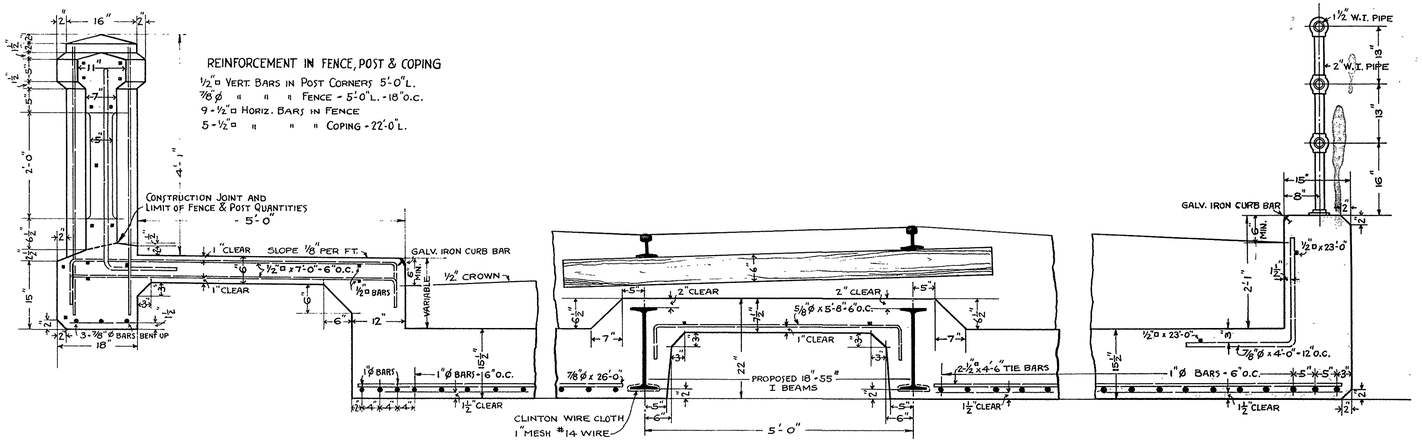
SECTION X-X





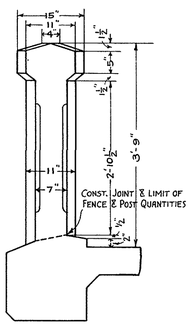
KEY PLAN AND PROFILE

HOR. SCALE: 1" = 20'
VERT. SCALE: 1" = 4'



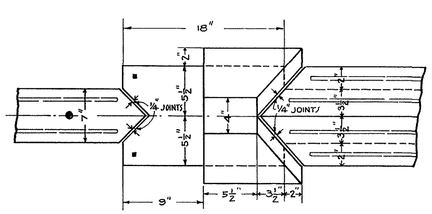
DETAIL OF FENCES, POSTS, SLABS & COPINGS

SCALE: ¾" = 1'-0"



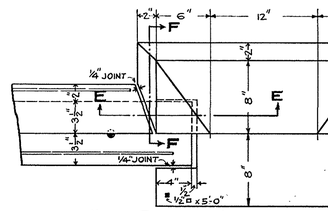
DETAIL OF INTERMEDIATE POST

SCALE: ¾" = 1'-0"

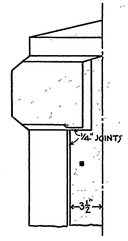


DETAIL OF INTERMEDIATE POST SHOWING EXPANSION JOINT

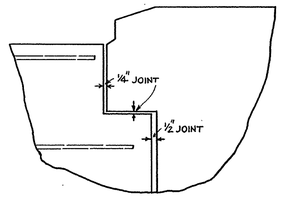
SCALE: 1½" = 1'-0"



NOTE: EXPANSION JOINTS TO BE MADE OF COTTON CLOTH SATURATED AND MOPPED WITH ASPHALT.



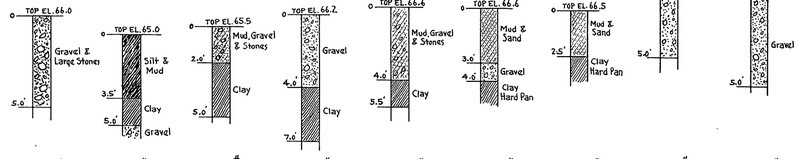
SECTION F-F



SECTION E-E

DETAILS OF MAIN POST SHOWING EXPANSION JOINT

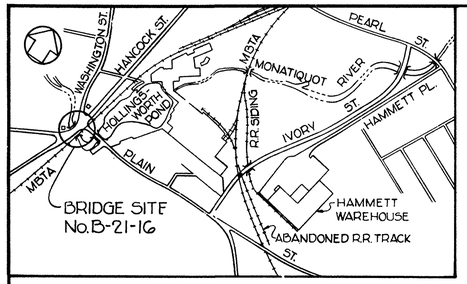
SCALE: 1½" = 1'-0"



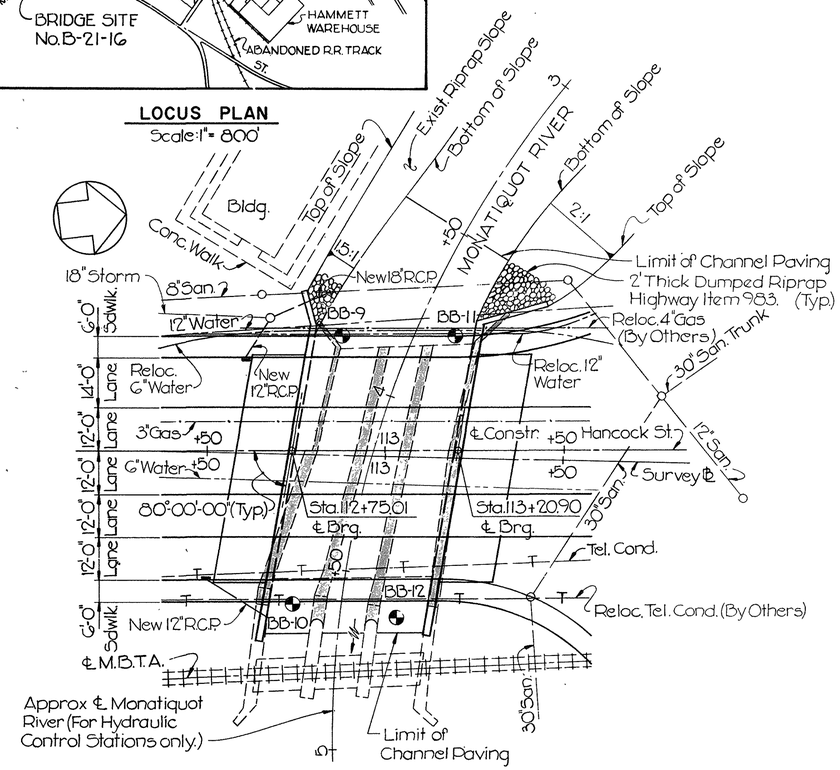
NOTE: DATA IS FROM WASH BORINGS AND IS NOT GUARANTEED
HIGH WATER EL. 69.6± VELOCITY - STILL WATER
LOCATION OF BORINGS SHOWN ON KEY PLAN

BORING DATA

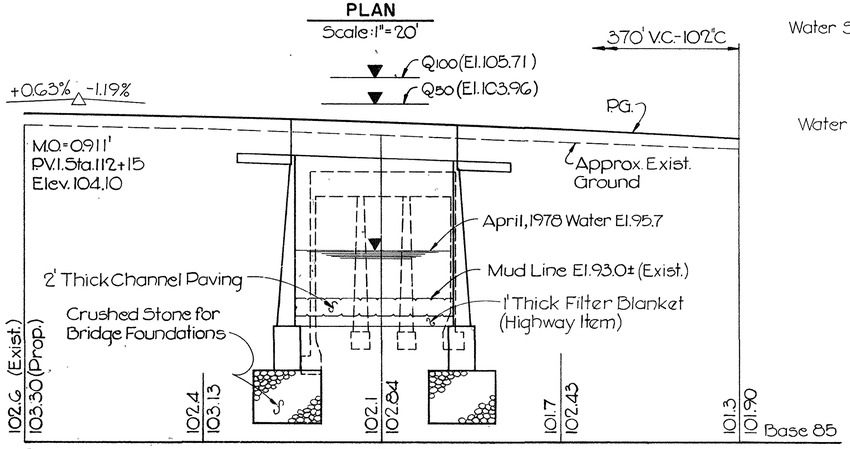
PUB. RD. DIV. NO.	STATE	FED. AID PROJ NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	MASS.	M-7760(002)	1979	48	115



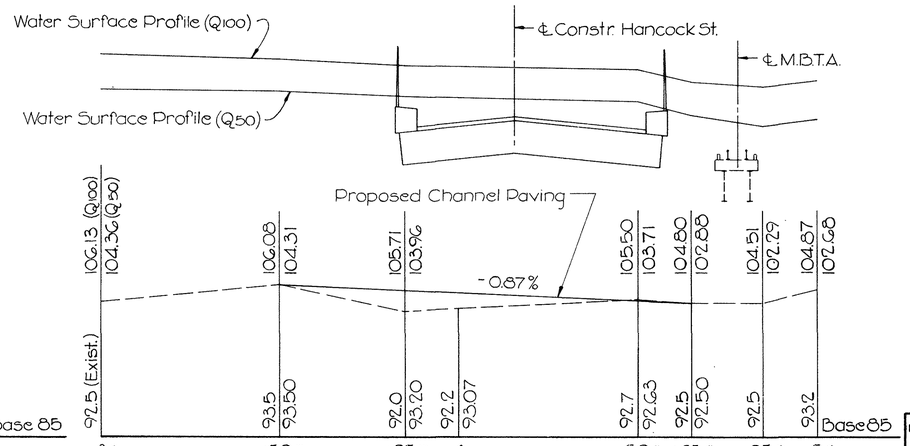
LOCUS PLAN
Scale: 1" = 800'



PLAN
Scale: 1" = 20'



PROFILE - HANCOCK ST.
Scale: Horz. 1" = 20'
Vert. 1" = 4'



* Indicates location of cross-section for Hydraulic Controls.

PROFILE - MONATIQUOT RIVER
Scale: Horz. 1" = 20'
Vert. 1" = 4'

GENERAL NOTES

DESIGN : IN ACCORDANCE WITH THE CURRENT SPECIFICATIONS OF A.A.S.H.T.O. (12th. EDITION & INTERIM THRU 1978) FOR HS20-44 LOADING.

REINFORCEMENT : ALL BARS SHALL CONFORM TO A.S.T.M. SPECIFICATIONS FOR A615 GRADE 60. UNLESS OTHERWISE SHOWN ON THE PLANS ALL #4 BARS SHALL BE LAPPED 20" AND ALL #5 BARS SHALL BE LAPPED 26". FOR HORIZONTAL BARS WITH 12" OR MORE OF CONCRETE BELOW THE BAR THE LAP SHALL BE 29" FOR #4 BARS AND 36" FOR #5 BARS. IF THE ABOVE BARS ARE SPACED 6" OR MORE ON CENTER, THE LAP LENGTH SHALL BE 80% OF THE LAP LENGTH GIVEN ABOVE. ALL OTHER BARS SHALL BE LAPPED AS SHOWN ON THE PLANS.

