

**STRUCTURES INSPECTION FIELD REPORT**

**ROUTINE & SPECIAL MEMBER INSPECTION**

2-DIST  
**04**

B.I.N.  
**2BQ**

BR. DEPT. NO.  
**L-15-031**

CITY/TOWN <b>LOWELL</b>		8-STRUCTURE NO. <b>L15031-2BQ-MUN-NBI</b>		11-Kilo. POINT <b>001.287</b>	41-STATUS <b>P:POSTED</b>	90-ROUTINE INSP. DATE <b>SEP 28, 2015</b>	
07-FACILITY CARRIED <b>HWY LAWRENCE ST</b>		MEMORIAL NAME/LOCAL NAME		27-YR BUILT <b>1850</b>	106-YR REBUILT <b>1951</b>	YR REHAB'D (NON 106) <b>0000</b>	
06-FEATURES INTERSECTED <b>WATER CONCORD RIVER</b>		26-FUNCTIONAL CLASS <b>Urban Minor Arterial</b>		DIST. BRIDGE INSPECTION ENGINEER <b>T. G. Weil</b>			
43-STRUCTURE TYPE <b>102 : Concrete Stringer/Girder</b>		22-OWNER City/ Municipal Highway A	21-MAINTAINER City/ Municipal Highway A	TEAM LEADER W. Mosher		PROJ MGR Collins Engineers Inc	
107-DECK TYPE <b>1 : Concrete Cast-in-Place</b>		WEATHER <b>Mixed</b>	TEMP. (air) <b>18°C</b>	TEAM MEMBERS <b>Z. D. JENKINS</b>			

**ITEM 58** 3

**DECK** DEF

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

CURB REVEAL (In millimeters)

N	S
120	100

**ITEM 59** 5

**SUPERSTRUCTURE** 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	N	-
10. Diaphragms/Cross Frames	5	M-P
11. Rivets & Bolts	N	-
12. Welds	N	-
13. Member Alignment	8	-
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 (X) Minor ( ) Moderate ( ) Severe ( )

Any Fracture Critical Member: (Y/N) N

Any Cracks: (Y/N) N

**ITEM 60** 4

**SUBSTRUCTURE** DEF

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

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

I-60 (Dive Report): 5 I-60 (This Report): 4

93B-U/W (DIVE) Insp 03/04/2015

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

CITY/TOWN <b>LOWELL</b>	B.I.N. <b>2BQ</b>	BR. DEPT. NO. <b>L-15-031</b>	8.-STRUCTURE NO. <b>L15031-2BQ-MUN-NBI</b>	INSPECTION DATE <b>SEP 28, 2015</b>
----------------------------	----------------------	----------------------------------	---	--

**ITEM 61**  
**CHANNEL & CHANNEL PROTECTION**

**5**

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

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

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

93b-U/W INSP. DATE:

**ITEM 36 TRAFFIC SAFETY**

	36	COND	DEF
A. Bridge Railing	0	5	S-P
B. Transitions	0	N	-
C. Approach Guardrail	0	N	-
D. Approach Guardrail Ends	0	N	-

**WEIGHT POSTING** Not Applicable

	H	3	3S2	Single
Actual Posting	20	23	40	N
Recommended Posting	20	23	40	N

Waived Date:  EJDMT Date:

At bridge		Other Advance	
E	W	E	W
Y	Y	N	Y
7	6	7	7

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

**CLEARANCE POSTING**

Not Applicabl

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

At bridge		Advance	
N	S	N	S

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

**ACCESSIBILITY (Y/N/P)**

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

**TOTAL HOURS**

**PLANS (Y/N):**

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

**TAPE#:** \_\_\_\_\_

*List of field tests performed:*

**RATING**  
Rating Report (Y/N):   
Date:   
Inspection data at time of existing rating  
I 58: 6 I 59: 7 I 60: 6 Date :09/11/1979

**(To be filled out by DBIE)**  
Request for Rating or Rerating (Y/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].

# STRUCTURES INSPECTION FIELD REPORT

## ROUTINE & SPECIAL MEMBER INSPECTION

2-DIST **04** B.I.N. **2BQ**

BR. DEPT. NO. **L-15-031**

CITY/TOWN <b>LOWELL</b>	8-STRUCTURE NO. <b>L15031-2BQ-MUN-NBI</b>	11-Kilo. POINT <b>001.287</b>	90-ROUTINE INSP. DATE <b>Sep 28, 2015</b>	93*-SPEC. MEMB. INSP. DATE <b>Sep 28, 2015</b>
07-FACILITY CARRIED <b>HWY LAWRENCE ST</b>		MEMORIAL NAME/LOCAL NAME	27-YR BUILT <b>1850</b>	106-YR REBUILT <b>1951</b>
06-FEATURES INTERSECTED <b>WATER CONCORD RIVER</b>		26-FUNCTIONAL CLASS <b>Urban Minor Arterial</b>	DIST. BRIDGE INSPECTION ENGINEER <b>T. G. Weil</b>	
43-STRUCTURE TYPE <b>102 : Concrete Stringer/Girder</b>		22-OWNER <b>City/ Municipal Highway A</b>	21-MAINTAINER <b>City/ Municipal Highway A</b>	TEAM LEADER <b>W. Mosher</b>
107-DECK TYPE <b>1 : Concrete Cast-in-Place</b>		WEATHER <b>Mixed</b>	TEMP. (air) <b>18°C</b>	PROJ MGR <b>Collins Engineers Inc</b>
		TEAM MEMBERS <b>Z. D. JENKINS</b>		

<b>WEIGHT POSTING</b>	<i>Not Applicable</i>				<b>Signs In Place</b> (Y=Yes, N=No, NR=Not Required)	<b>At bridge</b>		<b>Advance</b>		<b>PLANS</b> (Y/N): <b>N</b>
	H	3	3S2	Single		E	W	E	W	
<b>Actual Posting</b>	20	23	40	N	Y	Y	N	Y	<b>TAPE#:</b> _____	
<b>Recommended Posting</b>	20	23	40	N	7	7	7	7		
<b>Waived Date:</b>	00/00/00		<b>EJDMT Date:</b>		00/00/00					

**RATING**

Rating Report (Y/N): **Y** Date: **02/01/1985**

Request for Rating or Rerating (Y/N): **N** If YES please give priority:  
HIGH ( ) MEDIUM ( ) LOW ( )

Inspection data at time of existing rating  
I 58: 6 I 59: 7 I 60: 6 I 62: - Date :09/11/1979

**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 (0-9)	PRESENT (0-9)	H-20	3	3S2	
A	Item 58.2 - Deck Condition	N		See remarks in comments section.	3	3	Not Rated			S-A
B	Item 60.1.b - Bridge Seats	N		See remarks in comments section.	4	4	Not Rated			S-A
C	Item 60.2.d - Stems/Webs/Pierwalls	N		See remarks in comments section.	4	4	Not Rated			S-A
D										
E										

**List of field tests performed:**

	<b>I-58</b>	<b>I-59</b>	<b>I-60</b>	<b>I-62</b>
<b>(Overall Previous Condition)</b>	3	6	4	-
<b>(Overall Current Condition)</b>	3	5	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 <b>LOWELL</b>	B.I.N. <b>2BQ</b>	BR. DEPT. NO. <b>L-15-031</b>	8.-STRUCTURE NO. <b>L15031-2BQ-MUN-NBI</b>	INSPECTION DATE <b>SEP 28, 2015</b>
----------------------------	----------------------	----------------------------------	---	--

## REMARKS

### **BRIDGE ORIENTATION**

The structure is oriented east-west and carries Lawrence Street over the Concord River. Beams and bays are numbered from north to south, piers and diaphragms are numbered from west to east, abutments are labeled west and east, and the Concord River flows from south to north.

### **GENERAL REMARKS**

#### General

- Due to the deck condition rating of 3, underside access by snooper truck was not performed, and was instead performed by staging from a pontoon boat for spans B, C and D, and by wading/ladder for spans A, E and F, where the water depth was too shallow to permit boat use.
- The east approach posting sign is partially obscured by a street sign (Moore Street), **see Photo 1**.
- The east approach advance sign was not observed.

#### Guardrails

- There are no transition rails or approach rails.

#### West Abutment

- South fascia to beam line 7 - Abutment constructed from reinforced concrete.
- Beam line 7 to north fascia - Abutment constructed from stone masonry with a reinforced concrete bridge seat.

#### East Abutment

- Abutment constructed from reinforced concrete.

#### Piers

- South fascia to beam line 2 - Piers constructed from reinforced concrete.
- Beam line 2 to north fascia - Piers constructed from stone masonry with a reinforced concrete cap, stone masonry portion covered with shotcrete.

### **ITEM 58 - DECK**

#### **Item 58.1 - Wearing surface**

The wearing surface consists of bituminous concrete pavement which overall exhibits cracks up to 2" wide with some broken pavement and minor potholes. Approximately 11' of bridge lane is closed to traffic by concrete barriers, installed approximately 9' from the face of the south curb. The closed portion exhibits significant cracking, heaving at pier locations, and vegetation growth. Four steel plates (20' x 8', 20' x 6', 8' x 4', 20' x 8') were installed in Spans A, B, and E adjacent to the south curb. See **Sketches 2 and 3** for a summary of defects. Significant defects with photo references are as follows:

#### Eastbound Lane

- The wearing surface between the barriers and the south curb is displaced adjacent to the south curb, exhibits up to 1/2" wide cracks, and exhibits heaving at the pier locations up to 2", **see Photo 2**.
- There is significant vegetation growth along the south curb.

#### Westbound Lane

- There are multiple potholes up to 1" deep in Spans A and B located approximately 4' from the north curb, **see Photo 3**.

#### Pier 3

CITY/TOWN <b>LOWELL</b>	B.I.N. <b>2BQ</b>	BR. DEPT. NO. <b>L-15-031</b>	8.-STRUCTURE NO. <b>L15031-2BQ-MUN-NBI</b>	INSPECTION DATE <b>SEP 28, 2015</b>
----------------------------	----------------------	----------------------------------	---	--

## REMARKS

### Item 58.1 - Wearing surface (Cont'd)

- A 6" +/- wide section of cracked wearing surface with failed patches up to 2' extends the full roadway width, **see Photo 4.**

### Item 58.2 - Deck Condition

Overall the underside of the reinforced concrete deck exhibits significant delamination, full depth spalls with exposed bars and variable section loss, widespread transverse, longitudinal and pattern cracks with efflorescence and stalactites. There are discrete locations of efflorescence buildup at the deck/beam web interface. The presence of existing formwork in Span B, Bay 3 and in Span D, Bay 3 obscures the deck for inspection. There is heavy buildup of efflorescence at the edges of the formwork on the adjacent beams. See **Sketches 4 and 5** for a summary of defects. Significant defects with photo references are as follows:

- Span C, Bay 3 - There is a full depth spall 8' x 4' with 24 exposed bars, 10% to 25% section loss (20 bars), 100% section loss (4 bars), **see Photo 5.**
- Span C, Beam 3 at Pier 2 - Typical efflorescence buildup at the deck/beam web interface, **see Photo 6.**
- Span E, Bay 2 at Pier 4 - There is a full depth spall 14' x 4' with 48 exposed bars, 25% to 100% section loss, **see Photo 7.**
- Span E, Bay 4 - The deck is delaminated the full length between Pier 4 and Pier 5, within 30" north of Beam 4, **see Photo 8.**
- Span E, Bay 8 - There is pattern cracking within 8' of Pier 5, deck is damp and cracks exhibit efflorescence, **see Photo 9.**

### Item 58.4 - Curbs

The concrete curbs are monolithic with the concrete sidewalks, **see Item 58.6.**

