

2-DIST  
04

B.I.N.  
7VB

STRUCTURES INSPECTION FIELD REPORT

SPECIAL MEMBER INSPECTION

BR. DEPT. NO.  
B-07-015-W-04-039

CITY/TOWN <b>BELMONT=WALTHAM</b>	8-STRUCTURE NO. <b>B07015-7VB-MUN-CUL</b>	11-Kilo. POINT <b>000.000</b>	90-ROUTINE INSP. DATE <b>May 21, 2020</b>	93*-SPEC. MEMB. INSP. DATE <b>May 21, 2021</b>
07-FACILITY CARRIED <b>ST 60 TRAPELO RD</b>	MEMORIAL NAME/LOCAL NAME	27-YR BUILT <b>1850</b>	106-YR REBUILT <b>1900</b>	*YR REHAB'D (NON 106) <b>0000</b>
06-FEATURES INTERSECTED <b>WATER BEAVER BROOK</b>	26-FUNCTIONAL CLASS <b>Urban Arterial</b>	DIST. BRIDGE INSPECTION ENGINEER <b>J. Dideo</b>		
43-STRUCTURE TYPE <b>801 : Masonry Slab</b>	22-OWNER Town Agency	21-MAINTAINER Town Agency	TEAM LEADER <b>T. Franciosa</b>	PROJ MGR <b>Michael Baker Intl Inc</b>
107-DECK TYPE <b>1 : Concrete Cast-in-Place</b>	WEATHER <b>Clear</b>	TEMP. (air) <b>24°C</b>	TEAM MEMBERS <b>S. SKINNER</b>	

WEIGHT POSTING **Not Applicable**  **X**

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

Waived Date: **00/00/0000** EJDMT Date: **00/00/0000**

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

At bridge		Advance	
E	W	E	W

PLANS (Y/N): **N**  
(V.C.R.) (Y/N): **N**  
TAPE#:

RATING

Rating Report (Y/N): **N** Date: **----** Recommend for Rating or Rerating (Y/N): **N**

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

Inspection data at time of existing rating  
I 58: - I 59: - I 60: - I 62: - Date: 00/00/0000

REASON: 

**SPECIAL MEMBER(S):**

	MEMBER	CRACK (Y/N)	WELD'S CONDITION (0-9)	LOCATION OF CORROSION, SECTION LOSS (%), CRACKS, COLLISION DAMAGE, STRESS CONCENTRATION, ETC.	CONDITION		INV. RATING OF MEMBER FROM RATING ANALYSIS			Deficiencies
					PREVIOUS	PRESENT	H-20	3	3S2	
					(0-9)	(0-9)				
A	Item 58.2 - Deck Condition	N		See remarks in comments section.	3	3	Not Rated			S-A
B	Item 59.1 - Beams	N		See remarks in comments section.	3	3	Not Rated			S-A
C	Item 60.1.d - Breastwalls	N		See remarks in comments section.	4	4	Not Rated			S-A
D										
E										

List of field tests performed:

	I-58	I-59	I-60	I-62
(Overall Previous Condition)	3	3	4	-
(Overall Current Condition)	3	3	4	-

**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).

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



CITY/TOWN BELMONT=WALTHAM	B.I.N. 7VB	BR. DEPT. NO. B-07-015=W-04-039	8.-STRUCTURE NO. B07015-7VB-MUN-CUL	INSPECTION DATE MAY 21, 2021
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## REMARKS

### BRIDGE ORIENTATION

Structure B-07-015=W-04-039 (7VB) carries ST 60 Trapelo Road over Beaver Brook along the border line between the town of Belmont and city of Waltham. The approaches are west and east and the elevations are south and north (**see Photos 1-4**). Beaver Brook flows from north to south (**see Photos 5-6**).

### GENERAL REMARKS

There are multiple superstructure types for this bridge. There are sixteen (16) granite slabs labeled Slab 1 through 16 from south to north. There are eight (8) steel beams labeled Beam 1 through 8 between Slabs 4 and 5, with a utility main at Beam 5. There is a concrete slab with stay-in-place forms between Slabs 12 and 13. North of Slab 16 there is a concrete extension. There is a bituminous wearing surface that has been retrofitted with steel roadway plates that span the length of the superstructure (**see Sketch 1 and Photo 10**). The original abutments are comprised of dry laid stone at the south side, and the bridge was widened using cast in place concrete abutments on the north side. (**see Sketch 2 and Photo 7**).