BENCH MARK : □ CUT IN NORTH POST OF WASHINGTON ST. BRIDGE 31.7' Lt. OF STA. 113+26.2 EL. 105.225.

DATE & SEAL : TO BE PLACED ON THE INSIDE FACE OF THE SOUTHEAST AND NORTHWEST END POSTS. A SHEET SHOWING SIZE AND CHARACTER OF THE NUMERALS WILL BE FURNISHED. THE SEAL WILL BE FURNISHED BY THE STATE AND SHALL BE SET BY THE CONTRACTOR.

HYDRAULIC DATA :

DRAINAGE AREA	24.7 Sq. MILES
DESIGN FLOOD (50 Yr.)	1875 c.f.s.
DESIGN FLOOD ELEV.	103.96
VELOCITY AT DESIGN FLOOD	5.03 ft./sec.
BASIC FLOOD (100 Yr.)	2365 c.f.s.
BASIC FLOOD ELEV.	105.71
FLOOD OF RECORD (Freq. of Yrs.)	NOT AVAILABLE

FOUNDATIONS : FOUNDATIONS MAY BE ALTERED, IF NECESSARY, TO SUIT CONDITIONS ENCOUNTERED DURING CONSTRUCTION.

BRIDGE RAILINGS : SEE DEPARTMENT STANDARD, DATED OCT. 1978, FOR DETAILS OF ALUMINUM TYPE AL-3 BRIDGE RAILING.

UNSUITABLE MATERIAL : ALL UNSUITABLE MATERIAL SHALL BE REMOVED WITHIN THE LIMITS OF THE FOUNDATIONS OF THE STRUCTURE.

SCALES : SCALES NOTED ON PLANS ARE NOT APPLICABLE TO REDUCED SIZE PRINTS. DIVIDE SCALES BY 2 FOR 1/4 SIZE PRINTS.

DIMENSIONS : ALL DIMENSIONS AND ELEVATIONS OF THE EXISTING STRUCTURE AND UTILITIES SHALL BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ORDERING MATERIALS.

ESTIMATED QUANTITIES
(NOT GUARANTEED)

DEMOLITION OF BRIDGE No. B-21-16	1 L.S.
CLASS A ROCK EXCAVATION	10 C.Y.
BRIDGE EXCAVATION	675 C.Y.
CHANNEL EXCAVATION	350 C.Y.
CLASS B ROCK EXCAVATION	10 C.Y.
GRAVEL BORROW	255 C.Y.
CRUSHED STONE FOR BRIDGE FOUNDATIONS	100 TONS
CLASS I BITUMINOUS CONC. PAVEMENT, TYPE I-1	25 TONS
CLASS I DENSE PROT. (BOTT.) COURSE FOR BRIDGES	25 TONS
BRIDGE STRUCTURE No. B-21-16	1 L.S.
TEMPORARY BRIDGE No. B-21-16	1 L.S.
CHANNEL PAVING	560 S.Y.
CONTROL OF WATER STRUCTURE No. B-21-16	1 L.S.

LEGEND : ▭ INDICATE EXIST. STRUCTURE TO BE REMOVED.

⊕ INDICATE LOCATION OF BORINGS. SEE SHEET 2 FOR BORING LOGS.

3A / 5 — 3A = SECTION DESIGNATION 3A, 3B ETC.; 5 = SHEET NUMBER WHERE SECTION IS DRAWN.

SHEET NUMBER WHERE SECTION IS TAKEN.

EXISTING BRIDGE PLANS : PLANS OF EXISTING BRIDGE No. B-21-16 MAY BE SEEN AT THE OFFICE OF THE BRIDGE ENGINEER, DEPT. OF PUBLIC WORKS, 100 NASHUA STREET, BOSTON, MASS.

SURVEY NOTE BOOK NUMBERS : 25322, 37075, 38051.

ANCHOR BOLTS : ANCHOR BOLTS SHALL BE DRILLED & GROUTED IN PLACE AFTER BEAMS ARE SET.

COMMONWEALTH OF MASSACHUSETTS — JOHN L. CRAWFORD #20781 — REGISTERED PROFESSIONAL ENGINEER — 12/26/79

KNOERLE, BENDER, STONE & ASSOC. INC
CONSULTING ENGINEERS
150 CAUSEWAY STREET
BOSTON, MASSACHUSETTS

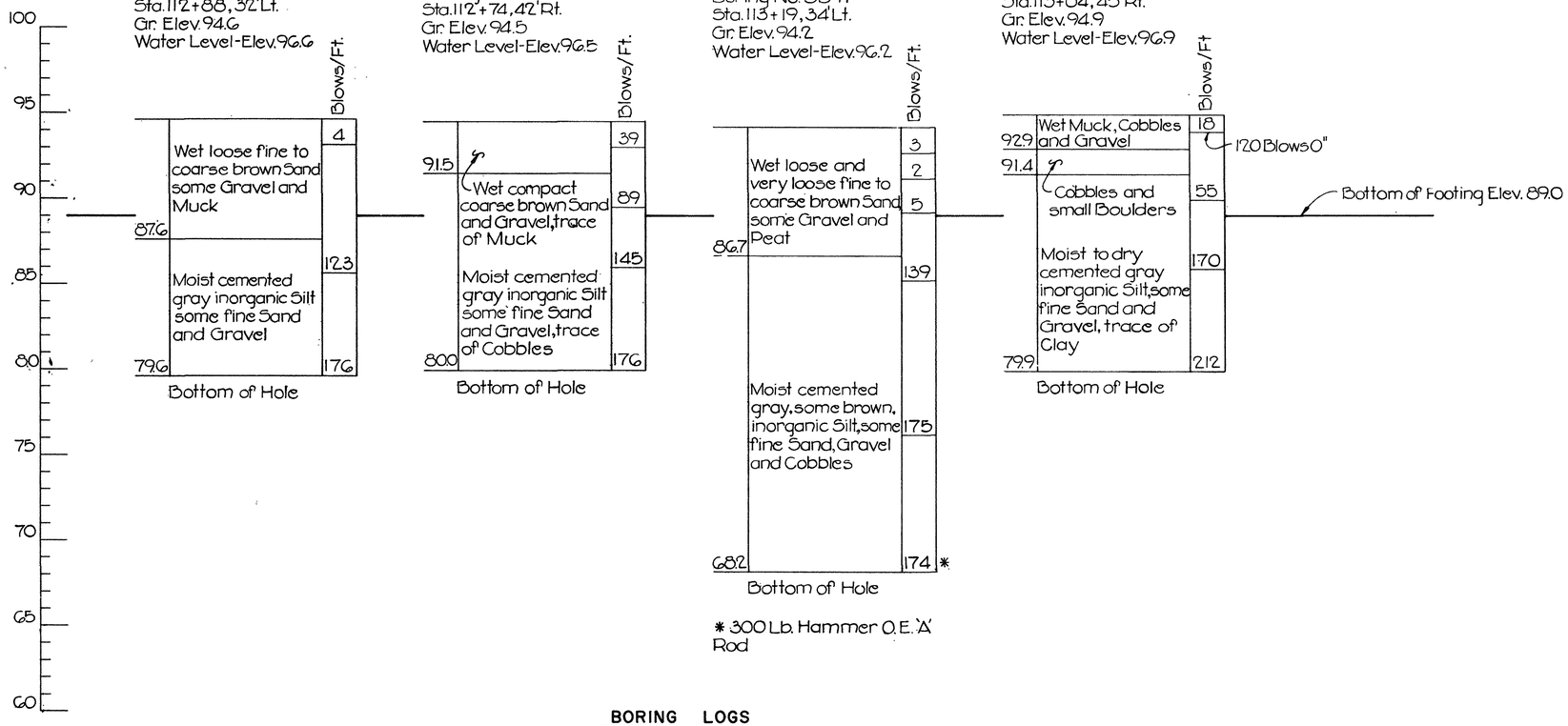
APRIL 17, 1982 — ISSUED FOR CONSTRUCTION

THE COMMONWEALTH OF MASSACHUSETTS
PROPOSED BRIDGE
IN
BRAINTREE
HANCOCK STREET
OVER
MONATIQUOT RIVER
SCALES AS NOTED
OFFICE OF
DEPARTMENT OF PUBLIC WORKS
100 NASHUA ST. BOSTON, MASS.

Acting BRIDGE ENGINEER — P.E. — CHIEF ENGINEER — P.E.

SHEET 1 OF 8 SHEETS BRIDGE No. B-21-16

PUB. RD. DIV. NO.	STATE	FED. AID PROJ NO.	FISCAL YEAR.	SHEET NO.	TOTAL SHEETS
1	MASS.	M-7760(002)	1979	49	115



BORING LOGS

Vert. Scale 1"=4'

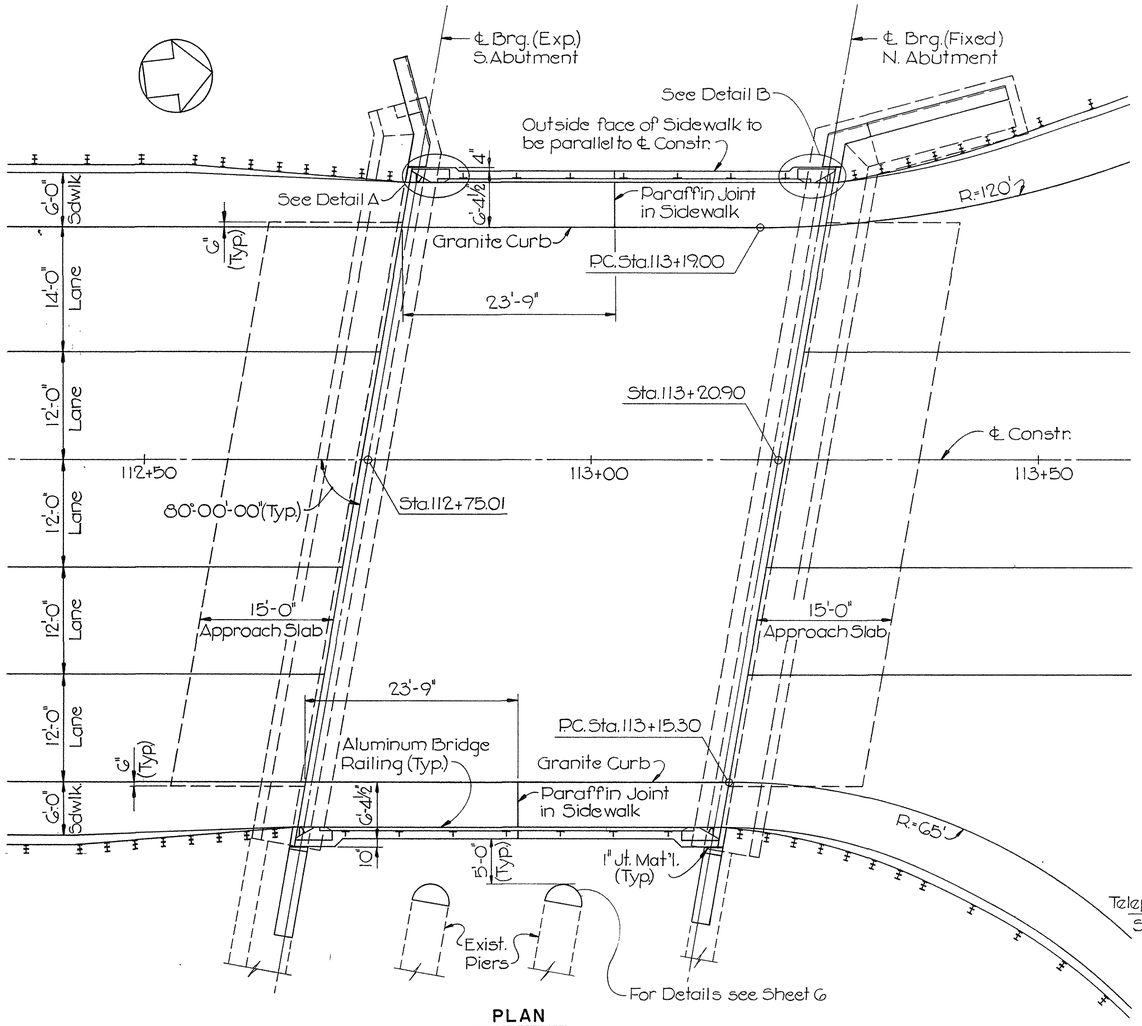
Boring Notes:

1. Location of borings shown thus ⊕ on Plan.
2. Borings taken for purpose of design and show conditions at boring points only but do not necessarily show nature of materials to be encountered during construction.
3. Figures in column indicated blows on 2" O.D. (1 3/8" I.D.) split spoon sampler per 1'-0" produced by 30" fall of 140 Lb. hammer except as noted.
4. Boring samples may be seen at the Research and Materials Division 99 Worcester St., Wellesley Hills, intersection of Route 9 and Route 128.
5. All borings were made during September, 1978 by Northeast Test Boring Co. Inc., of Weymouth, Mass. for the Commonwealth of Massachussetts Department of Public Works.
6. 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.

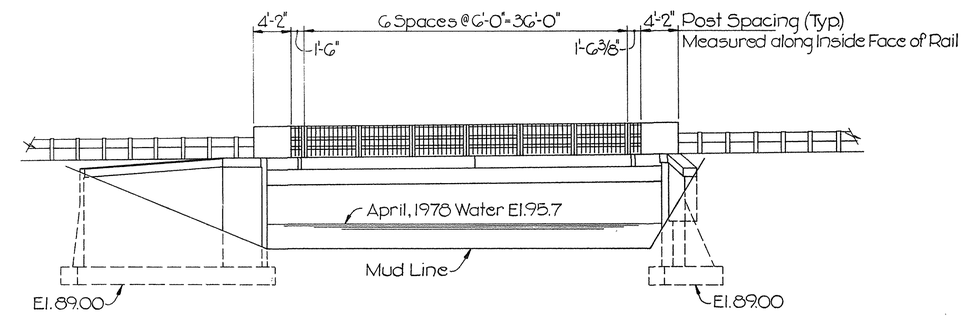
DATE	DESCRIPTION
APRIL 17, 1982	ISSUED FOR CONSTRUCTION

USE ONLY PRINTS OF LATEST DATE

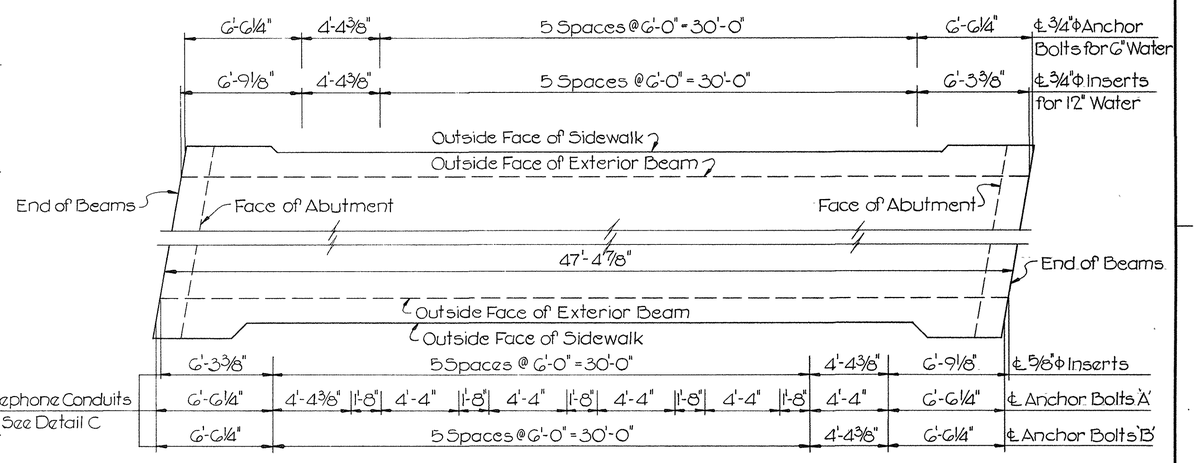
PUB. RD. DIV. NO.	STATE	FED. AID PROJ NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	MASS.	M-7760(002)	1979	50	115



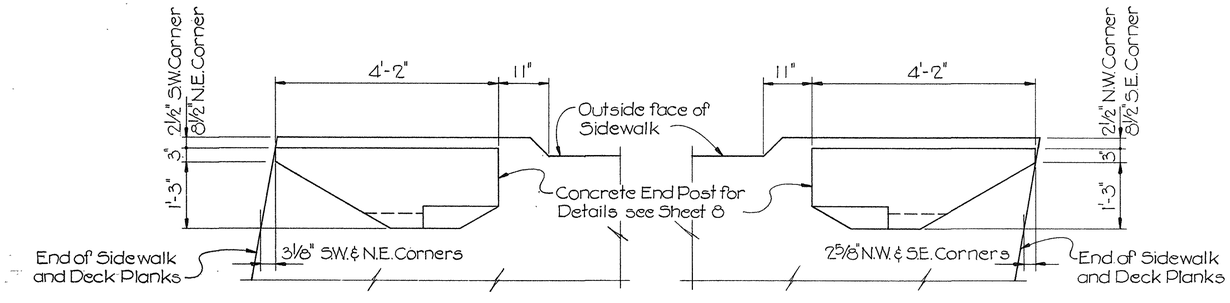
PLAN
Scale: 1/8" = 1'-0"



WESTERLY ELEVATION
Scale: 1/8" = 1'-0"

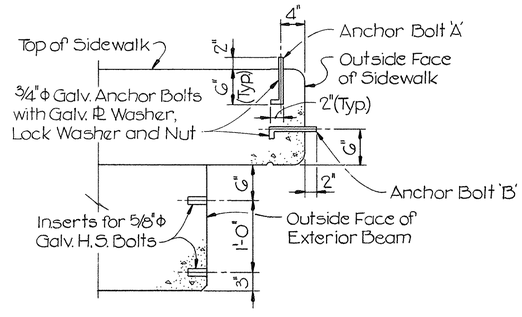


UTILITIES SUPPORT LOCATIONS
Scale: 1/4" = 1'-0"



DETAIL A
Scale: 3/4" = 1'-0"

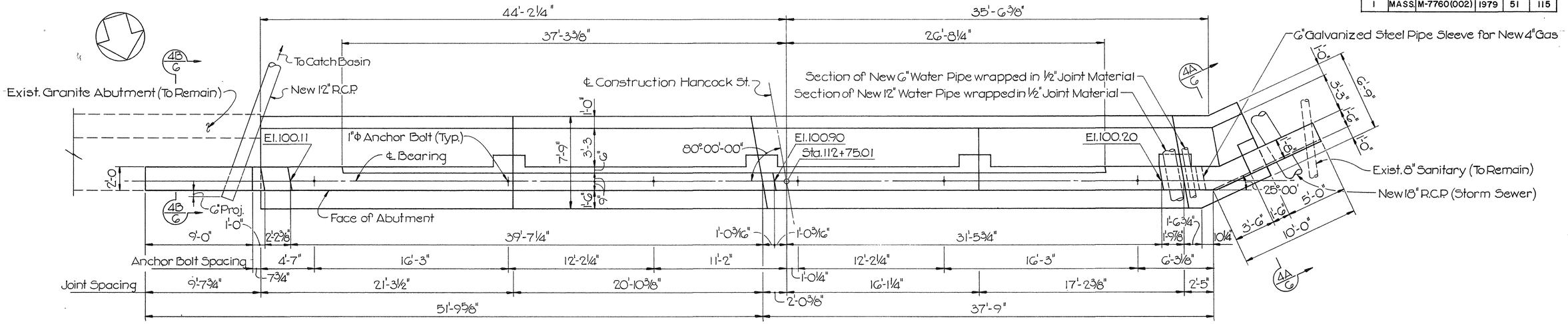
DETAIL B
Scale: 3/4" = 1'-0"



DETAIL C
Scale: 1" = 1'-0"

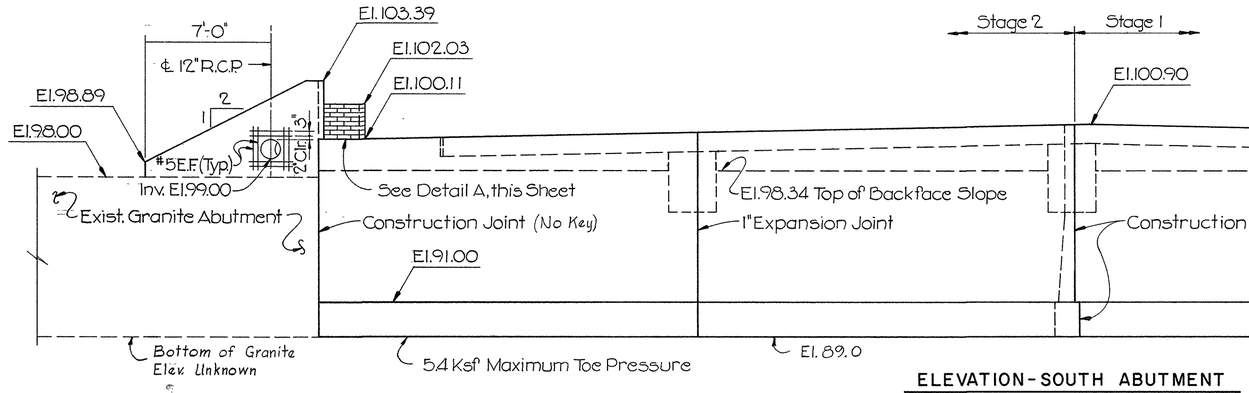
DATE	DESCRIPTION
APRIL 17, 1982	ISSUED FOR CONSTRUCTION
USE ONLY PRINTS OF LATEST DATE	