### Item 58.6 - Sidewalks

The reinforced concrete sidewalks generally exhibit discrete locations of spalls/patches, transverse, longitudinal and pattern cracking, abrasion (south sidewalk). Both sidewalks are monolithic with the concrete curbs. See **Sketches 2 and 3** for a summary of defects. Significant defects with photo references are as follows:

#### South Sidewalk

- Over Pier 1 - Bituminous concrete patch along the curb section adjacent to the roadway, **see Photo 10.**
- Over the East Abutment - Spall adjacent to the roadway with typical cracking along the curb section, **see Photo 11.**

#### North Sidewalk

- Over the West Abutment - 8' spall adjacent to the roadway spall with 11 exposed bars up to 10% section loss, **see Photo 12.**

### Item 58.8 - Railing

There is a non-standard painted metal bridge railing consisting of posts and pickets (panels) which overall exhibits moderate to severe coating loss (50% to 100%), and discrete locations of severe section loss (100%, considered failed) to the posts, **see Sketches 2 and 3** for a summary of defects. Significant defects with photo references are as follows:

#### South Railing

- First two panels adjacent to the East Abutment have limited capacity due to corroded connections, **see Photo 13.**
- 5% of the pickets exhibit impact damage at discrete locations along the railing, **see Photo 14.**
- Second post west of Pier 3 has failed, **see Photo 15.**

CITY/TOWN <b>LOWELL</b>	B.I.N. <b>2BQ</b>	BR. DEPT. NO. <b>L-15-031</b>	8.-STRUCTURE NO. <b>L15031-2BQ-MUN-NBI</b>	INSPECTION DATE <b>SEP 28, 2015</b>
----------------------------	----------------------	----------------------------------	---	--

## REMARKS

### Item 58.8 - Railing (Cont'd)

#### North Railing

- Second post east of Pier 3 has failed, **see Photo 16.**

### Item 58.12 - Utilities

#### North Utilities

- The utility hangers and utility pipes have minor to moderate corrosion, **see Photo 17.**

#### South Utilities

- The utility support has minor to moderate paint loss, **see Photo 18.**
- The plastic conduit at the West Abutment is broken open with a portion exposing interior utilities, **see Photo 19.**
- The utility pipe in Bay 1 at Pier 3 is severely corroded with 100% section loss, **see Photo 20.**

## APPROACHES

### Approaches a - Appr. pavement condition

The approach pavement consists of a bituminous concrete wearing surface. Minor defects and defects with photo references are as follows:

- East Approach - There are two 1/4" transverse cracks approximately 18" apart located approximately 18' east of the East Abutment, **see Photo 21.**
- West Approach - Approximately 30 sf of bituminous patching and approximately 25 sf of cracked/broken pavement adjacent to the north curb/abutment, **see Photo 22.**

### Approaches b - Appr. Roadway Settlement

There is minor settlement at both approaches by the curbs.

### Approaches c - Appr. Sidewalk Settlement

- Southwest - There is minor settlement adjacent to the approach curb.
- Southeast - There is settlement up to 1-1/2", significant bituminous concrete cracking with patched areas, and vegetation growth adjacent to the bridge sidewalk, **see Photo 23.**
- Northwest - There is settlement up to 2" with broken bituminous concrete adjacent to the concrete bridge sidewalk.
- Northeast - There is minor cracking and patched areas.

## ITEM 59 - SUPERSTRUCTURE

### Item 59.4 - Girders or Beams

The reinforced concrete beams generally exhibit discrete locations of delaminations with rust stains and spalls; transverse, longitudinal and pattern cracks with efflorescence in the bottom flanges and webs; and longitudinal cracks with efflorescence in the deck haunches. See **Sketches 6 and 7** for a summary of defects. Significant defects with photo references are as follows:

- Span C, Beam 9 - Typical bottom flange cracks with rust staining and efflorescence, **see Photo 24.**
- Span C, Beam 5 at Pier 3 - Bottom flange spall with 1 bar exposed, approximately 50% section loss, **see Photo 25.**
- Span D, Beam 2 at Pier 3 - Typical longitudinal crack with efflorescence in the beam haunch and pattern cracks on the web, **see Photo 26.**

CITY/TOWN <b>LOWELL</b>	B.I.N. <b>2BQ</b>	BR. DEPT. NO. <b>L-15-031</b>	8.-STRUCTURE NO. <b>L15031-2BQ-MUN-NBI</b>	INSPECTION DATE <b>SEP 28, 2015</b>
----------------------------	----------------------	----------------------------------	---	--

## REMARKS

### Item 59.4 - Girders or Beams (Cont'd)

- Span E, Beam 3 - 15' long bottom flange delamination, **see Photo 27.**

### Item 59.10 - Diaphragms/Cross Frames

The reinforced concrete diaphragms generally exhibit discrete locations of delaminations and spalls; and vertical, horizontal and pattern cracks with efflorescence. There are discrete locations of efflorescence build-up at the beam interface. Significant defects with photo references are as follows:

- Span D, Bay 3 at Pier 3 - Typical delamination with horizontal cracks and efflorescence buildup, **see Photo 28.**
- Span D, Bay 5 at Pier 3 - Spall, **see Photo 29.**
- Span F, Bay 7 at Beam 8 - Typical efflorescence buildup at beam interface, **see Photo 30.**

## ITEM 60 - SUBSTRUCTURE

### Item 60.1 - Abutments

#### Item 60.1.b - Bridge Seats

The abutment breastwall defects extend up to the elevation of the bridge seat, **see Item 60.1.d** and **Sketch 8** for a summary of defects. Significant defects with photo references are as follows:

#### East Abutment

- There are two concrete spalls in the breastwall located under the beam bearings, **see Item 60.1.d** for additional information.

#### West Abutment

- Beam 4 - 2' x 1' x 4" deep spall, note impending bearing undermining, **see Photo 31.**
- Bay 5 - 2' x 1' x 2" deep spall with 2 exposed bars, **see Photo 32.**

#### Item 60.1.d - Breastwalls

The reinforced concrete breastwalls generally exhibit discrete locations of spalls, delaminations, vertical cracks and efflorescence, which is most prevalent along upper the portion of breastwall/bridge seat. The stone masonry breastwall exhibits voids and missing stones. See the March 4, 2015 Routine Underwater Inspection Report for additional information. See **Sketch 8** for a summary of defects. Significant defects with photo references are as follows:

#### West Abutment

- Beam 2 - 7' x 3' x 6" deep spall with 9 exposed bars with up to 100% section loss, **see Photo 33.**
- Beam 3 - 2' x 1' x 14" deep void, **see Photo 34.**

#### East Abutment

- Beam 2 - 9' x 8' x 6" deep spall extending from breastwall into bridge seat with 10 exposed bars up to 100% section loss, **see Photo 35.**
- Beam 9 - 3.5' x 2' x 6" spall extending from breastwall into bridge seat with 3 exposed bars up to 100% section loss, **see Photo 36.**

CITY/TOWN <b>LOWELL</b>	B.I.N. <b>2BQ</b>	BR. DEPT. NO. <b>L-15-031</b>	8.-STRUCTURE NO. <b>L15031-2BQ-MUN-NBI</b>	INSPECTION DATE <b>SEP 28, 2015</b>
----------------------------	----------------------	----------------------------------	---	--

## REMARKS

### **Item 60.1.e - Wingwalls**

The reinforced concrete wingwalls generally exhibit spalls, cracking, and abrasion. Some stones in the northwest wingwall have shifted and are missing. See **Sketch 8** for a summary of defects. Significant defects with photo references are as follows:

- Southwest wingwall - 4' x 3' x 2" spall with 7 exposed bars up to 100% section loss, **see Photo 37**.

### **Item 60.1.j - Scour**

The East Abutment curtain wall is undermined for the full length, see **Sketch 8** and the March 4, 2015 Routine Underwater Inspection Report for additional information.

### **Item 60.1.k - Settlement**

There are shifted and missing stones at the Northwest wingwall and irregular below water voids along the West Abutment. See **Sketch 8** and the March 4, 2015 Routine Underwater Inspection Report for additional information.

### **Item 60.1.l - Curtain Wall**

There is a concrete curtain wall at the East Abutment. **See Sketch 8** for a summary of defects and the March 4, 2015 Routine Underwater Inspection Report for additional information. Specific defects are as follows:

- Exposed and undermined for the entire length.
- Two vertical cracks adjacent to beam lines 1 and 2.
- Minor to moderate abrasion within 2' from the top.
- Two voids adjacent to beam line 8.

### **Item 60.2 - Piers or Bents**

#### **Item 60.2.b - Caps**

The reinforced concrete caps generally exhibit moderate spalls and cracks. See **Sketches 9 - 13** for a summary of the defects. Significant defects with photo references are as follows:

- Pier 2, east face, Bay 9 - Vertical crack, **see Photo 38**.
- Pier 3, west face, Beam 5 - 3' x 8" x 6" deep spall, **see Photo 39**.

#### **Item 60.2.d - Stems/Webs/Pierwalls**

The reinforced concrete pier walls exhibit discrete locations of significant delamination at Piers 3 and 4, spalls with exposed bars and variable section loss. The stone masonry pier walls exhibit discrete locations of missing/split stones at Piers 1 and 2. See the March 4, 2015 Routine Underwater Inspection Report for additional information, and **Sketches 9 - 13** for a summary of the defects. Typical defects with photo references are as follows:

- Pier 1, west face, Bay 9 - Displaced stone at the waterline, **see Photo 40**.
- Pier 1, north nose - Split stone, **see Photo 41**.
- Pier 3, south nose - Significant concrete delamination/spall, **see Photo 42**.
- Pier 3, east face, Beam 3 - Significant concrete delamination/spall, **see Photo 43**.

#### **Item 60.2.i - Settlement**

Pier 1, North end - Full-height vertical crack.

#### **Item 60.2.j - Curtain Wall**

See the March 4, 2015 Routine Underwater Inspection Report.

CITY/TOWN <b>LOWELL</b>	B.I.N. <b>2BQ</b>	BR. DEPT. NO. <b>L-15-031</b>	8.-STRUCTURE NO. <b>L15031-2BQ-MUN-NBI</b>	INSPECTION DATE <b>SEP 28, 2015</b>
----------------------------	----------------------	----------------------------------	---	--

## REMARKS

### **SubStructure Undermining Notes**

See the March 4, 2015 dive report.

### **ITEM 61 - CHANNEL AND CHANNEL PROTECTION**

#### **Item 61.1 - Channel Scour**

The East Abutment may be undermined up to approximately 2', with some curtain wall exposure at all piers, see the March 4, 2015 Routine Underwater Inspection Report for additional information.

#### **Item 61.2 - Embankment Erosion**

Southeast and Northeast embankments have moderate erosion with some undercutting.

#### **Item 61.3 - Debris**

There is debris and trash consisting of bike frames, shopping carts and blocks throughout all spans , extending approximately 10' upstream and downstream into the channels.

### **TRAFFIC SAFETY**

#### **Item 36a - Bridge Railing**

See Item 58.8.

#### **Item 36b - Transitions**

There are no transitions.

#### **Item 36c - Approach Guardrail**

There are no approach guardrails.

#### **Item 36d - Approach Guardrail Ends**

There are no guardrail terminals.