"Caution" signs are in place at both approaches (**Photos 8 and 9**).

There is a gaseous smell near the Southwest Wingwall.

### SPECIAL MEMBER INSPECTION

The scope of the Special Member inspection includes the hands on inspection and monitoring of identified members with advanced deterioration.

### ITEM 58 - DECK

#### Item 58.2 - Deck Condition

The roadway plates are designated as P1 through P6 from south to north. There are fully broken tack welds between roadway plates. The plates with broken tack welds typically deflect under live load. There is typically minor scrapes and gouges on the leading edge of the roadway plates. There are isolated up to 2'-0" wide x 7" long x 2" deep spalls in the pavement adjacent to the roadway plates (**see Photo 11 for northeast corner**). Also, there are isolated transverse hairline cracks. **See Sketch 1** for conditions and locations.

### ITEM 59 - SUPERSTRUCTURE

#### Item 59.1 - Beams

Conditions noted with the Granite Masonry Slabs and the Steel Beams are documented as follows:

#### Granite Slabs:

The southwest corner of Slab 1 is unsupported for 6" (**see Photo 12**). There are isolated longitudinal and diagonal hairline cracks, some with efflorescence near the abutments (**see Photo 13**). There are several transverse hairline cracks, some with efflorescence near mid-span (**see Photos 18-19**). Slab 7 near mid-span has an up to 2" wide x full depth crack, with a 20" long x 13" wide x 2" deep spall at the south edge (**see Photos 20-22**). Slab 6 and 7 are monitored with crack gauges (**see Photos 18-21**). The crack gauges indicated little to no movement since installation, and no measurable movement since the previous inspection. **See Sketch 2** for conditions and locations.

#### Steel I-Beams:

There is timber shielding between the steel I-beams preventing inspection of the web and top flanges. The beams typically exhibit minor rotation about the longitudinal axis, resulting in the bottom flanges no longer being level.

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## REMARKS

### Item 59.1 - Beams (Cont'd)

There is typically heavy rust and laminated rust throughout the beams. The top and bottom flange of isolated beams near the abutments and at mid-span have up to 100% section loss x full width (**see Photos 14-17**). **See Sketch 3** for conditions and locations.

### Reinforced concrete slab:

The reinforced concrete slab which acts as part of the superstructure below the westbound roadway is missing 50% of the stay in place forms on the north side of the slab.

There are two spalls with exposed rebars along the south edge measuring up to 2'-6" long x 9" high x 6" wide (**see Photo 23**). **See Sketch 2** for conditions and locations.

### ITEM 60 - SUBSTRUCTURE

#### Item 60.1 - Abutments

##### Item 60.1.d - Breastwalls

There are typically voids up to 2'-0" deep throughout the abutments. There are missing and cracked stones throughout both breastwalls and below the drainage pipes. Some areas have been repaired and filled with concrete and sandbags. Conditions and locations are as follows:

#### West Abutment:

Below Slab 2, there is a 3'-4" long x 20" high x 2'-0" deep void with shifted stones (**see Photo 24**).

Below Slab 5 at the waterline, there are two (2) up to 2'-0" in diameter x up to 2'-0" deep voids.

Below Slab 9, missing sandbags at concrete and sandbag repair.

Below the interior concrete slab between Granite Slabs 12 & 13, there is a full height hairline crack up to 2'-0" high in the masonry stone.

Below Slab 13, there is a 12" long x 2'-0" high x 2'-0" deep spall in the cast in place concrete.

For underwater inspection details, see the latest Routine Underwater inspection report dated 5/13/19.

#### East Abutment:

Below Slab 1, there are full height cracks in multiple stones up to 10" long (**see Photo 25**).

Below Slab 4 at the waterline, there is a 2'-5" long x 20" high x 3'-3" deep void.

Between Slab 5 and the top of the breastwall, there is a 20" wide x 3" high x 2'-0" deep void.

Below Slab 5 at the waterline, there is a 2'-6" long x 2'-3" high x 3'-2" deep void.

For underwater inspection details, see the latest Routine Underwater inspection report dated 5/13/19.