PUB. RD. DIV. NO.	STATE	FED. AID PROJ NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	MASS.	M-7760(002)	1979	51	115



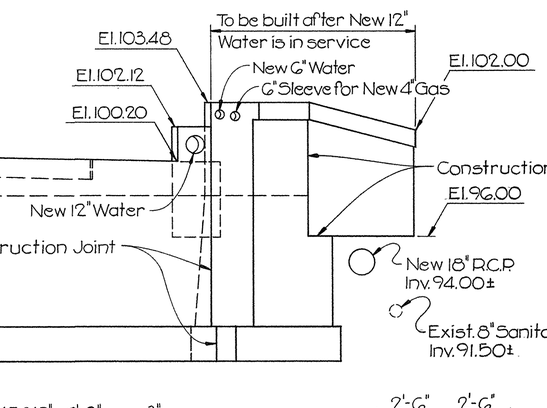
PLAN - SOUTH ABUTMENT

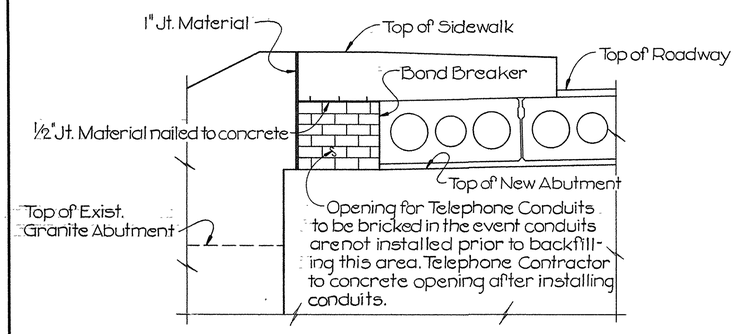
Scale: ¼" = 1'-0"



ELEVATION - SOUTH ABUTMENT

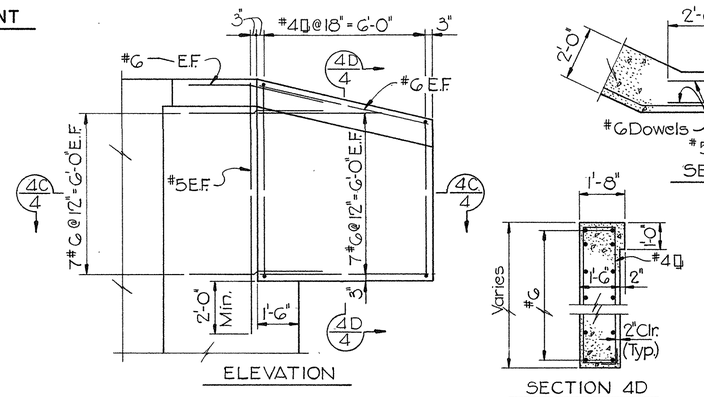
Scale: ¼" = 1'-0"



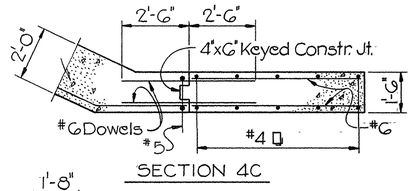


DETAIL A

Scale: ½" = 1'-0"



ELEVATION



SECTION 4C

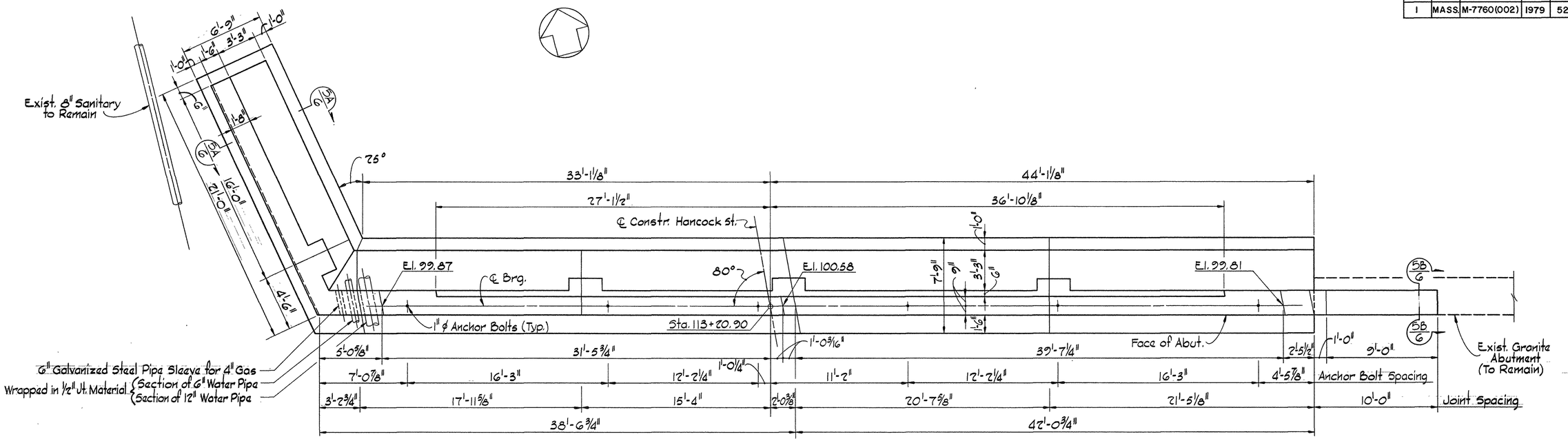
SECTION 4D

SOUTHWEST WINGWALL DETAILS

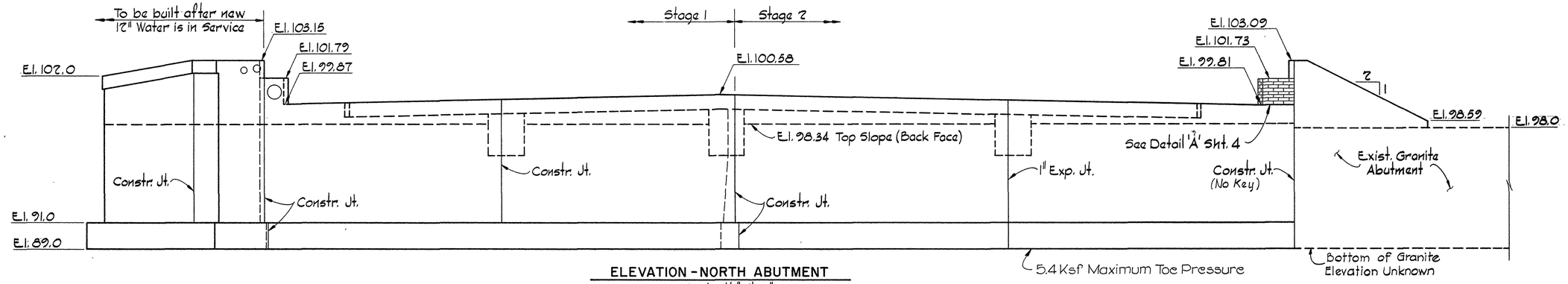
Scale: ⅜" = 1'-0"

DATE	DESCRIPTION
APRIL 17, 1982	ISSUED FOR CONSTRUCTION
USE ONLY PRINTS OF LATEST DATE	

PUB. RD. DIV. NO.	STATE	FED. AID PROJ NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	MASS.	M-7760(002)	1979	52	115

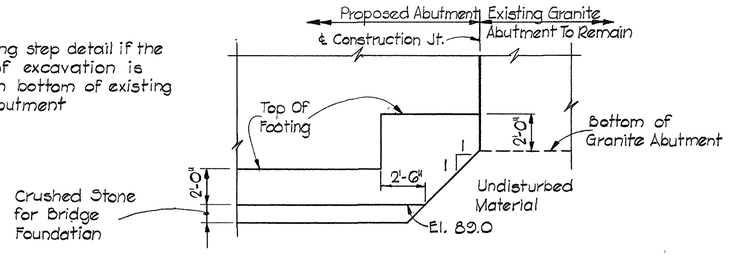


PLAN - NORTH ABUTMENT
Scale : 1/4" = 1'-0"



ELEVATION - NORTH ABUTMENT
Scale : 1/4" = 1'-0"

NOTE : Use footing step detail if the bottom of excavation is lower than bottom of existing granite abutment

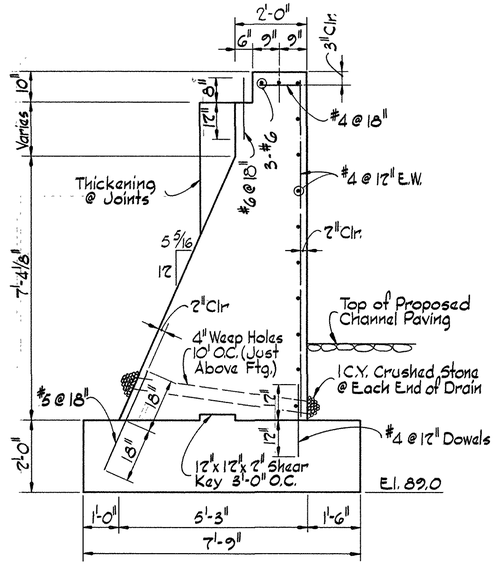


FOOTING STEP DETAIL
Scale : 1/4" = 1'-0"

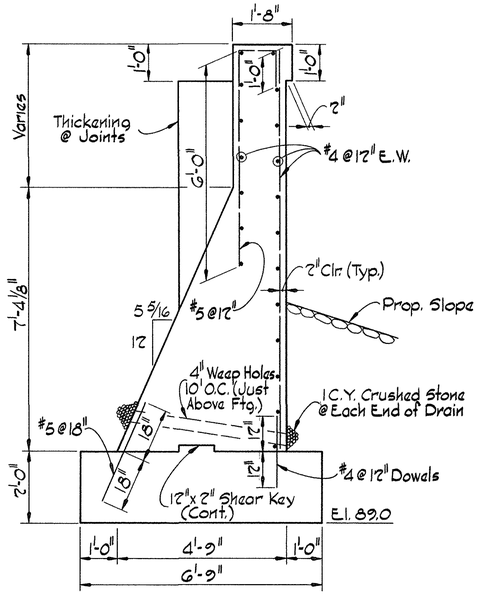
DATE	DESCRIPTION
APRIL 17, 1982	ISSUED FOR CONSTRUCTION
	USE ONLY PRINTS OF LATEST DATE

PUB. RD DIV. NO.	STATE	FED. AID PROJ NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	MASS.	M-7760(002)	1979	53	115

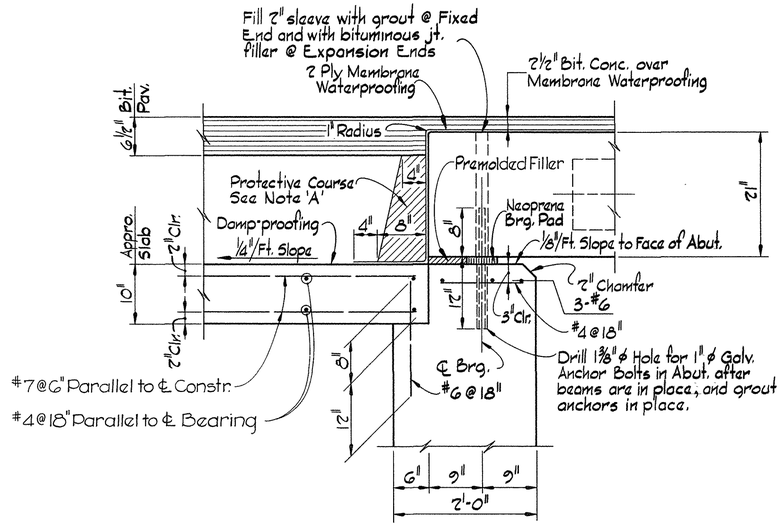
Note 'A'; Protective Course to be Brick or 8"x16"x 7" Class D Cement Conc. Masonry Blocks Laid in Mortar, or poured in Place Class D Cement Conc. Masonry.