### **Sketch / Photo Log**

- Sketch 1 : Location Plan
- Sketch 2 : Topside Plan, Spans A-C
- Sketch 3 : Topside Plan, Spans D-F
- Sketch 4 : Underdeck Plan, Spans A-C
- Sketch 5 : Underdeck Plan, Spans D-F
- Sketch 6 : Beam Plans, Spans A-C
- Sketch 7 : Beam Plans, Spans D-F
- Sketch 8 : Abutment Elevations
- Sketch 9 : Pier 1 Elevations
- Sketch 10 : Pier 2 Elevations
- Sketch 11 : Pier 3 Elevations
- Sketch 12 : Pier 4 Elevations
- Sketch 13 : Pier 5 Elevations
- Photo 1 : Partially obscured east approach posting sign
- Photo 2 : Typical south pavement condition
- Photo 3 : Multiple wearing surface potholes up to 1" deep, approx. 4 feet off north curb
- Photo 4 : Deteriorated wearing surface and previous repairs, Pier 3
- Photo 5 : Span C, Bay 3 - Full depth spall
- Photo 6 : Span C, Beam 3, Pier 2 - typical efflorescence buildup at deck/beam interface
- Photo 7 : Span E, Bay 2, Pier 4 - Full depth deck spall
- Photo 8 : Span E, Bay 4 - Full length deck delamination between Piers 4 and 5

CITY/TOWN <b>LOWELL</b>	B.I.N. <b>2BQ</b>	BR. DEPT. NO. <b>L-15-031</b>	8.-STRUCTURE NO. <b>L15031-2BQ-MUN-NBI</b>	INSPECTION DATE <b>SEP 28, 2015</b>
----------------------------	----------------------	----------------------------------	---	--

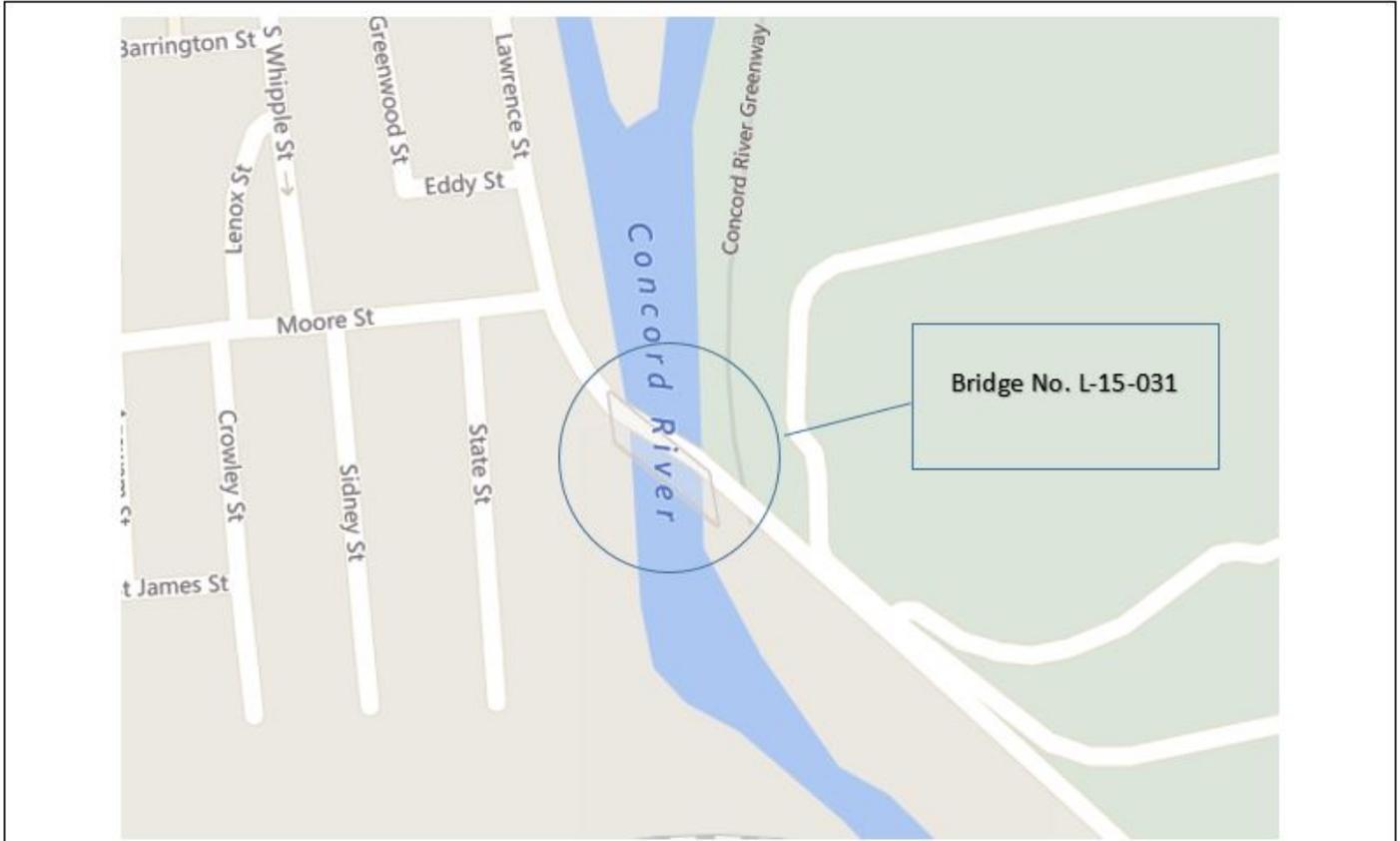
## REMARKS

### Sketch / Photo Log (Cont'd)

- Photo 9 : Span E, Bay 8 - map cracking
- Photo 10 : Pier 1 - Bituminous concrete surface patch at south sidewalk
- Photo 11 : Over East Abutment - curb spall and cracking
- Photo 12 : Over West Abutment - 8 foot spall in sidewalk curb section, 11 exposed bars
- Photo 13 : Southeast sidewalk at east abutment - damage railing panels and corroded post connections to sidewalk (2 sections)
- Photo 14 : Typical picket impact damage
- Photo 15 : Second post west of pier 3 - failed due to corrosion/section loss and split
- Photo 16 : Second north railing post east of pier 3 - failed due to corrosion/section loss
- Photo 17 : Typical lower utility corrosion
- Photo 18 : Typical south utility support paint loss
- Photo 19 : South sidewalk at west abutment - Damaged plastic conduit
- Photo 20 : Bay 1, Pier 3, south fascia - failed utility pipe due to corrosion/section loss
- Photo 21 : East Approach - Cracks approx. 18 feet from abutment
- Photo 22 : West approach adjacent to north sidewalk - cracked wearing surface and patch repair
- Photo 23 : Southeast sidewalk approach - cracked/patched wearing surface and vegetation growth
- Photo 24 : Span C, Beam 9 - typical bottom flange cracks with rust and efflorescence
- Photo 25 : Span C, Beam 5, Pier 3 - bottom flange spall
- Photo 26 : Span D, Beam 2, Pier 3 - Typical longitudinal beam haunch crack
- Photo 27 : Span E, Beam 3 - 15 foot bottom flange delamination
- Photo 28 : Span D, Bay 3, Pier 3 - Typical diaphragm delamination
- Photo 29 : Span D, Bay 5, Pier 3 - Diaphragm spall
- Photo 30 : Span F, Bay 7, Beam 8 - Typical efflorescence at beam/diaphragm interface
- Photo 31 : West Abutment, Beam 4 - spall/efflorescence
- Photo 32 : West Abutment, Bay 5 - spall with 2 exposed bars
- Photo 33 : East Abutment, Beam 2 - spall with 9 exposed bars
- Photo 34 : East Abutment, Beam 9 - spall with 3 exposed bars
- Photo 35 : West Abutment, Beam 2 - spall with 9 exposed bars
- Photo 36 : West Abutment, Beam 3 - void at waterline
- Photo 37 : Southwest wingwall - spall with 7 exposed bars
- Photo 38 : Pier 2, east face, Bay 9 - vertical crack in concrete cap
- Photo 39 : Pier 3, west face, Beam 5 - spall
- Photo 40 : Pier 1, west face, Bay 9 - displaced stones at waterline
- Photo 41 : Pier 1, north nose - split stone
- Photo 42 : Pier 3, south nose - significant concrete spall/delamination
- Photo 43 : Pier 3, south nose, Beam 3 - significant concrete spall/delamination with beam bearing undermining

CITY/TOWN <b>LOWELL</b>	B.I.N. <b>2BQ</b>	BR. DEPT. NO. <b>L-15-031</b>	8.-STRUCTURE NO. <b>L15031-2BQ-MUN-NBI</b>	INSPECTION DATE <b>SEP 28, 2015</b>
----------------------------	----------------------	----------------------------------	---	--

**SKETCHES**



West approach load posting at bridge 20T/23T/40T



East approach load posting at bridge 20T/23T/40T

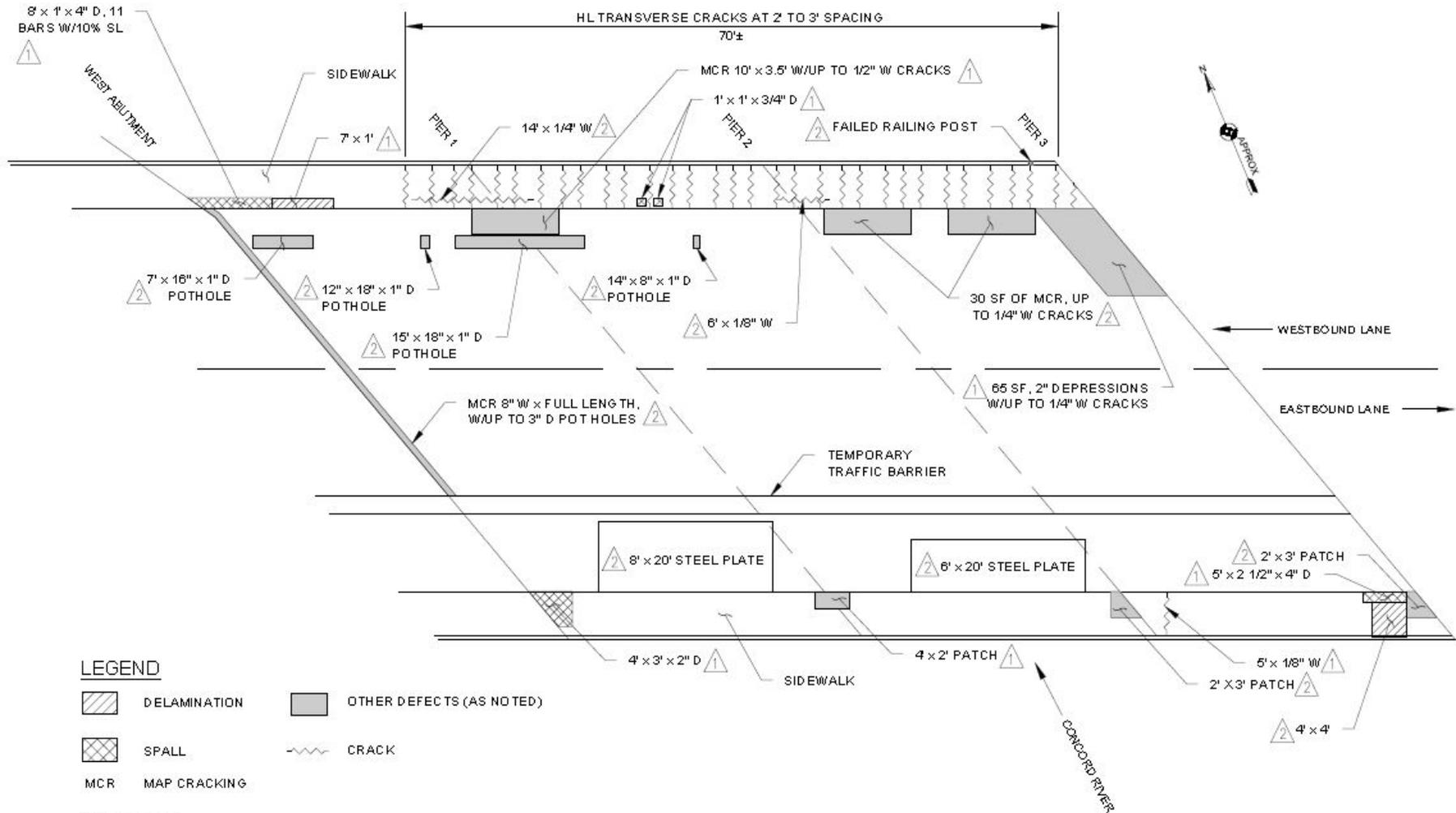
West approach load posting in advance of bridge  
20T/23T/40T