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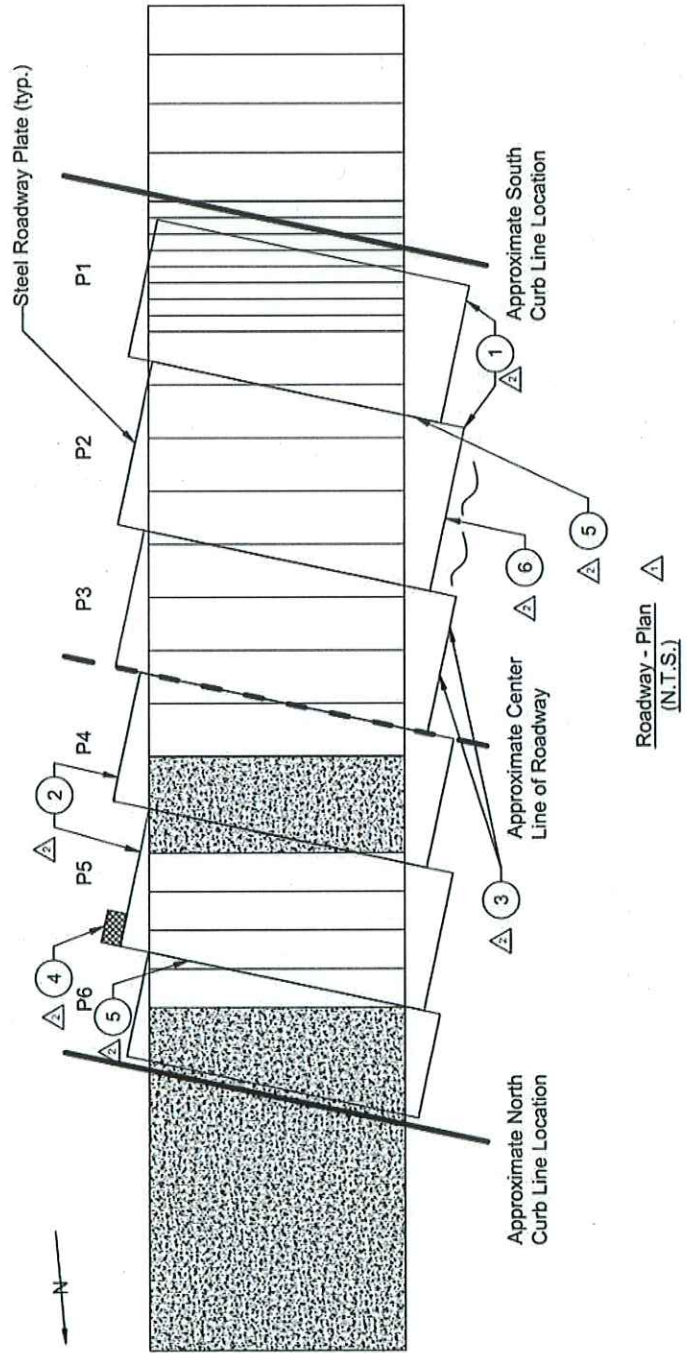
## REMARKS

### Sketch / Photo Log

- Sketch 1 : Roadway Plate Conditions
- Sketch 2 : Superstructure Conditions
- Sketch 3 : Steel Beam Conditions
- Photo 1 : Typical East Approach looking west
- Photo 2 : Typical West Approach looking east
- Photo 3 : Typical North Elevation
- Photo 4 : Typical South Elevation
- Photo 5 : Typical Upstream looking north
- Photo 6 : Typical Downstream looking south
- Photo 7 : Typical Underside looking south
- Photo 8 : "Caution" sign in-place at the east approach
- Photo 9 : "Caution" sign in-place at the west approach
- Photo 10 : Typical retrofitted steel roadway plates looking north.
- Photo 11 : Steel Plate 5, northeast corner: 2'-0" wide x 7" long x up to 2" deep spall.
- Photo 12 : Slab 1 southwest corner at West Abutment: Slab is unsupported for 6".
- Photo 13 : Slab 4 underside at East Abutment: diagonal hairline crack.
- Photo 14 : Steel Beam 1 bottom flange near Mid-span: 100% section loss x 1" wide at the south toe with 3/16" thickness remaining.
- Photo 15 : Steel Beam 2 bottom flange at West Abutment: 100% section loss x 1" wide at the south toe with 3/16" thickness remaining.
- Photo 16 : Steel Beam 3 bottom flange at West Abutment: 100% section loss x 1/2" wide at both toes with 1/8" thickness remaining.
- Photo 17 : Steel Beam 8 bottom flange near Mid-span: 100% section loss x up to full width.
- Photo 18 : Slab 6 underside near Mid-span: Transverse hairline crack with efflorescence. Note: Crack Gauge.
- Photo 19 : Slab 6 underside near Mid-span: Crack gauge shows minor movement ( < 1 mm in both directions). No change since previous inspection.
- Photo 20 : Slab 7 near Mid-span: Up to 2" W x FW x FD crack with a 20" L x 13" W x 2" D spall.
- Photo 21 : Slab 7 near Mid-span: Crack gauge shows minor movement ( < 1 mm in longitudinal direction only). No change since previous inspection.
- Photo 22 : Slab 7 near Mid-span at the south edge: 20" long x 13" wide x 2" deep.
- Photo 23 : Concrete slab at the south edge: Two (2) up to 2'-6" L x 6" W x up to 9" D spalls with exposed rebar.
- Photo 24 : West Abutment below Slab 2: 3'-4" long x 20" high x 2'-0" deep void with shifted stones.
- Photo 25 : East Abutment below the south edge of Slab 1: Multiple stones with vertical cracks.