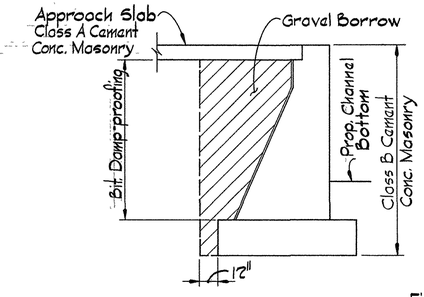
TYPICAL ABUTMENT SECTION
Scale: 1/2" = 1'-0"



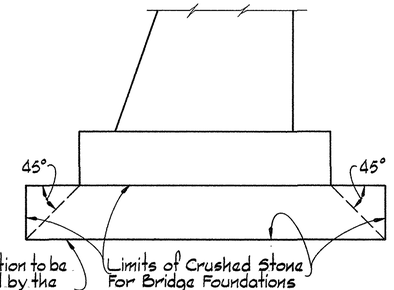
SECTION 4A & 5A
Scale: 1/2" = 1'-0"



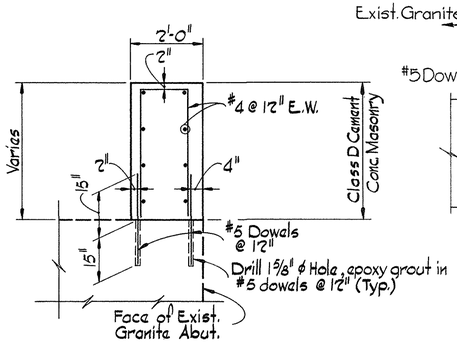
DETAIL AT TOP OF ABUTMENTS
Scale: 1" = 1'-0"



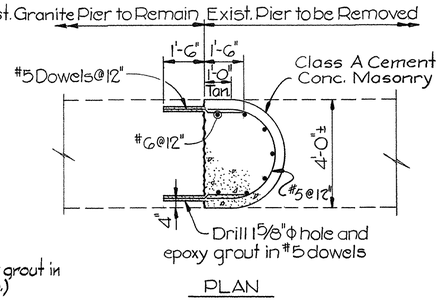
ABUTMENT



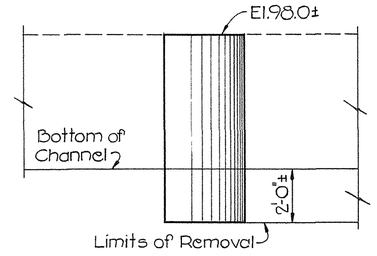
CRUSHED STONE FOR BRIDGE FOUNDATIONS
N.T.S.



SECTION 4B & 5B
Scale: 1/2" = 1'-0"

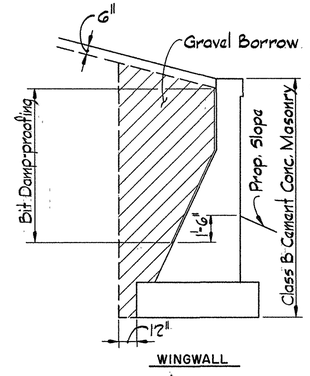


PLAN



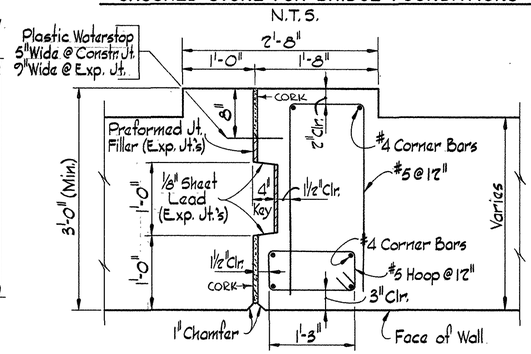
ELEVATION

CONCRETE NOSING DETAIL AT EXISTING PIERS
Scale: 3/8" = 1'-0"



WINGWALL

SECTION FOR QUANTITIES
Scale: 1/4" = 1'-0"

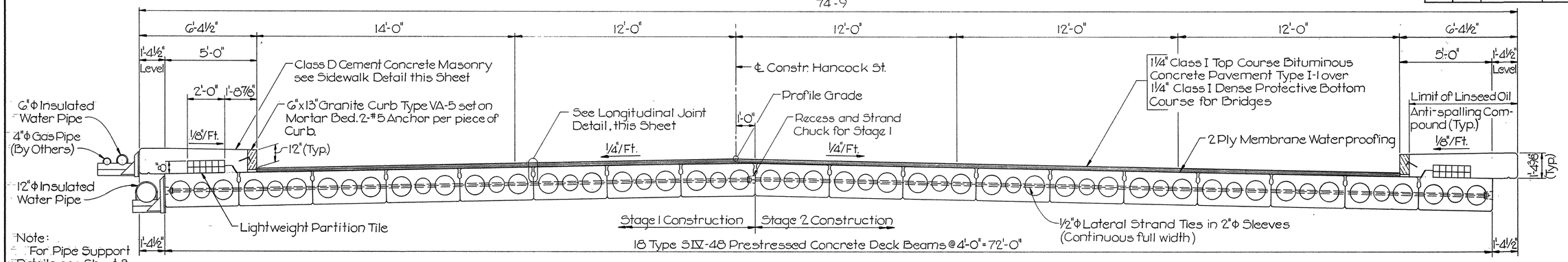


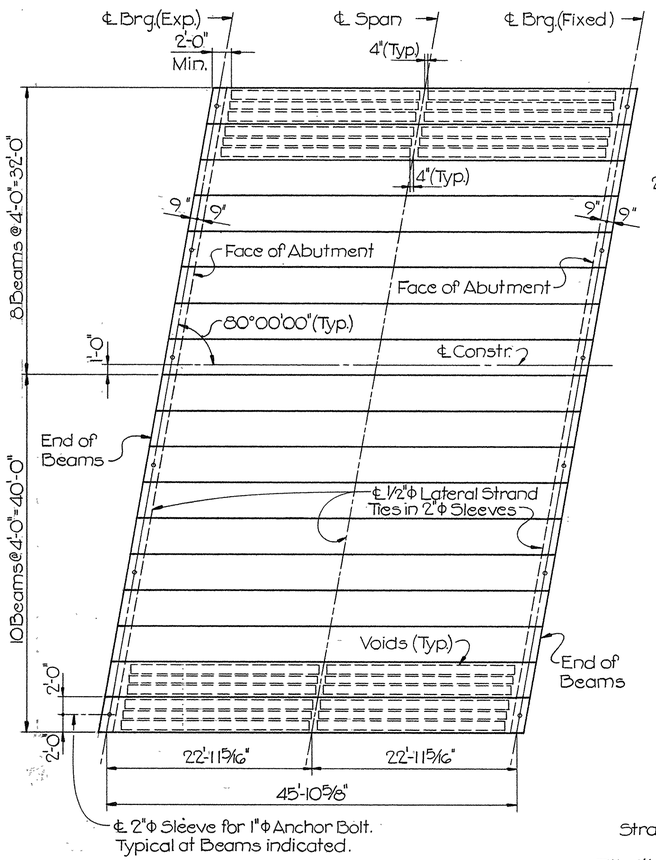
Notes:
1) 1/2" or 1" Preformed Jt. Filler to be carried to top of Wall.
2) For Constr. Jt.'s omit Reinforcing Steel, Sheet Lead & Jt. Filler.

EXPANSION & CONSTRUCTION JOINT DETAIL
Scale: 1/2" = 1'-0"

DATE	DESCRIPTION
APRIL 17, 1982	ISSUED FOR CONSTRUCTION
	USE ONLY PRINTS OF LATEST DATE

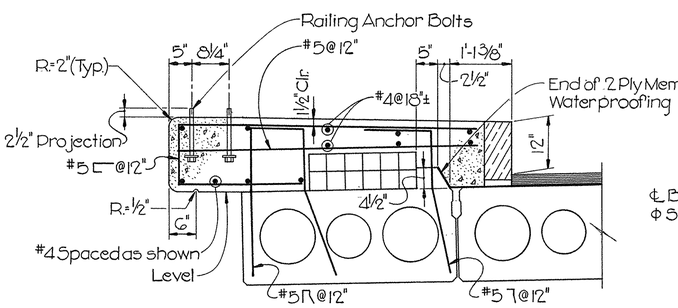
PUB. RD. DIV. NO.	STATE	FED. AID PROJ NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	MASS.	M-7760(002)	1979	54	115



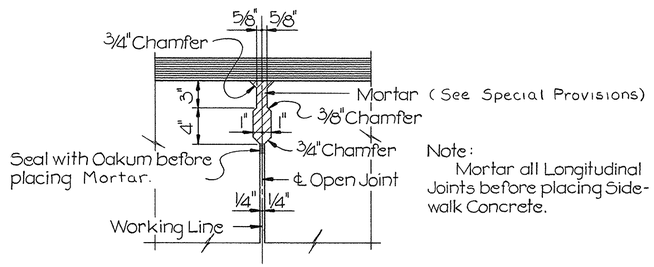


PLAN OF DECK BEAMS
Scale: ⅛"=1'-0"

CROSS SECTION THRU DECK
Scale: ⅜"=1'-0"

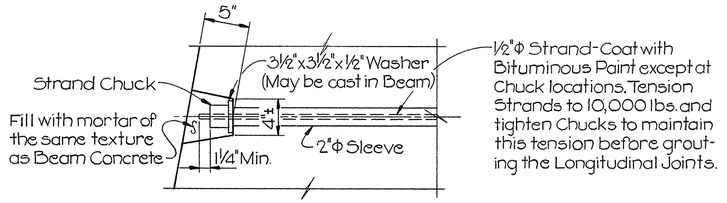


SIDEWALK DETAIL
Scale: ¾"=1'-0"



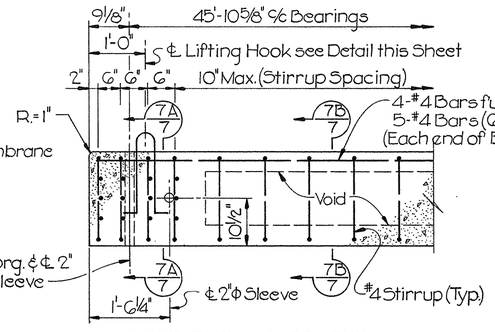
Note: Mortar all Longitudinal Joints before placing Sidewalk Concrete.