East approach load posting in advance of bridge  
NOT POSTED

**Sketch 1: Location Plan**

CITY/TOWN <b>LOWELL</b>	B.I.N. <b>2BQ</b>	BR. DEPT. NO. <b>L-15-031</b>	8.-STRUCTURE NO. <b>L15031-2BQ-MUN-NBI</b>	INSPECTION DATE <b>SEP 28, 2015</b>
----------------------------	----------------------	----------------------------------	---	--

**SKETCHES**



**LEGEND**

- DELAMINATION
- SPALL
- MCR MAP CRACKING
- OTHER DEFECTS (AS NOTED)
- CRACK

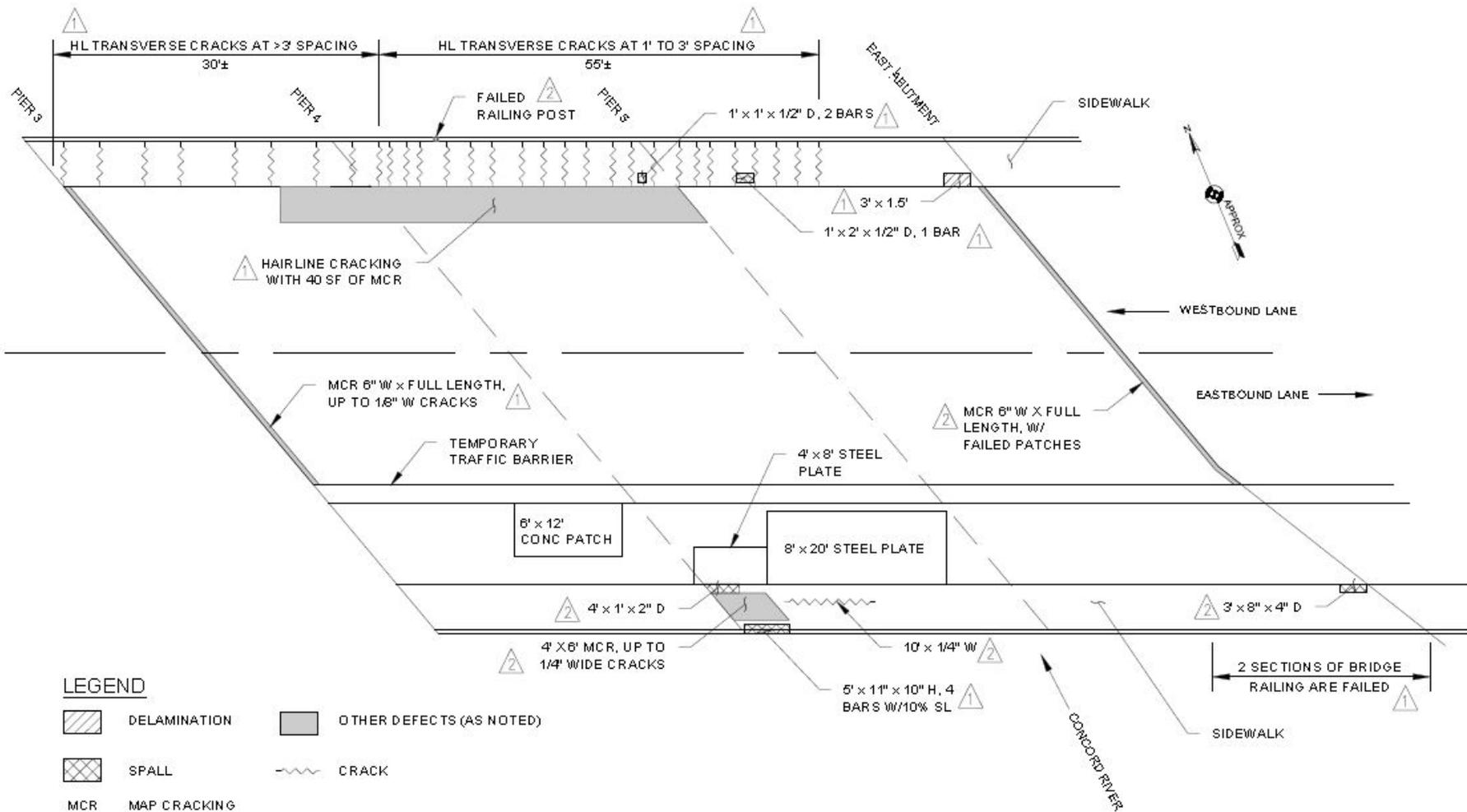
**REVISIONS**

- UPDATED INFORMATION FROM PREVIOUS INSPECTION
- 2015 DEFECT

**Sketch 2: Topside Plan, Spans A-C**

CITY/TOWN <b>LOWELL</b>	B.I.N. <b>2BQ</b>	BR. DEPT. NO. <b>L-15-031</b>	8.-STRUCTURE NO. <b>L15031-2BQ-MUN-NBI</b>	INSPECTION DATE <b>SEP 28, 2015</b>
----------------------------	----------------------	----------------------------------	---	--

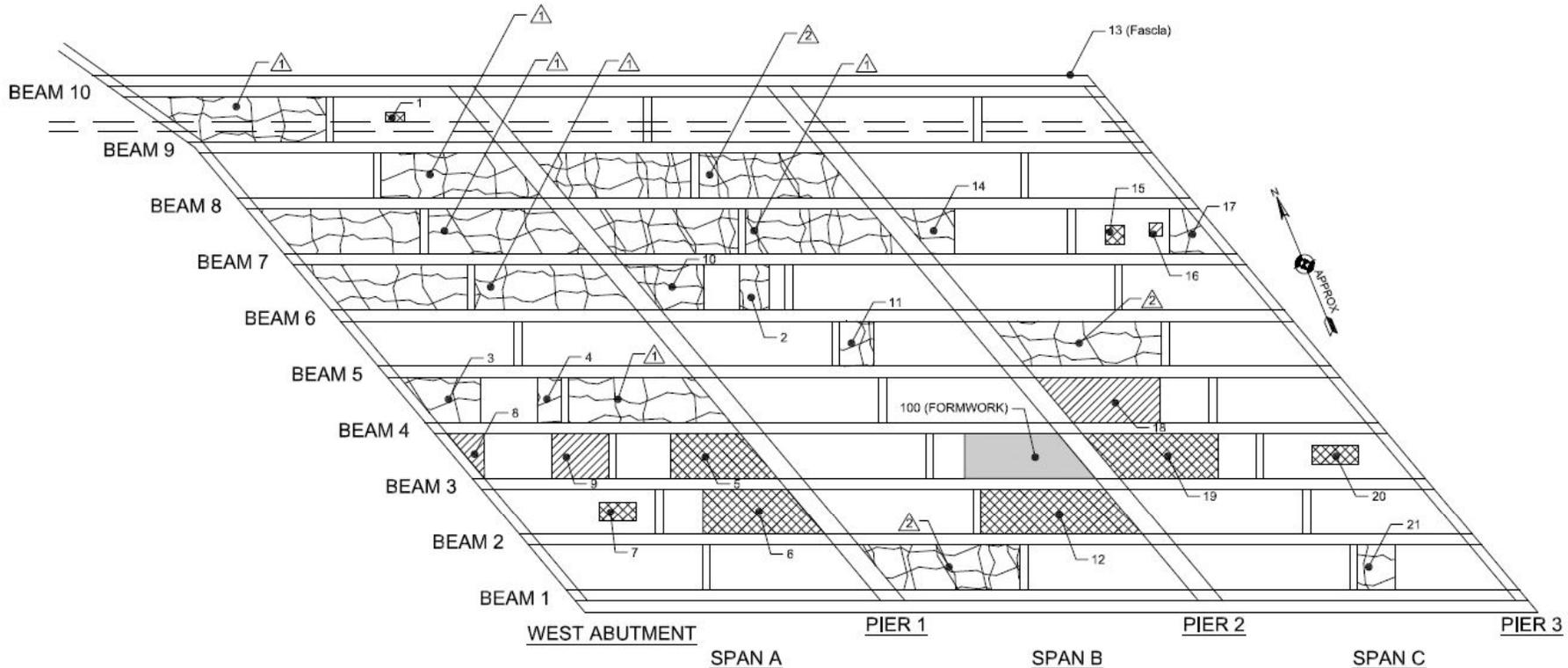
### SKETCHES



**Sketch 3: Topside Plan, Spans D-F**

CITY/TOWN <b>LOWELL</b>	B.I.N. <b>2BQ</b>	BR. DEPT. NO. <b>L-15-031</b>	8.-STRUCTURE NO. <b>L15031-2BQ-MUN-NBI</b>	INSPECTION DATE <b>SEP 28, 2015</b>
----------------------------	----------------------	----------------------------------	---	--

**SKETCHES**



**LEGEND**

- DELAMINATION
- SPALL
- DEFECT I,D
- UPDATED INFORMATION FROM PREVIOUS INSPECTION
- 2015 DEFECT
- OTHER DEFECTS (AS NOTED)
- MAP CRACKING

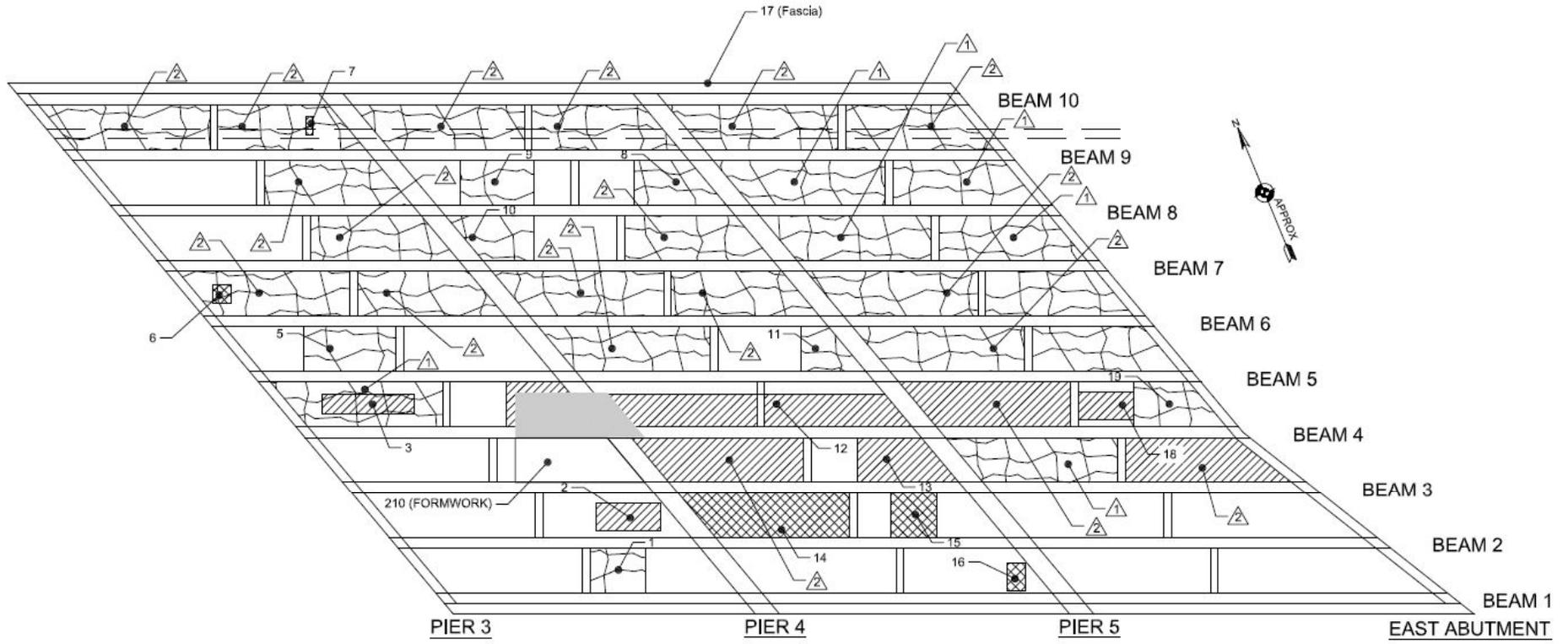
ID	Length (ft)	Width (in)	Depth (in)	# Bars	% Loss	Revisions	ID	Length (ft)	Width (in)	Depth (in)	# Bars	% Loss	Revisions
1	1	2	0.25	1		1	12	14	48	8	40	25-100	1
2	1.5	48				1	13	2	8				2
3	8	48				1	14	3	48				1
4	3	48				1	15	2	24	7	2	10	x
5	8	48	8	20	25	x	16	1.5	18				2
6	9	48	8	28	50	x	17	4	48				1
7	4	24	6	11	25	x	18	7	48				2
8	2	48				2	19	8	48	8	24	10-100	x
9	6	24				2	20	5	24	8	9	10-50	1
10	8	48				1	21	4	48				2
11	3	48				2							