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**SKETCHES**

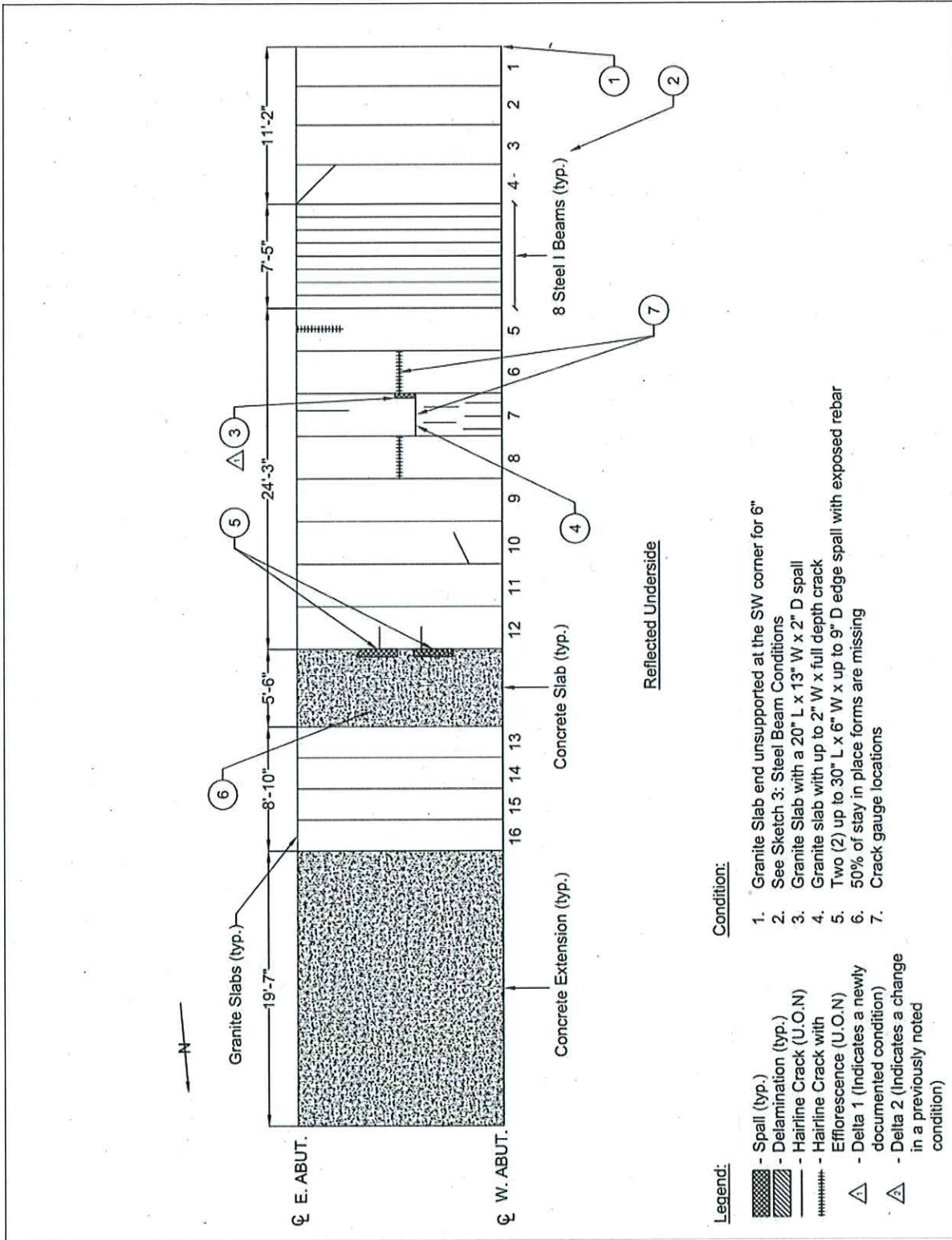


- Legend:**
- Spall (typ.)
  - Delamination (typ.)
  - Hairline Crack (U.O.N)
  - Hairline Crack with Efflorescence (U.O.N)
  - Indicates a newly documented condition
  - Indicates a change in a previously noted condition
- Condition:**
1. Southwest corner deflects under live load
  2. Northeast corner deflects under live load
  3. Minor spalls adjacent to roadway plate
  4. 2'-0" W x 7" L x 2" D spall/pothole
  5. Full length broken tack weld
  6. Minor scrapes and gouges (typ.)

**Sketch 1: Roadway Plate Conditions**

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**SKETCHES**



- Legend:**
- Spall (typ.)
  - Delamination (typ.)
  - Hairline Crack (U.O.N)
  - Hairline Crack with Efflorescence (U.O.N)
  - Delta 1 (Indicates a newly documented condition)