LONGITUDINAL JOINT DETAIL
Scale: 1½"=1'-0"

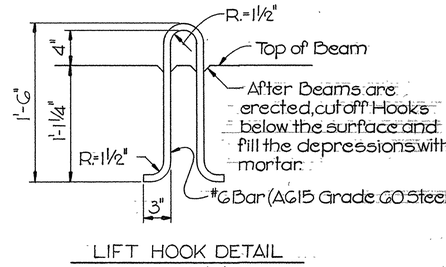


½"Φ Strand-Coat with Bituminous Paint except at Chuck locations. Tension Strands to 10,000 lbs. and tighten Chucks to maintain this tension before grouting the Longitudinal Joints.

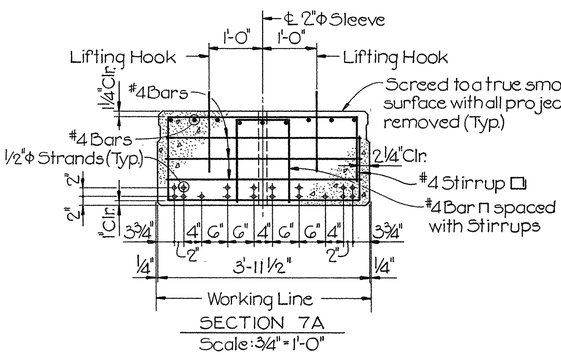
LATERAL ANCHORAGE DETAIL
Scale: 1½"=1'-0"



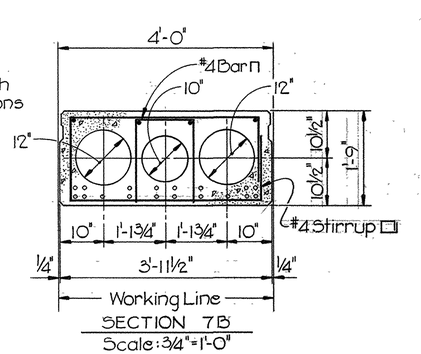
LONGITUDINAL SECTION
Scale: ¾"=1'-0"



LIFT HOOK DETAIL
Scale: 1½"=1'-0"

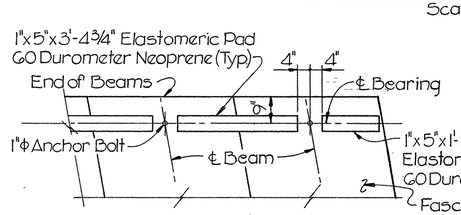


SECTION 7A
Scale: ¾"=1'-0"



SECTION 7B
Scale: ¾"=1'-0"

DECK BEAM REINFORCING DETAILS
Scale As Noted



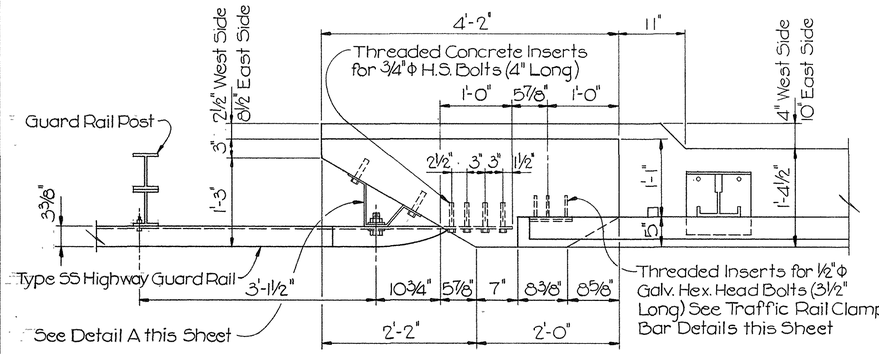
PLAN OF ELASTOMERIC BEARINGS
Scale: ½"=1'-0"

Notes:
1. All prestressing strands are ½"Φ (270K).
2. Initial Prestressing Force: 18 x 28,917 Lbs = 520,506 Lbs.
3. Deck Beams are A.A.S.H.T.O. Type 5IV-48.
4. Concrete Strength for Deck Beams: @ 28 Days = 5,000 P.S.I. @ Release = 4,000 P.S.I.

DATE	DESCRIPTION
APRIL 17, 1982	ISSUED FOR CONSTRUCTION
USE ONLY PRINTS OF LATEST DATE	

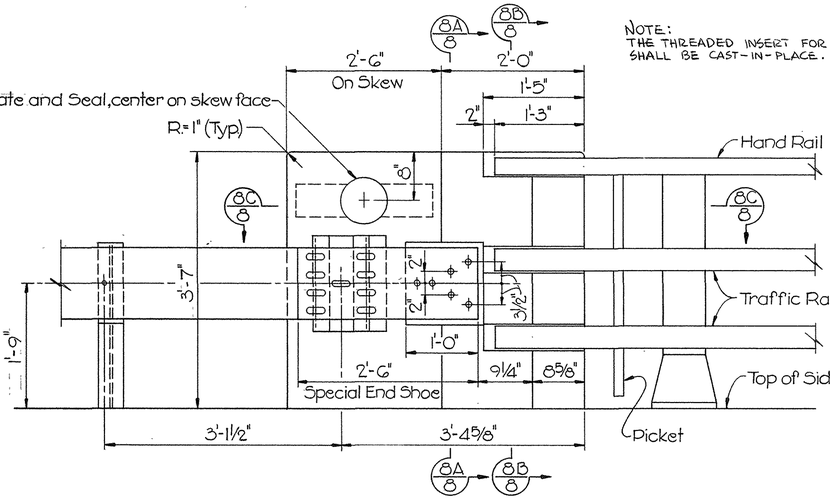
PUB. RD. DIV. NO.	STATE	FED. AID PROJ NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	MASS.	M-7760(002)	1979	55	115

Note:
For Sidewalk Reinforcing see Detail on Sheet No.7



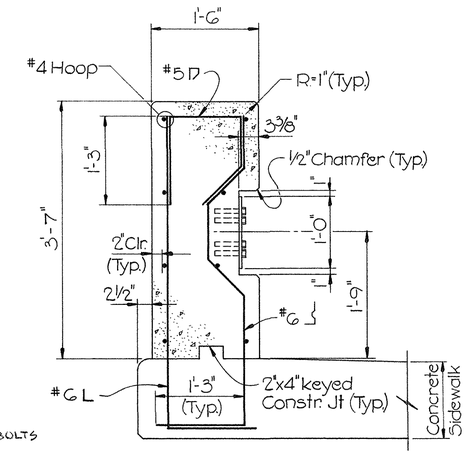
PLAN

NOTE:
THE THREADED INSERT FOR H.S. BOLTS SHALL BE CAST-IN-PLACE.

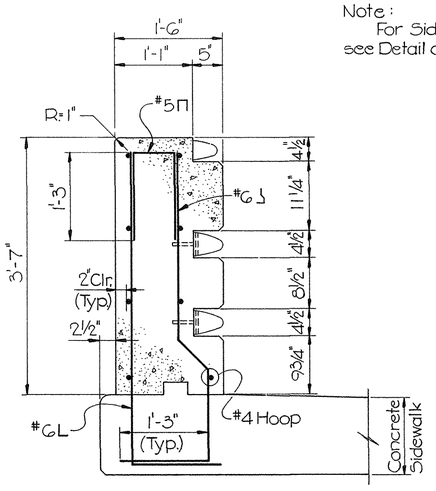


ELEVATION

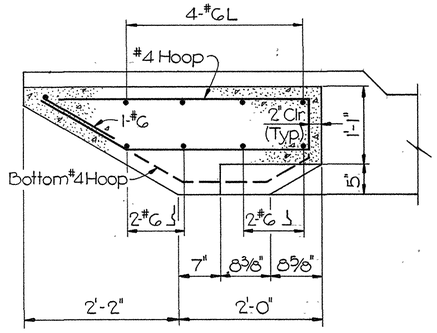
END POST
Scale: 1"=1'-0"



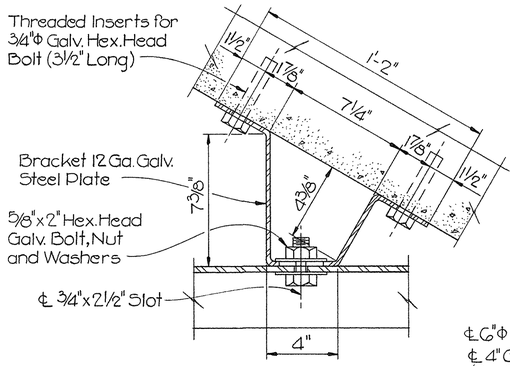
SECTION 8A
Scale: 1"=1'-0"



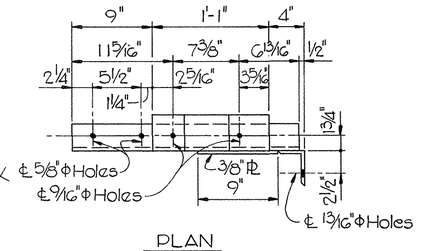
SECTION 8B
Scale: 1"=1'-0"



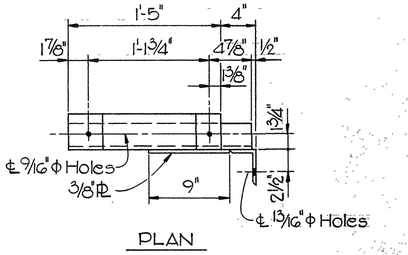
SECTION 8C
Scale: 1"=1'-0"



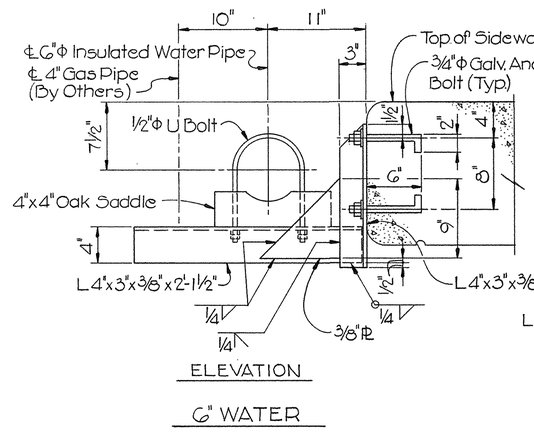
DETAIL A
Scale: 3"=1'-0"