Revisions:  
 1 - Updated information from previous inspection  
 2 - New information from current inspection  
 x - no change from previous inspection

**Sketch 4: Underdeck Plan, Spans A-C**

CITY/TOWN <b>LOWELL</b>	B.I.N. <b>2BQ</b>	BR. DEPT. NO. <b>L-15-031</b>	8.-STRUCTURE NO. <b>L15031-2BQ-MUN-NBI</b>	INSPECTION DATE <b>SEP 28, 2015</b>
----------------------------	----------------------	----------------------------------	---	--

**SKETCHES**



**LEGEND**

- DELAMINATION
- SPALL
- OTHER DEFECTS (AS NOTED)
- MAP CRACKING
- DEFECT I.D.
- UPDATED INFORMATION FROM PREVIOUS INSPECTION
- 2015 DEFECT

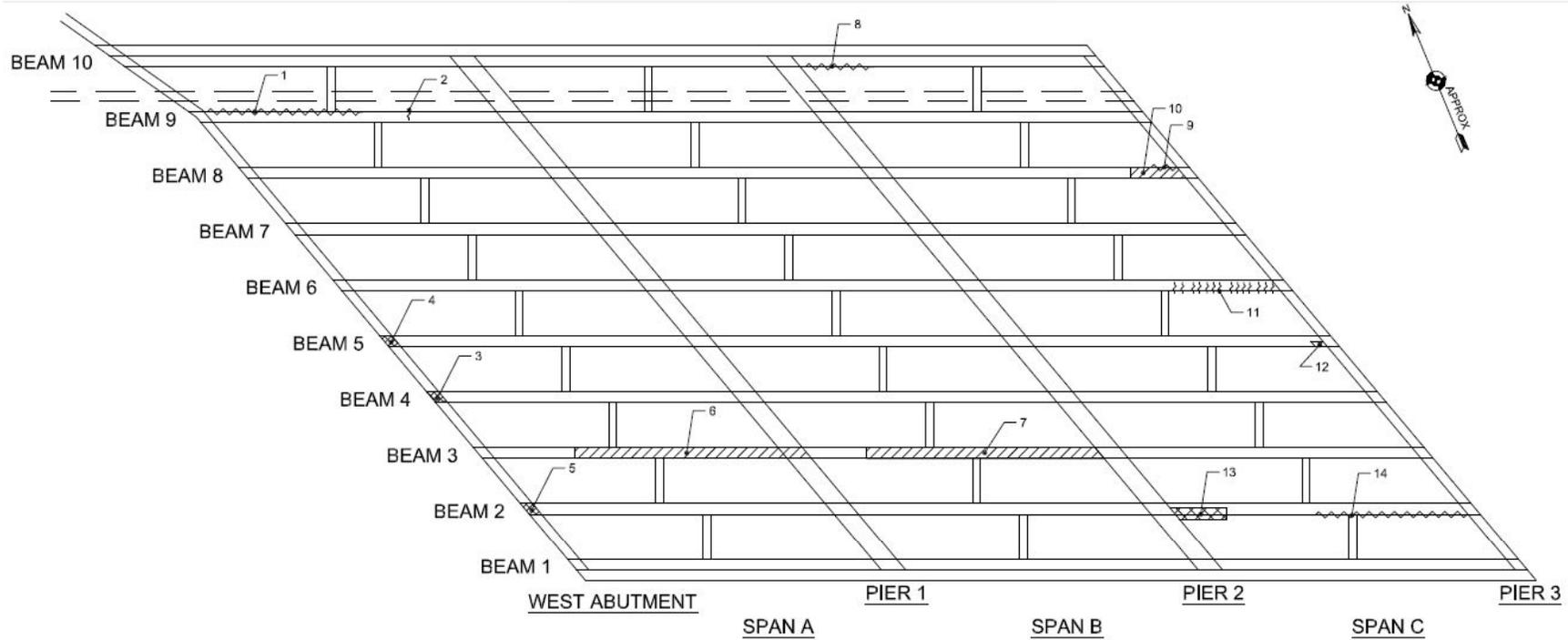
ID	Length (ft)	Width (in)	Depth (in)	# Bars	% Loss	Revisions	ID	Length (ft)	Width (in)	Depth (in)	# Bars	% Loss	Revisions
1	5	48				2	11	4	48				2
2	7	36				2	12	34.3	30				2
3	10	24				2	13	8	48				1
4	7	48				2	14	18.2	48	8	48	25-100	x
5	12.4	48				2	15	5	48	8	24	25-100	x
6	0.67	8	1			2	16	1	36				2
7	0.67	2	0.5	1		2	17	29.4	6				2
8	8	48				2	18	6	36				2
9	7	48				2	19	10	48				1
10	7	48				2							

Revisions:  
 1 - Updated information from previous inspection  
 2 - New information from current inspection  
 x - no change from previous inspection

**Sketch 5: Underdeck Plan, Spans D-F**

CITY/TOWN <b>LOWELL</b>	B.I.N. <b>2BQ</b>	BR. DEPT. NO. <b>L-15-031</b>	8.-STRUCTURE NO. <b>L15031-2BQ-MUN-NBI</b>	INSPECTION DATE <b>SEP 28, 2015</b>
----------------------------	----------------------	----------------------------------	---	--

**SKETCHES**



**LEGEND**

- DELAMINATION
- SPALL
- CRACK
- DEFECT I.D.

ID	Defect	Length (ft)	Width (in)	Depth (in)	# Bars	% Loss	Revisions	ID	Defect	Length (ft)	Width (in)	Depth (in)	# Bars	% Loss	Revisions
1	LCR	17	0.25				2	9	LCR	3	0.125				2
2	VCR	2.8	0.25				2	10	DELAM	6	14				2
3	SPALL	0.25	3	0.5	1		2	11	VCR	66*	0.03				2
4	SPALL	0.25	4	0.5	1		2	12	SPALL	0.5	4	1	1	50	2
5	SPALL	0.25	3	2	1		2	13	SPALL	2	6	1			2
6	DELAM	25	16				2	14	LCR	16.5	0.25				2
7	DELAM	24.5	16				2								
8	LCR	8	0.125				2								

\*Defect represents series of multiple cracks; length reflects combined length of cracks

LCR - Horizontal crack parallel to beam axis

VCR - Vertical crack perpendicular to beam axis

Revisions:

1 - Updated information from previous inspection

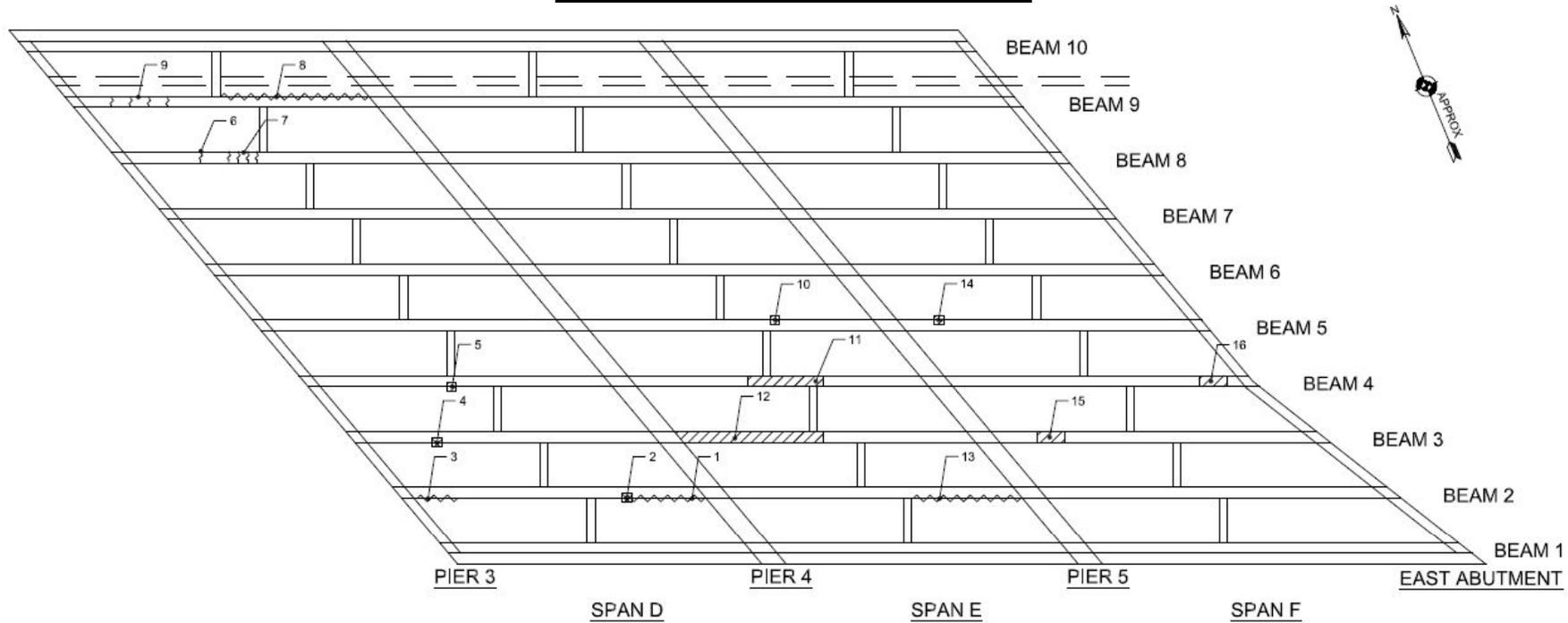
2 - New information from current inspection

x - no change from previous inspection

**Sketch 6: Beam Plans, Spans A-C**

CITY/TOWN <b>LOWELL</b>	B.I.N. <b>2BQ</b>	BR. DEPT. NO. <b>L-15-031</b>	8.-STRUCTURE NO. <b>L15031-2BQ-MUN-NBI</b>	INSPECTION DATE <b>SEP 28, 2015</b>
----------------------------	----------------------	----------------------------------	---	--

**SKETCHES**



**LEGEND**

- DELAMINATION
- SPALL
- CRACK
- DEFECT I.D.