  - Delta 2 (Indicates a change in a previously noted condition)
- Condition:**
1. Granite Slab end unsupported at the SW corner for 6"
  2. See Sketch 3: Steel Beam Conditions
  3. Granite Slab with a 20" L x 13" W x 2" D spall
  4. Granite slab with up to 2" W x full depth crack
  5. Two (2) up to 30" L x 6" W x up to 9" D edge spall with exposed rebar
  6. 50% of stay in place forms are missing
  7. Crack gauge locations

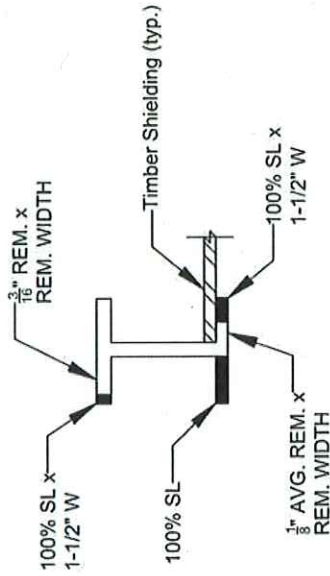
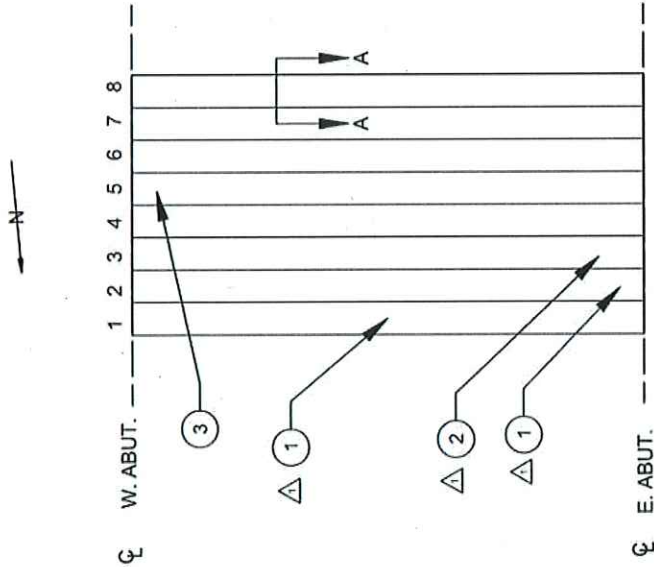
**Sketch 2: Superstructure Conditions**



CITY/TOWN <b>BELMONT=WALTHAM</b>	B.I.N. <b>7VB</b>	BR. DEPT. NO. <b>B-07-015=W-04-039</b>	8.-STRUCTURE NO. <b>B07015-7VB-MUN-CUL</b>
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**SKETCHES**

**NOTE:**  
Interior web and top flange inaccessible due to timber shielding.  
Beams bottom flanges are typically rotated.



Steel Beam - Reflected Underside  
(N.T.S.)