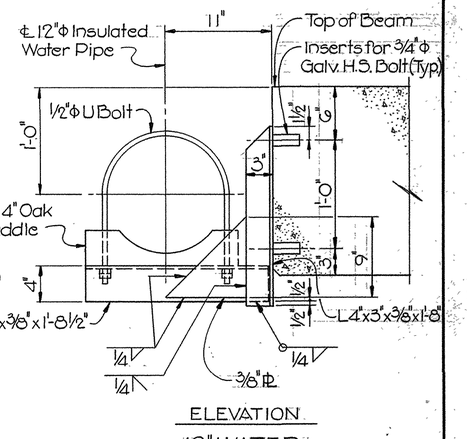
PLAN



PLAN



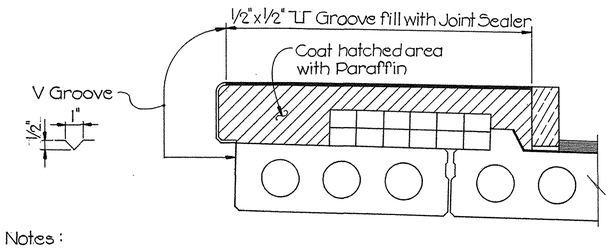
ELEVATION
6" WATER



ELEVATION
12" WATER

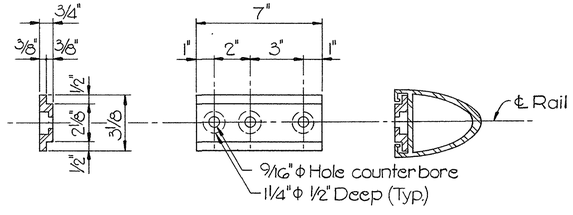
PIPE SUPPORT DETAILS
Scale: 1 1/2"=1'-0"

Pipe Support Notes:
1. Steel for Pipe Supports to be galvanized.
2. 1/2"ϕ Threaded U Bolt, Nuts and Locknuts to be galvanized. Tighten nuts for snug assembly and lock.
3. Cost of the supports, except anchor bolts and inserts, shall be included in the L.F. bid price of the pipe.



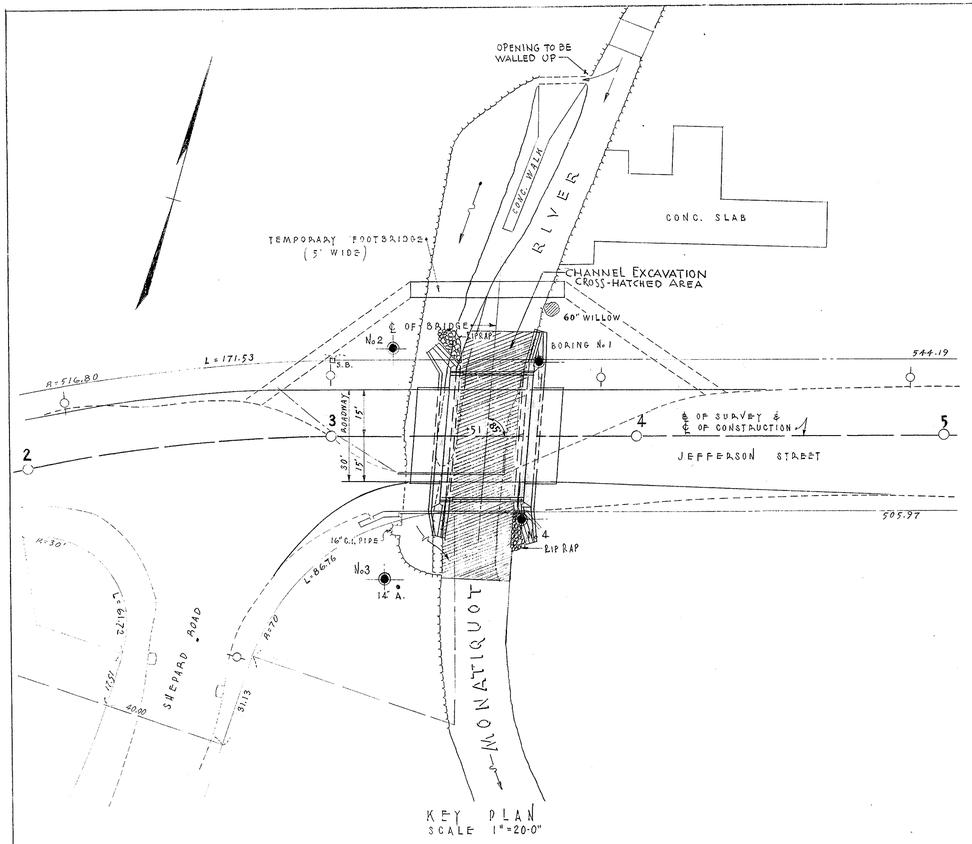
Notes:
1. Sidewalks shall be placed in alternate sections and shall have a curing period of not less than 3 days between pours.
2. A mortared joint in the curb shall be placed at each paraffin joint.
3. Longitudinal reinforcing to stop 2" each side of paraffin joints.
4. Joint sealer to be same color as concrete.
5. Joint to be square to face of curb.

PARAFFIN JOINT DETAIL
Scale: 3/4"=1'-0"

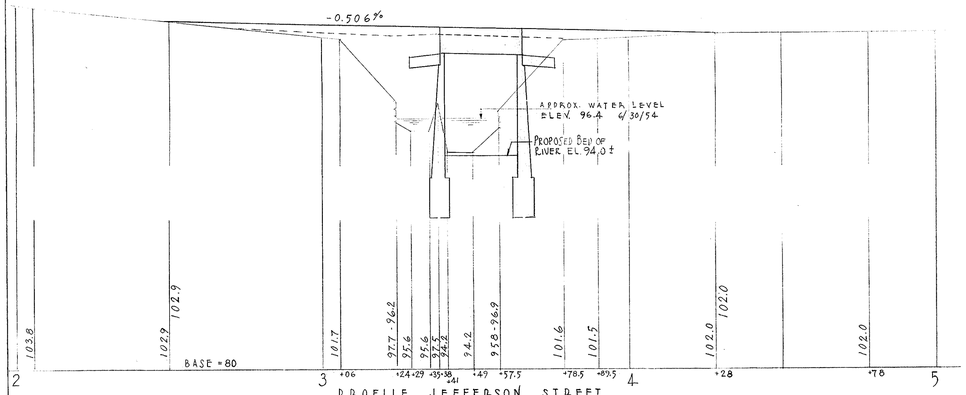


TRAFFIC RAIL CLAMP BAR DETAILS
Scale: 3"=1'-0"

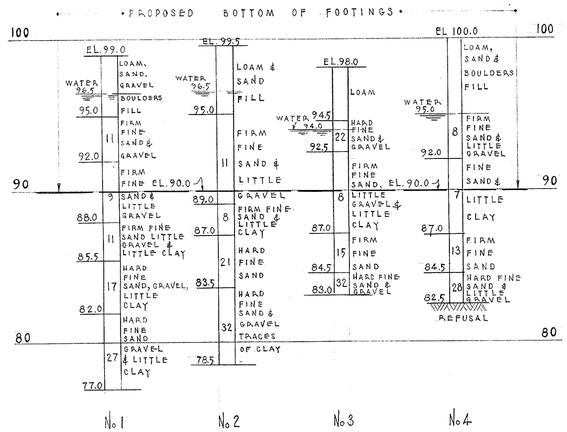
APRIL 17, 1982	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION
USE ONLY PRINTS OF LATEST DATE	



KEY PLAN
SCALE 1"=20'-0"



PROFILE JEFFERSON STREET
HORIZ. SCALE 1"=20'-0" VERT SCALE 1"=4'-0"

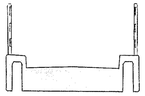


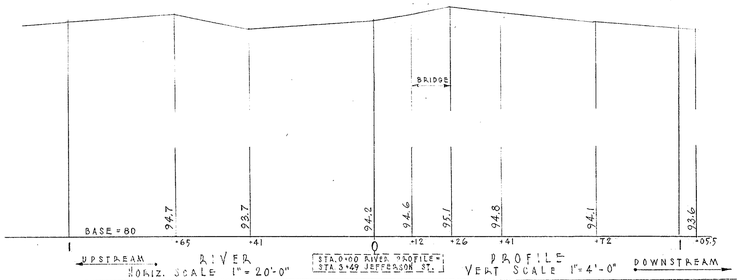
BORING DATA

SCALE 1" = 4'-0" BORINGS TAKEN AUG. 1954

BORING NOTES

LOCATION OF BORINGS SHOWN ON KEY PLAN THUS: ⊕ No.1. BORINGS TAKEN FOR PURPOSE OF DESIGN AND SHOW CONDITIONS AT BORING POINTS ONLY, BUT DO NOT NECESSARILY SHOW NATURE OF MATERIALS TO BE ENCOUNTERED DURING CONSTRUCTION. FIGURES IN COLUMNS INDICATE BLOWS PER FOOT ON ONE INCH ϕ PIPE PRODUCED BY 30 INCH FALL OF 140 POUND HAMMER. BORING SAMPLES MAY BE SEEN AT THE TOWN OFFICES.





HORIZ. SCALE 1" = 20'-0" | STA. 0+00 RIVER PROFILES, STA. 3+49 JEFFERSON ST. | PROFILE VERT SCALE 1"=4'-0"

GENERAL NOTES

FOUNDATIONS:
MAY BE ALTERED, IF NECESSARY, TO SUIT CONDITIONS ENCOUNTERED IN CONSTRUCTION

DATE:
TO BE PLACED IN CENTER OF INSIDE FACES OF NORTHEASTERLY AND SOUTHWESTERLY END POSTS AS SHOWN IN DETAIL ON SHEET 2. A SHEET SHOWING SIZE AND CHARACTER OF NUMERALS WILL BE FURNISHED.

DESIGN:
ACCORDING TO SPECIFICATIONS OF AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS (1953 ED) FOR H20-44 LOADING.

REINFORCEMENT:
ALL BARS SHALL HAVE DEFORMATIONS CONFORMING TO A.S.T.M. DESIGNATION A305. UNLESS OTHERWISE SHOWN ON THE PLANS, REINFORCING BARS SHALL BE LAPPED 20 DIAMETERS TO MAKE A SPLICE, EXCEPT THAT MAIN REINFORCING BARS NEAR THE TOP OF SLABS AND BEAMS HAVING MORE THAN 12 INCHES OF CONCRETE UNDER THE BARS SHALL BE LAPPED 35 DIAMETERS TO MAKE A SPLICE.

HYDRAULIC DATA
SIZE OF DRAINAGE AREA = 24.6 SQ. MILES.
BRIDGE OPENING PROVIDED FOR MINOR FLOOD.
ESTIMATED DISCHARGE = 1015 CU. FT. PER SEC.
VELOCITY OF FLOOD FLOW = 8.8 FT PER SEC.
BENCH MARK: STA. 3+87± 57½ LT CHISEL CUT IN COLNER OLD CONCRETE PLATFORM, EL. 100.49 U.S.C.&G.S. DATUM.