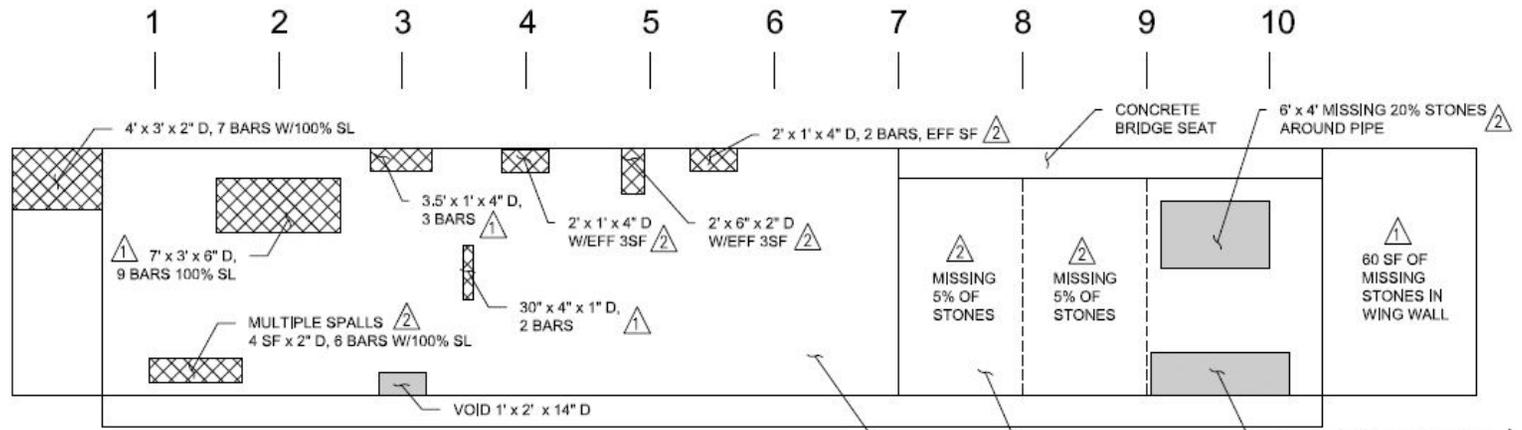
ID	Defect	Length (ft)	Width (in)	Depth (in)	# Bars	% Loss	Revisions	ID	Defect	Length (ft)	Width (in)	Depth (in)	# Bars	% Loss	Revisions
1	LCR	9	0.05				2	10	DELAM	C.25	8				2
2	SPALL	0.35	6	0.5			2	11	DELAM	8	16				2
3	LCR	5	0.06				2	12	DELAM	15	16				2
4	SPALL	1	6	2	0		2	13	LCR	34.7	0.03				2
5	DELAM	3	16				2	14	DELAM	C.67	4				2
6	VCR	2	0.03				2	15	DELAM	3	12				2
7	VCR	8*	0.03				2	16	DELAM	3	12				2
8	LCR	18.2	0.06				2								
9	VCR	10*	0.02				2								

\*Defect represents series of multiple cracks; length reflects combined length of cracks  
 LCR - horizontal crack parallel to beam axis  
 VCR - vertical crack perpendicular to beam axis  
 Revisions:  
 1 - Updated information from previous inspection  
 2 - New information from current inspection  
 x - no change from previous inspection

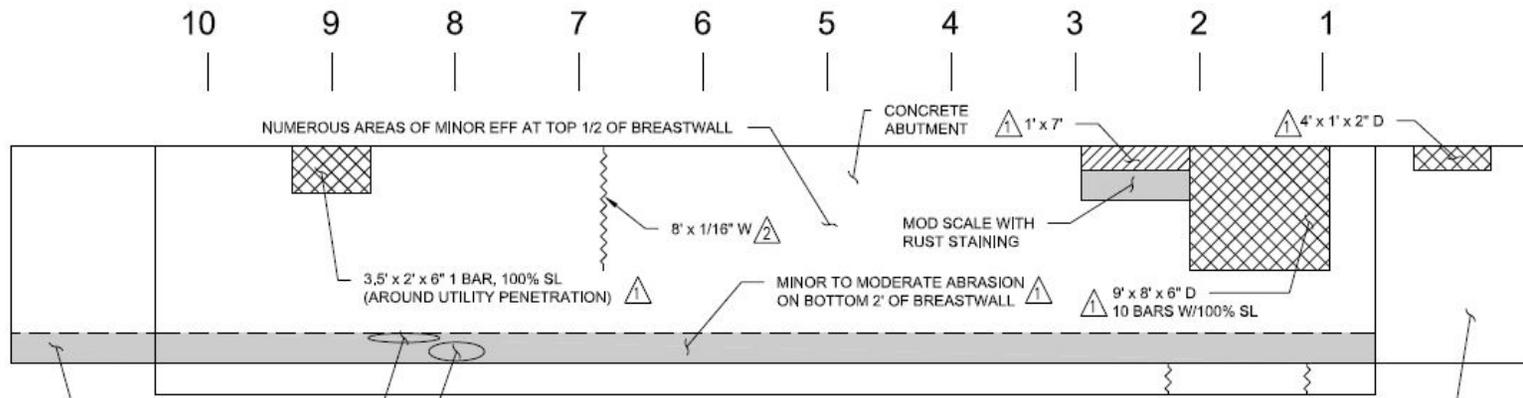
**Sketch 7: Beam Plans, Spans D-F**

CITY/TOWN <b>LOWELL</b>	B.I.N. <b>2BQ</b>	BR. DEPT. NO. <b>L-15-031</b>	8.-STRUCTURE NO. <b>L15031-2BQ-MUN-NBI</b>	INSPECTION DATE <b>SEP 28, 2015</b>
----------------------------	----------------------	----------------------------------	---	--

**SKETCHES**



**WEST ABUTMENT**



**EAST ABUTMENT**

**LEGEND**

- DELAMINATION
- SPALL
- CRACK
- OTHER DEFECTS (AS NOTED)

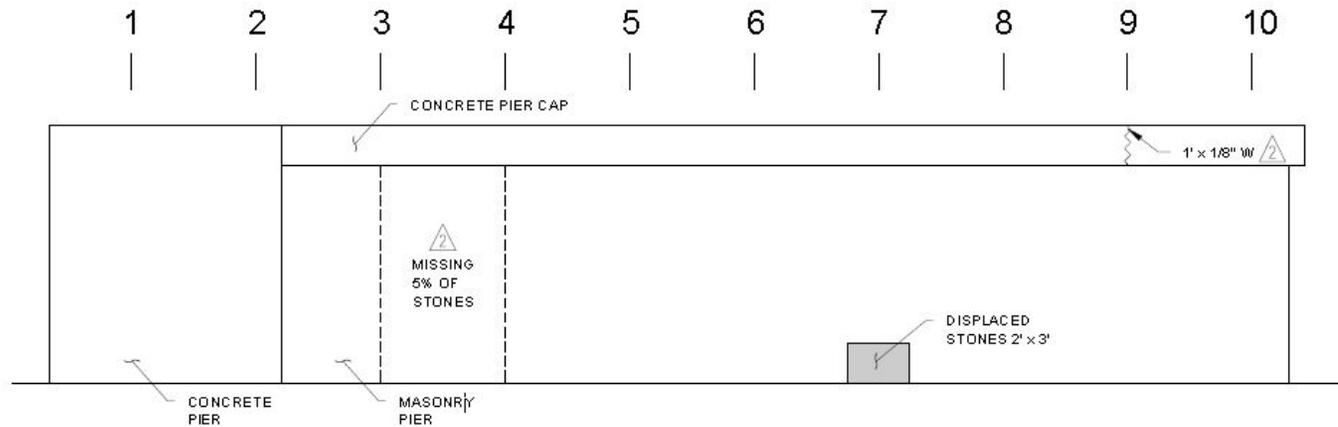
**REVISIONS**

- UPDATED INFORMATION FROM PREVIOUS INSPECTION
- 2015 DEFECT

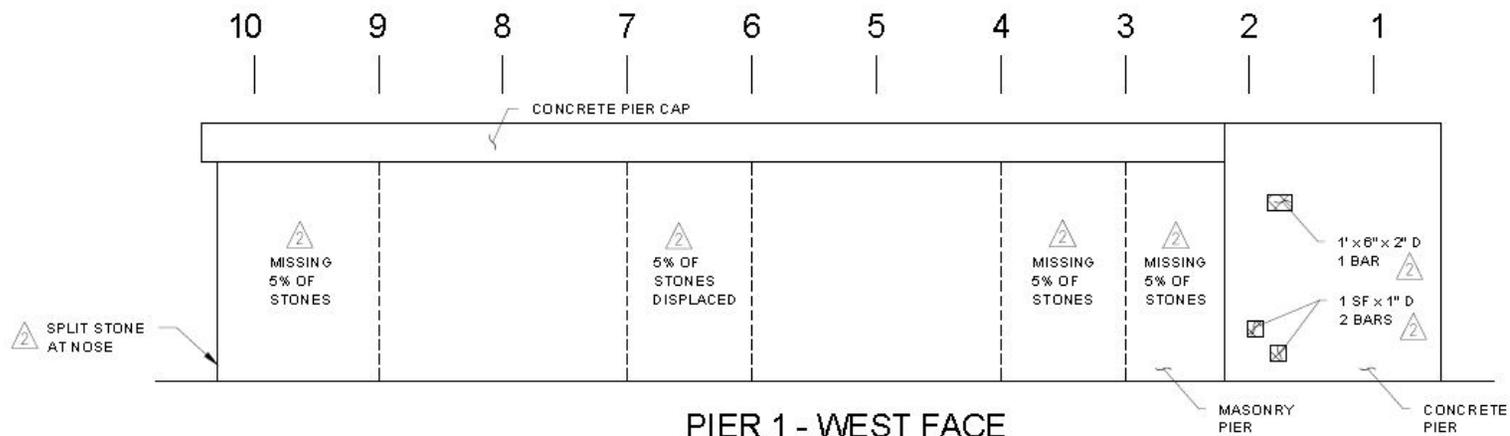
**Sketch 8: Abutment Elevations**

CITY/TOWN <b>LOWELL</b>	B.I.N. <b>2BQ</b>	BR. DEPT. NO. <b>L-15-031</b>	8.-STRUCTURE NO. <b>L15031-2BQ-MUN-NBI</b>	INSPECTION DATE <b>SEP 28, 2015</b>
----------------------------	----------------------	----------------------------------	---	--

**SKETCHES**



**PIER 1 - EAST FACE**



**PIER 1 - WEST FACE**

**LEGEND**

- DELAMINATION
- CRACK
- SPALL
- OTHER DEFECTS (AS NOTED)