Section A-A   
Beam 8

**Legend:**

- Indicates a newly documented condition
- Indicates a change in a previously noted condition

**Conditions:**

1. Bottom Flange: 100% section loss x 1" W at the south toes,  $\frac{3}{16}$ " average remaining x remaining width
2. Bottom Flange: 100% section loss x  $\frac{1}{2}$ " W at both toes,  $\frac{1}{8}$ " average remaining x remaining width
3. Bottom Flange: Cut out section at the west end above the drainage pipe

**Sketch 3: Steel Beam Conditions**

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**PHOTOS**



**Photo 1: Typical East Approach looking west**



**Photo 2: Typical West Approach looking east**



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**PHOTOS**

Photo 3: Typical North Elevation



Photo 4: Typical South Elevation



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**PHOTOS**

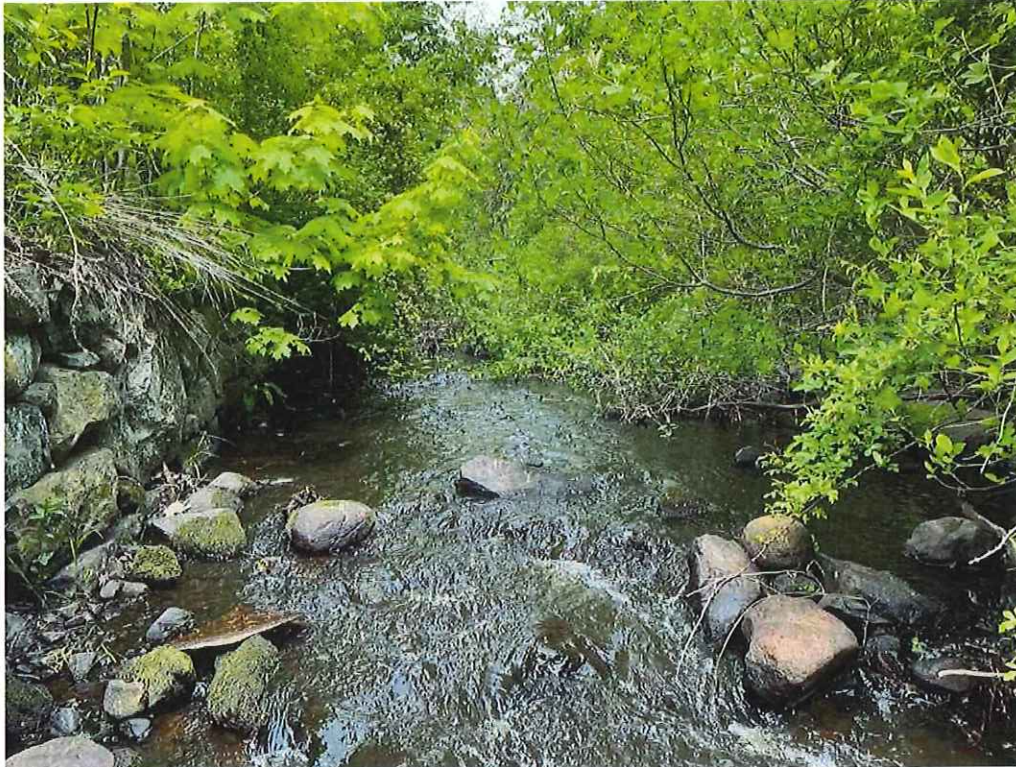


Photo 5: Typical Upstream looking north



Photo 6: Typical Downstream looking south



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**PHOTOS**

Photo 7: Typical Underside looking south



Photo 8: "Caution" sign in-place at the east approach



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**PHOTOS**



Photo 9: "Caution" sign in-place at the west approach



Photo 10: Typical retrofitted steel roadway plates looking north.



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**PHOTOS**

**Photo 11: Steel Plate 5, northeast corner: 2'-0" wide x 7" long x up to 2" deep spall.**



**Photo 12: Slab 1 southwest corner at West Abutment: Slab is unsupported for 6".**



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**PHOTOS**

**Photo 13: Slab 4 underside at East Abutment: diagonal hairline crack.**



**Photo 14: Steel Beam 1 bottom flange near Mid-span: 100% section loss x 1" wide at the south toe with 3/16" thickness remaining.**