ESTIMATED QUANTITIES
(NOT GUARANTEED)

BRIDGE EXCAVATION	370	CU. YDS.
CLASS B ROCK EXCAVATION	5	CU. YDS.
CHANNEL EXCAVATION	150	CU. YDS.
CLASS A ROCK EXCAVATION	5	CU. YDS.
GRAVEL BORROW	200	CU. YDS.
CLASS A CEM. CONC MASONRY	80	CU. YDS.
CLASS B CEM. CONC. MASONRY	210	CU. YDS.
STEEL REINF. FOR STRUCTURES	13,200	POUNDS
BITUMINOUS DAMP-PROOFING	200	SQ. YDS.
RIP RAP	6	CU. YDS.
STONE MASONRY WALLS (REM. & REB.)(DRY)	5	CU. YDS.
BRIDGE FENCES TYPE "E"	55	LIN. FT.
LUMBER SHEETING	9	M.F.B.M.
TEMPORARY STRUCTURE	1	LUMP SUM
REMOVAL OF PRESENT SUPERSTRUCTURE	1	LUMP SUM

TOWN ADVICE

DES. WFB
DR. WFB J.S.S.
CHK. L.S.C.
APPROVED FOR
DES ____
ARCH. ____
SPECS. ____

ISSUED FOR CONSTRUCTION

THE COMMONWEALTH OF MASSACHUSETTS
PROPOSED BRIDGE

BRAINTREE

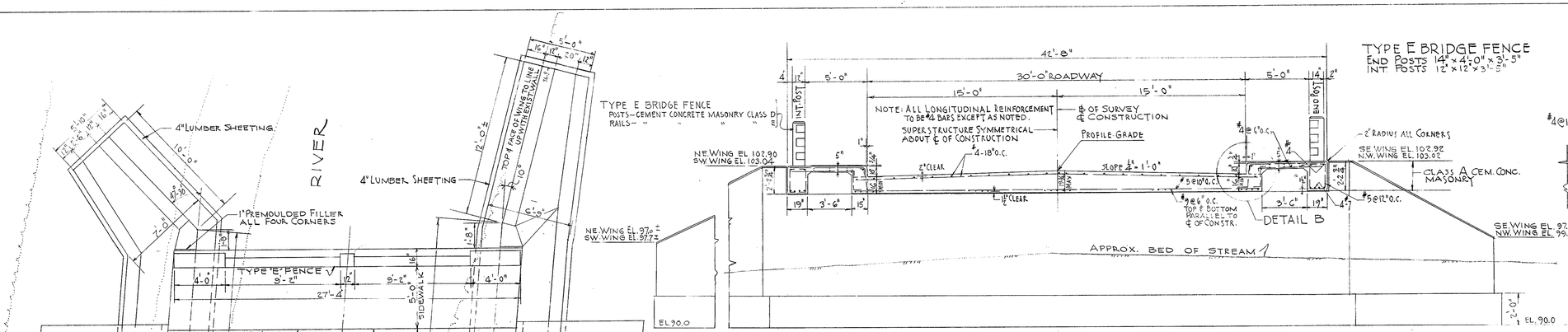
JEFFERSON STREET (STA 3+51)
OVER MONATIQUOT RIVER
SCALES AS NOTED

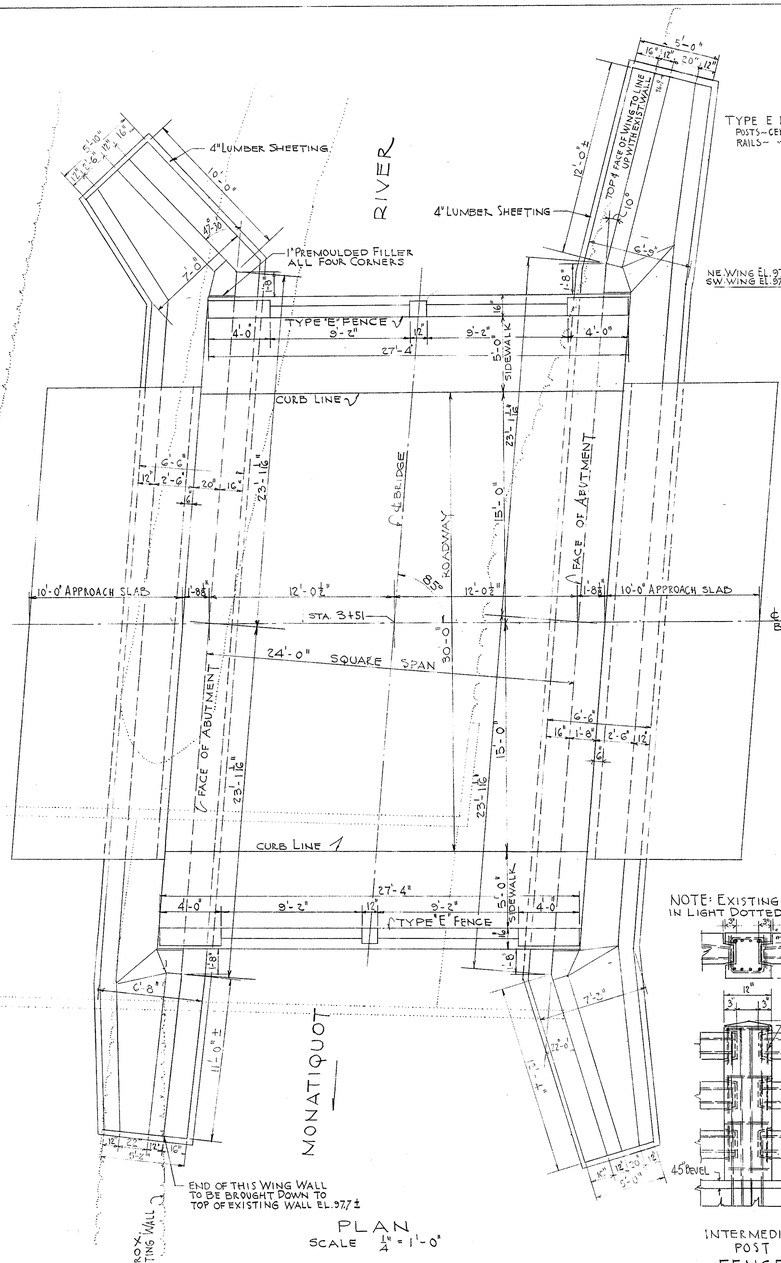
OFFICE OF
DEPARTMENT OF PUBLIC WORKS
100 NASHUA ST. BOSTON, MASS.
DEC. 1954

J.C. Sullivan — BRIDGE ENGINEER
N.E. Gray — CHIEF ENGINEER

SHEET 1 OF 2 SHEETS BRIDGE No. B-21-54

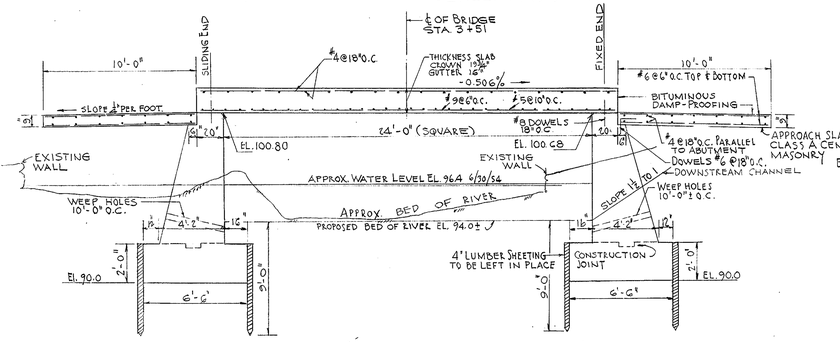
CHANGED FROM No. B-21-29 TO No. B-21-54 AUG. 19, 1957



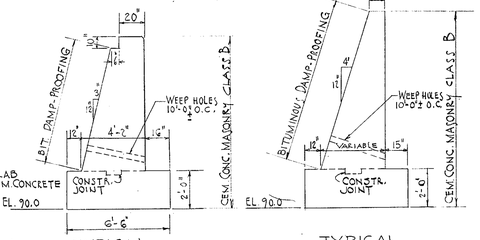


ELEVATION OF EASTERLY ABUTMENT
AND CROSS SECTION OF SUPERSTRUCTURE
SCALE ¼" = 1'-0"

WESTERLY ABUTMENT SAME EXCEPT AS SHOWN



LONGITUDINAL SQUARE SECTION
LOOKING NORTH
SCALE ¼" = 1'-0"

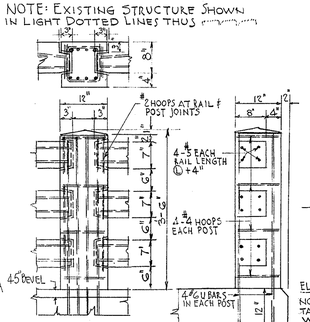


TYPICAL ABUTMENT SECTION
SCALE ¼" = 1'-0"

TYPICAL WING SECTION
SCALE ¼" = 1'-0"

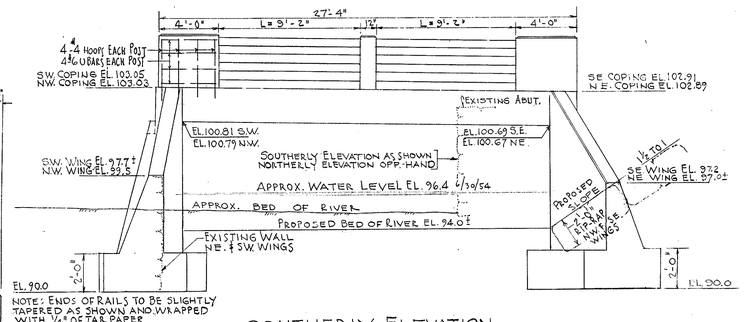
FOUNDATION PRESSURE 3350 LBS. PER FT.

NOTE: EXISTING STRUCTURE SHOWN IN LIGHT DOTTED LINES THUS



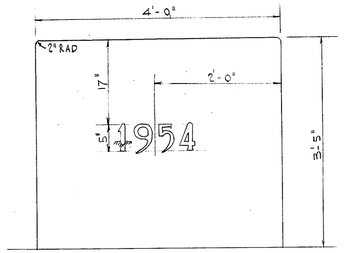
INTERMEDIATE POST CROSS SECTION

FENCE AND POST DETAILS
SCALE ¾" = 1'-0"



SOUTHERLY ELEVATION
SCALE ¼" = 1'-0"

NORTHERLY ELEVATION SAME EXCEPT AS SHOWN



DETAIL OF END POST SHOWING DATE
SCALE 1" = 1'-0"

NOTE: APPROACH SLABS AND ALL SUPERSTRUCTURE CONCRETE TO BE CEMENT CONCRETE MASONRY CLASS A, EXCEPT FENCE & POST CONCRETE AS NOTED. ALL SUBSTRUCTURE CONCRETE TO BE CEMENT CONCRETE MASONRY CLASS B

DATE	DESCRIPTION
	ISSUED FOR CONSTRUCTION
	USE ONLY PRINTS OF LATEST DATE

SHEET 2 OF 2 SHEETS BRIDGE № B-21-54

CHANGED FROM № B-21-29 TO № B-21-54 AUG. 19, 1957