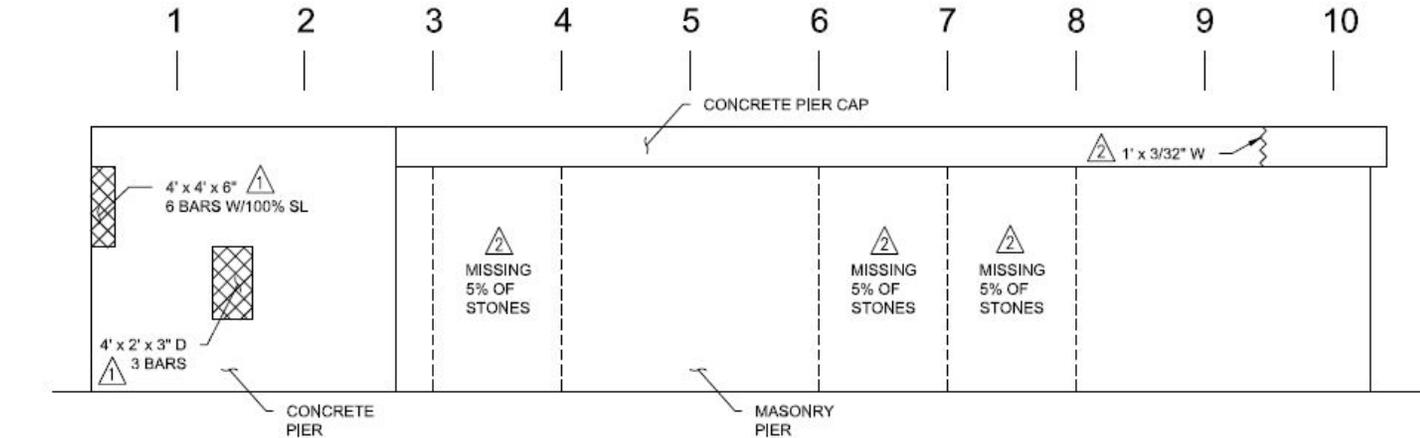
**REVISIONS**

- UPDATED INFORMATION FROM PREVIOUS INSPECTION
- 2015 DEFECT

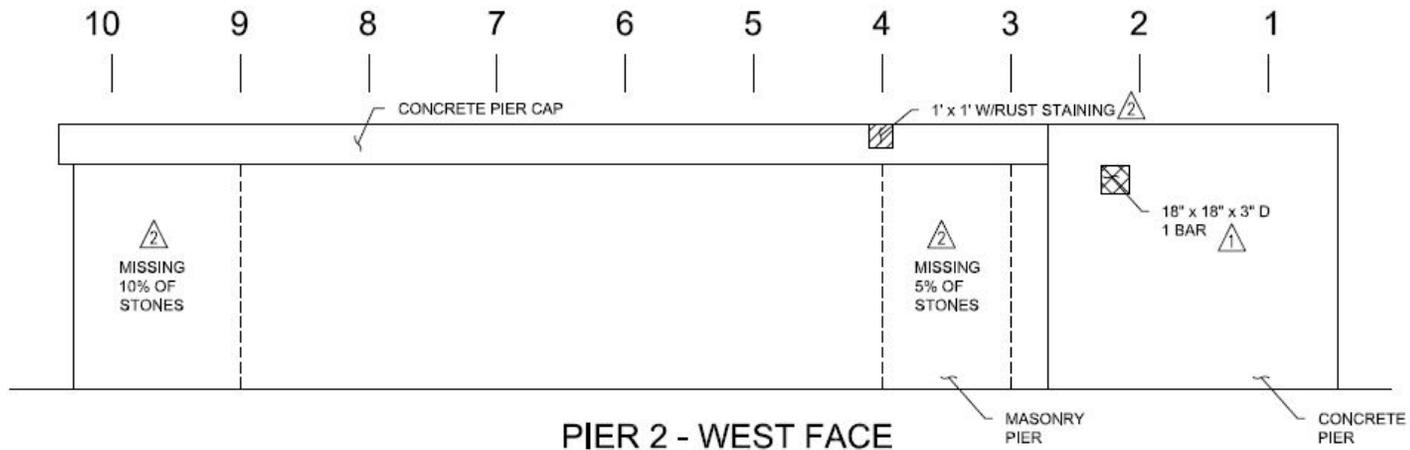
**Sketch 9: Pier 1 Elevations**

CITY/TOWN <b>LOWELL</b>	B.I.N. <b>2BQ</b>	BR. DEPT. NO. <b>L-15-031</b>	8.-STRUCTURE NO. <b>L15031-2BQ-MUN-NBI</b>	INSPECTION DATE <b>SEP 28, 2015</b>
----------------------------	----------------------	----------------------------------	---	--

**SKETCHES**



**PIER 2 - EAST FACE**



**PIER 2 - WEST FACE**

**LEGEND**

- DELAMINATION
- CRACK
- SPALL
- OTHER DEFECTS (AS NOTED)

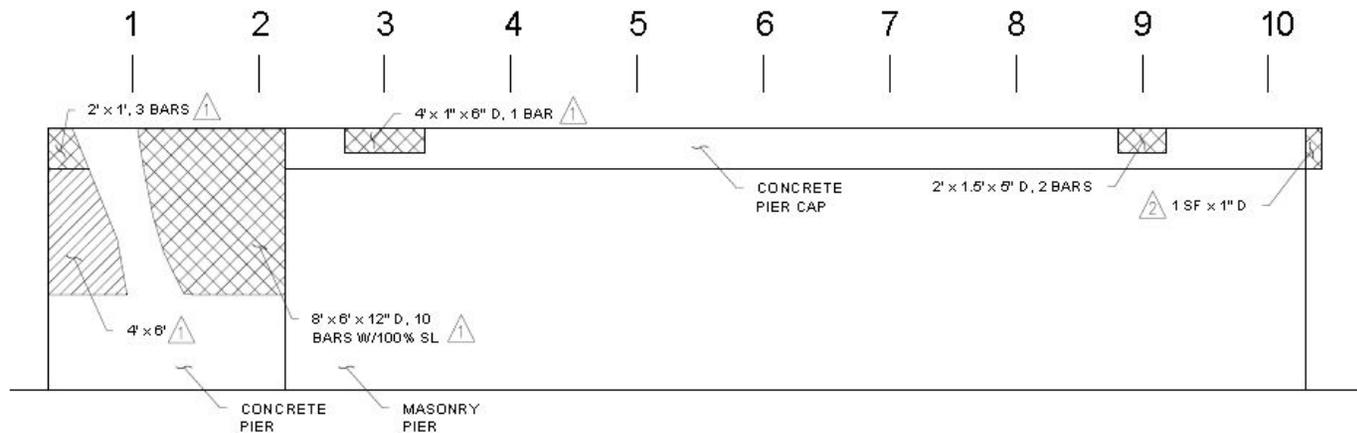
**REVISIONS**

- UPDATED INFORMATION FROM PREVIOUS INSPECTION
- 2015 DEFECT

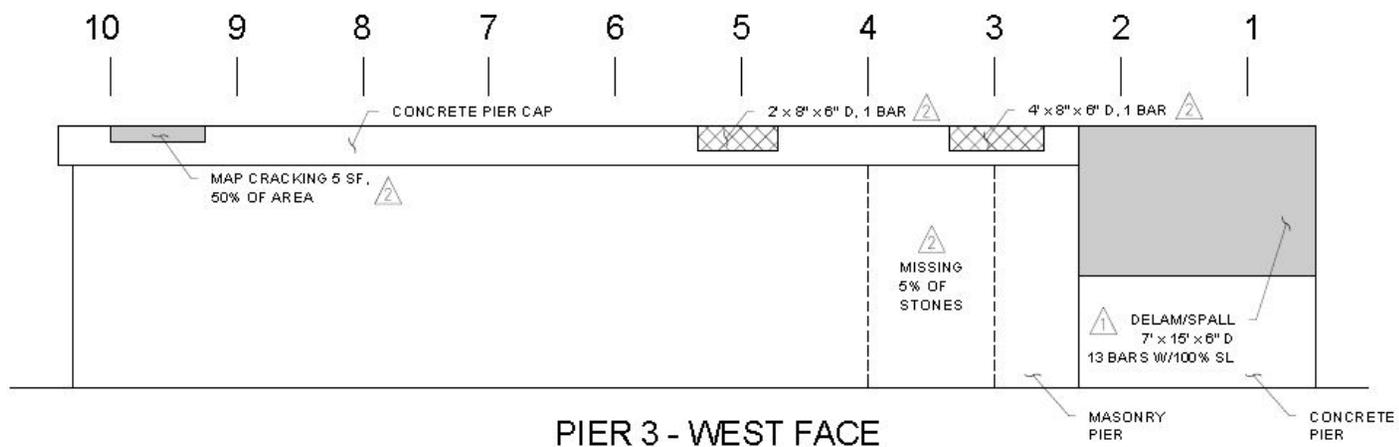
**Sketch 10: Pier 2 Elevations**

CITY/TOWN <b>LOWELL</b>	B.I.N. <b>2BQ</b>	BR. DEPT. NO. <b>L-15-031</b>	8.-STRUCTURE NO. <b>L15031-2BQ-MUN-NBI</b>	INSPECTION DATE <b>SEP 28, 2015</b>
----------------------------	----------------------	----------------------------------	---	--

**SKETCHES**



PIER 3 - EAST FACE



PIER 3 - WEST FACE

LEGEND

- DELAMINATION
- CRACK
- SPALL
- OTHER DEFECTS (AS NOTED)

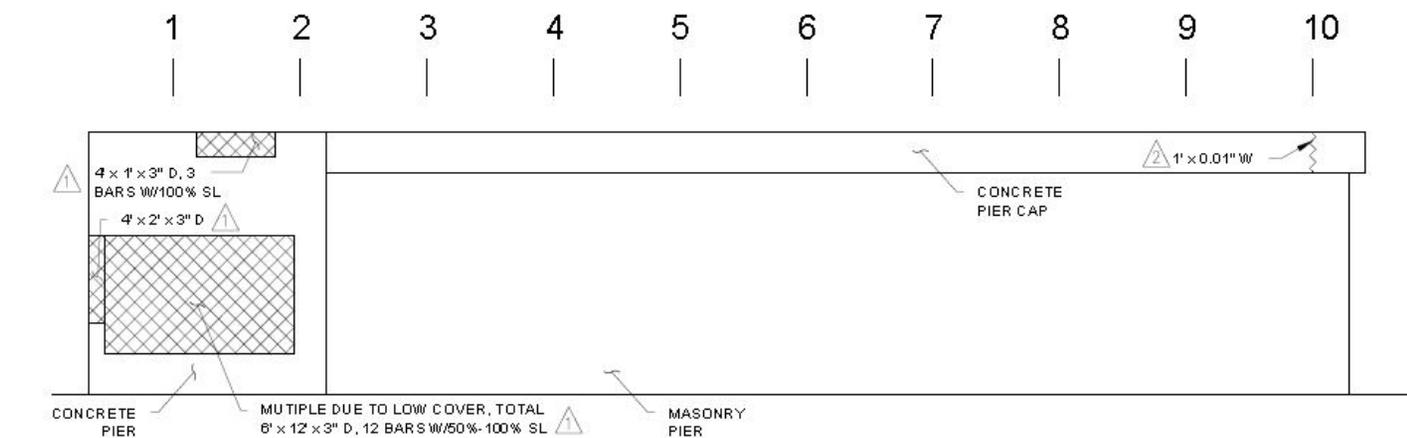
REVISIONS

- UPDATED INFORMATION FROM PREVIOUS INSPECTION
- 2015 DEFECT

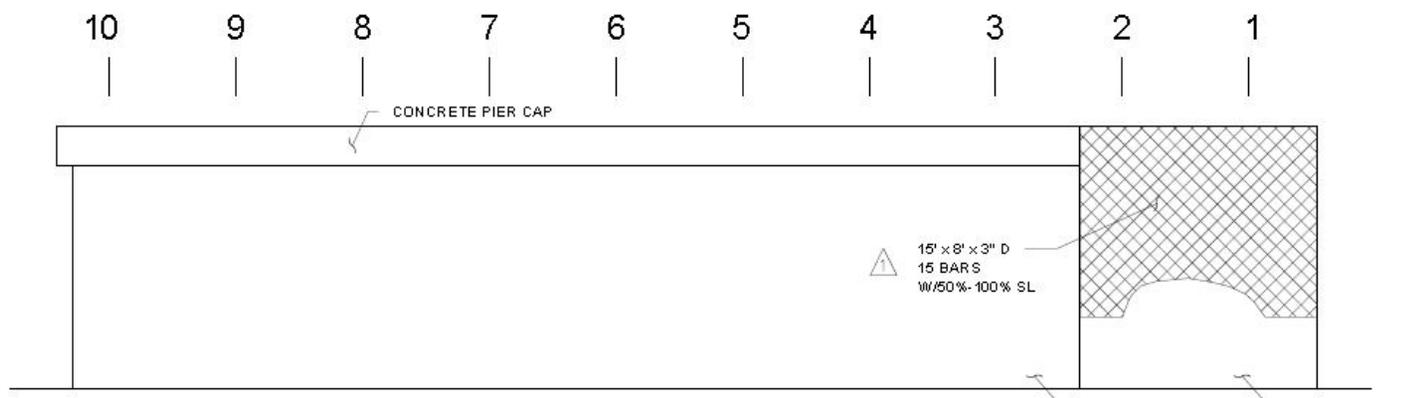
**Sketch 11: Pier 3 Elevations**

CITY/TOWN <b>LOWELL</b>	B.I.N. <b>2BQ</b>	BR. DEPT. NO. <b>L-15-031</b>	8.-STRUCTURE NO. <b>L15031-2BQ-MUN-NBI</b>	INSPECTION DATE <b>SEP 28, 2015</b>
----------------------------	----------------------	----------------------------------	---	--