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**PHOTOS**

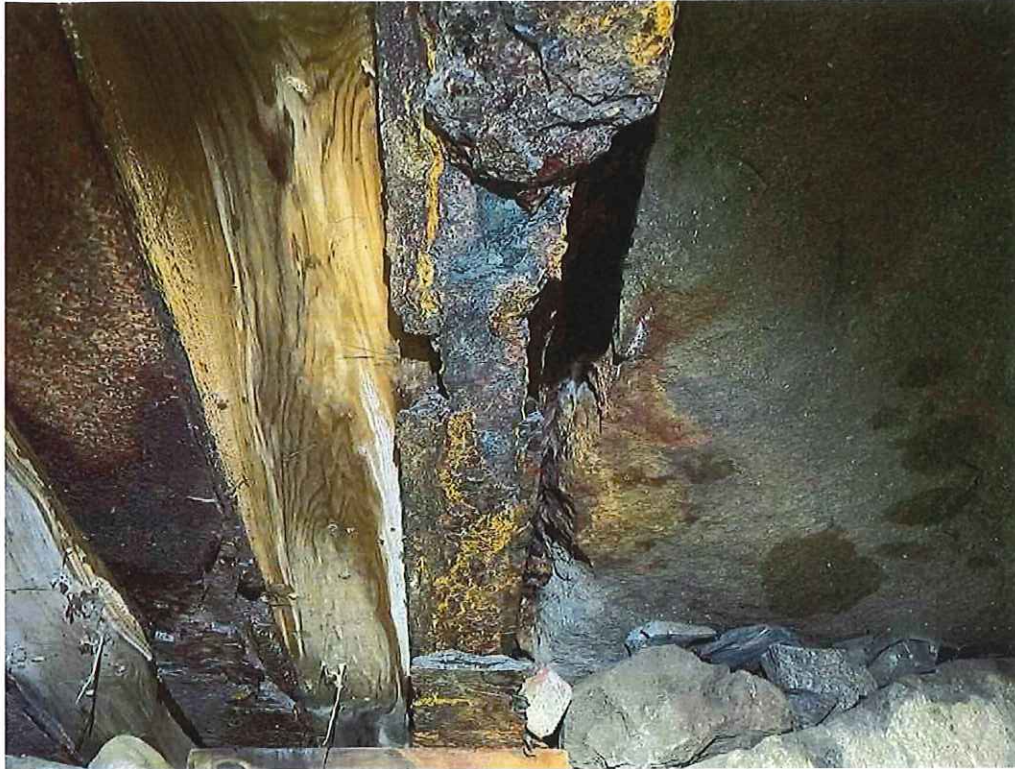
**Photo 15: Steel Beam 2 bottom flange at West Abutment: 100% section loss x 1" wide at the south toe with 3/16" thickness remaining.**



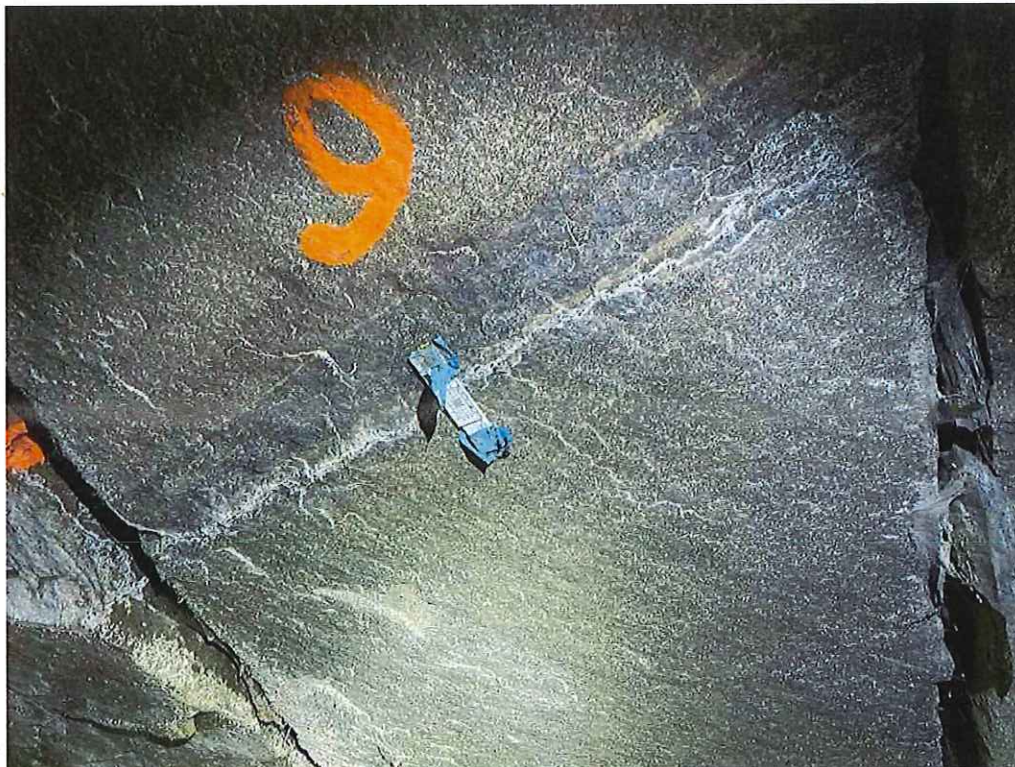
**Photo 16: Steel Beam 3 bottom flange at West Abutment: 100% section loss x 1/2" wide at both toes with 1/8" thickness remaining.**



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**PHOTOS**

**Photo 17: Steel Beam 8 bottom flange near Mid-span: 100% section loss x up to full width.**



**Photo 18: Slab 6 underside near Mid-span: Transverse hairline crack with efflorescence. Note: Crack Gauge.**

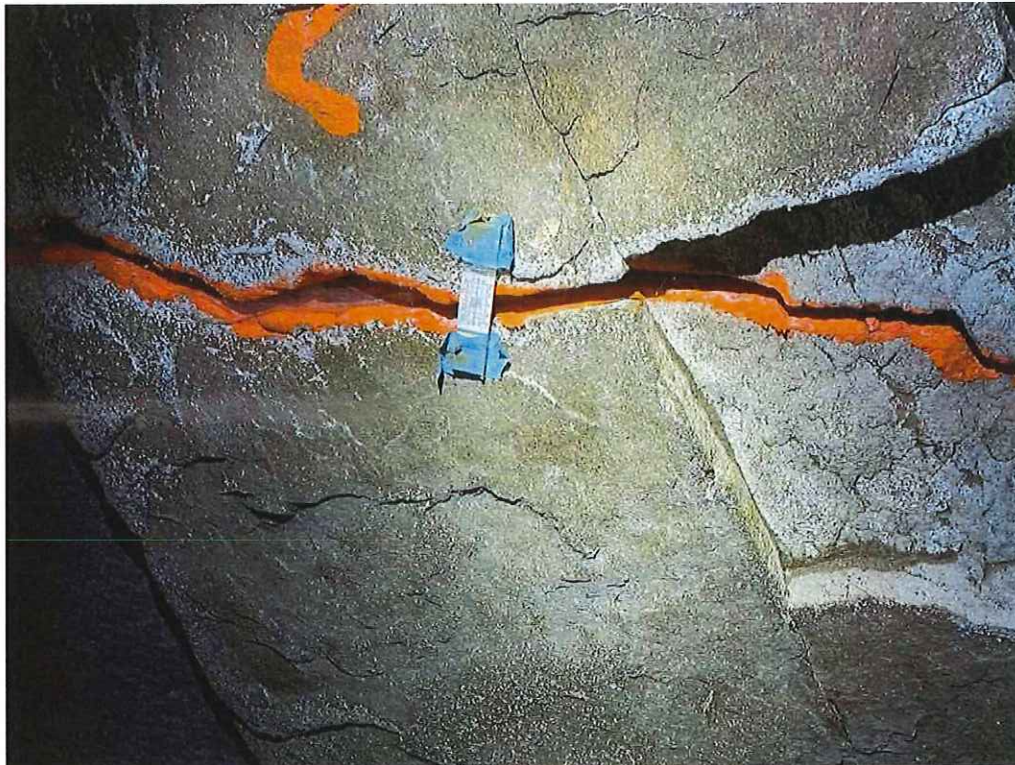


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### PHOTOS



**Photo 19:** Slab 6 underside near Mid-span: Crack gauge shows minor movement ( $< 1$  mm in both directions). No change since previous inspection.



**Photo 20:** Slab 7 near Mid-span: Up to 2" W x FW x FD crack with a 20" L x 13" W x 2" D spall.



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**PHOTOS**

**Photo 21:** Slab 7 near Mid-span: Crack gauge shows minor movement ( $< 1$  mm in longitudinal direction only). No change since previous inspection.



**Photo 22:** Slab 7 near Mid-span at the south edge: 20" long x 13" wide x 2" deep.



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**PHOTOS**

**Photo 23:** Concrete slab at the south edge: Two (2) up to 2'-6" L x 6" W x up to 9" D spalls with exposed rebar.



**Photo 24:** West Abutment below Slab 2: 3'-4" long x 20" high x 2'-0" deep void with shifted stones.



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**PHOTOS**

**Photo 25: East Abutment below the south edge of Slab 1: Multiple stones with vertical cracks.**