**SKETCHES**



**PIER 4 - EAST FACE**



**PIER 4 - WEST FACE**

**LEGEND**

- DELAMINATION
- CRACK
- SPALL
- OTHER DEFECTS (AS NOTED)

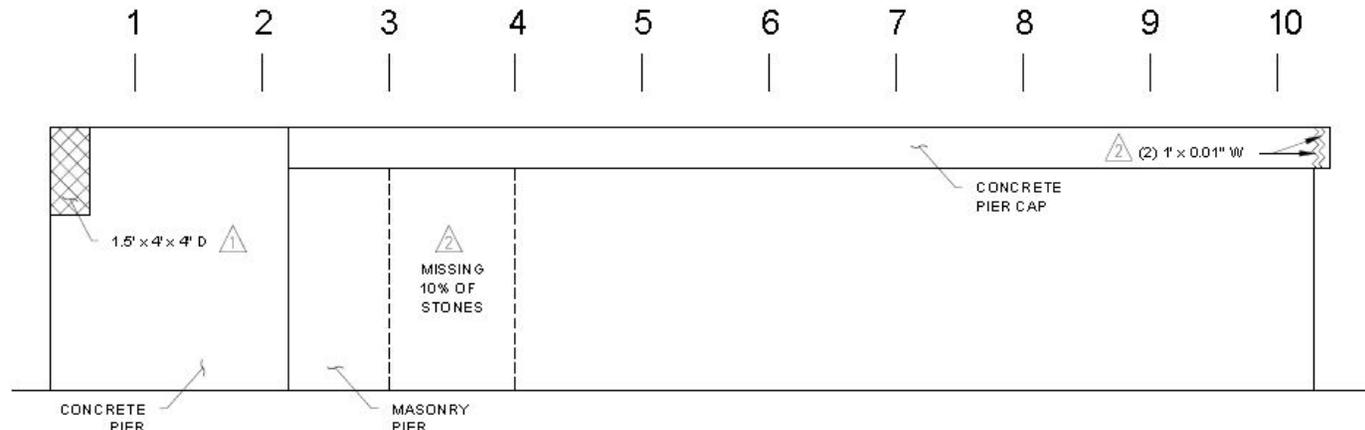
**REVISIONS**

- UPDATED INFORMATION FROM PREVIOUS INSPECTION
- 2015 DEFECT

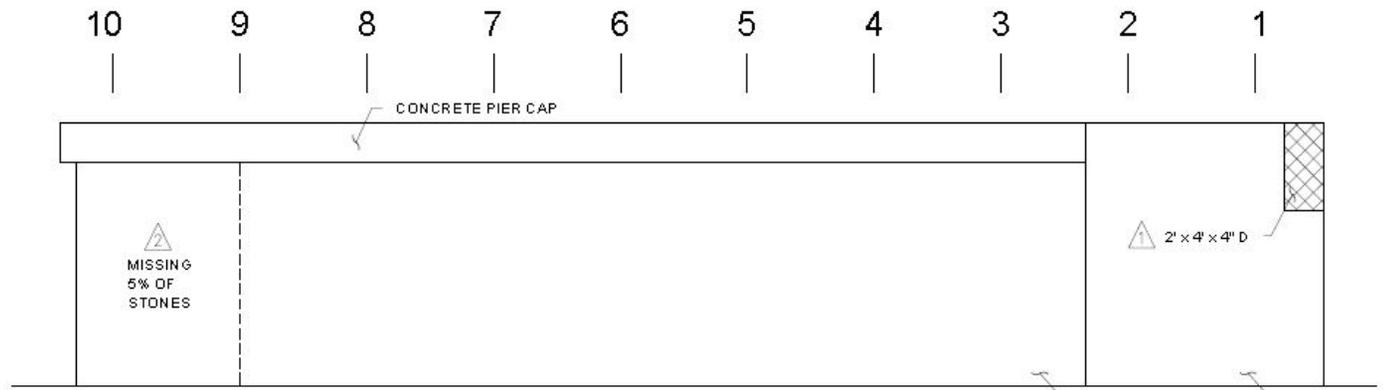
**Sketch 12: Pier 4 Elevations**

CITY/TOWN <b>LOWELL</b>	B.I.N. <b>2BQ</b>	BR. DEPT. NO. <b>L-15-031</b>	8.-STRUCTURE NO. <b>L15031-2BQ-MUN-NBI</b>	INSPECTION DATE <b>SEP 28, 2015</b>
----------------------------	----------------------	----------------------------------	---	--

**SKETCHES**



PIER 5 - EAST FACE



PIER 5 - WEST FACE

LEGEND

- DELAMINATION
- CRACK
- SPALL
- OTHER DEFECTS (AS NOTED)

REVISIONS

- UPDATED INFORMATION FROM PREVIOUS INSPECTION
- 2015 DEFECT

**Sketch 13: Pier 5 Elevations**

CITY/TOWN <b>LOWELL</b>	B.I.N. <b>2BQ</b>	BR. DEPT. NO. <b>L-15-031</b>	8.-STRUCTURE NO. <b>L15031-2BQ-MUN-NBI</b>	INSPECTION DATE <b>SEP 28, 2015</b>
----------------------------	----------------------	----------------------------------	---	--

**PHOTOS**



**Photo 1: Partially obscured east approach posting sign**



**Photo 2: Typical south pavement condition**

CITY/TOWN LOWELL	B.I.N. 2BQ	BR. DEPT. NO. L-15-031	8.-STRUCTURE NO. L15031-2BQ-MUN-NBI	INSPECTION DATE SEP 28, 2015
---------------------	---------------	---------------------------	--	---------------------------------

**PHOTOS**

**Photo 3:** Multiple wearing surface potholes up to 1" deep, approx. 4 feet off north curb



**Photo 4:** Deteriorated wearing surface and previous repairs, Pier 3

CITY/TOWN LOWELL	B.I.N. 2BQ	BR. DEPT. NO. L-15-031	8.-STRUCTURE NO. L15031-2BQ-MUN-NBI	INSPECTION DATE SEP 28, 2015
---------------------	---------------	---------------------------	--	---------------------------------

**PHOTOS**

**Photo 5:** Span C, Bay 3 - Full depth spall



**Photo 6:** Span C, Beam 3, Pier 2 - typical efflorescence buildup at deck/beam interface

CITY/TOWN LOWELL	B.I.N. 2BQ	BR. DEPT. NO. L-15-031	8.-STRUCTURE NO. L15031-2BQ-MUN-NBI	INSPECTION DATE SEP 28, 2015
---------------------	---------------	---------------------------	--	---------------------------------

**PHOTOS**

**Photo 7: Span E, Bay 2, Pier 4 - Full depth deck spall**



**Photo 8: Span E, Bay 4 - Full length deck delamination between Piers 4 and 5**

CITY/TOWN <b>LOWELL</b>	B.I.N. <b>2BQ</b>	BR. DEPT. NO. <b>L-15-031</b>	8.-STRUCTURE NO. <b>L15031-2BQ-MUN-NBI</b>	INSPECTION DATE <b>SEP 28, 2015</b>
----------------------------	----------------------	----------------------------------	---	--

**PHOTOS**



**Photo 9: Span E, Bay 8 - map cracking**



**Photo 10: Pier 1 - Bituminous concrete surface patch at south sidewalk**

CITY/TOWN <b>LOWELL</b>	B.I.N. <b>2BQ</b>	BR. DEPT. NO. <b>L-15-031</b>	8.-STRUCTURE NO. <b>L15031-2BQ-MUN-NBI</b>	INSPECTION DATE <b>SEP 28, 2015</b>
----------------------------	----------------------	----------------------------------	---	--

**PHOTOS**



**Photo 11: Over East Abutment - curb spall and cracking**



**Photo 12: Over West Abutment - 8 foot spall in sidewalk curb section, 11 exposed bars**

CITY/TOWN LOWELL	B.I.N. 2BQ	BR. DEPT. NO. L-15-031	8.-STRUCTURE NO. L15031-2BQ-MUN-NBI	INSPECTION DATE SEP 28, 2015
---------------------	---------------	---------------------------	--	---------------------------------

**PHOTOS**

**Photo 13:** Southeast sidewalk at east abutment - damage railing panels and corroded post connections to sidewalk (2 sections)



**Photo 14:** Typical picket impact damage

CITY/TOWN <b>LOWELL</b>	B.I.N. <b>2BQ</b>	BR. DEPT. NO. <b>L-15-031</b>	8.-STRUCTURE NO. <b>L15031-2BQ-MUN-NBI</b>	INSPECTION DATE <b>SEP 28, 2015</b>
----------------------------	----------------------	----------------------------------	---	--

**PHOTOS**



**Photo 15: Second post west of pier 3 - failed due to corrosion/section loss and split**



**Photo 16: Second north railing post east of pier 3 - failed due to corrosion/section loss**

CITY/TOWN LOWELL	B.I.N. 2BQ	BR. DEPT. NO. L-15-031	8.-STRUCTURE NO. L15031-2BQ-MUN-NBI	INSPECTION DATE SEP 28, 2015
---------------------	---------------	---------------------------	--	---------------------------------

**PHOTOS**

Photo 17: Typical lower utility corrosion



Photo 18: Typical south utility support paint loss

CITY/TOWN LOWELL	B.I.N. 2BQ	BR. DEPT. NO. L-15-031	8.-STRUCTURE NO. L15031-2BQ-MUN-NBI	INSPECTION DATE SEP 28, 2015
---------------------	---------------	---------------------------	--	---------------------------------

**PHOTOS**

**Photo 19: South sidewalk at west abutment - Damaged plastic conduit**



**Photo 20: Bay 1, Pier 3, south fascia - failed utility pipe due to corrosion/section loss**

CITY/TOWN LOWELL	B.I.N. 2BQ	BR. DEPT. NO. L-15-031	8.-STRUCTURE NO. L15031-2BQ-MUN-NBI	INSPECTION DATE SEP 28, 2015
---------------------	---------------	---------------------------	--	---------------------------------

**PHOTOS**

**Photo 21: East Approach - Cracks approx. 18 feet from abutment**



**Photo 22: West approach adjacent to north sidewalk - cracked wearing surface and patch repair**

CITY/TOWN LOWELL	B.I.N. 2BQ	BR. DEPT. NO. L-15-031	8.-STRUCTURE NO. L15031-2BQ-MUN-NBI	INSPECTION DATE SEP 28, 2015
---------------------	---------------	---------------------------	--	---------------------------------

**PHOTOS**

**Photo 23:** Southeast sidewalk approach - cracked/patched wearing surface and vegetation growth



**Photo 24:** Span C, Beam 9 - typical bottom flange cracks with rust and efflorescence

CITY/TOWN LOWELL	B.I.N. 2BQ	BR. DEPT. NO. L-15-031	8.-STRUCTURE NO. L15031-2BQ-MUN-NBI	INSPECTION DATE SEP 28, 2015
---------------------	---------------	---------------------------	--	---------------------------------

**PHOTOS**

Photo 25: Span C, Beam 5, Pier 3 - bottom flange spall



Photo 26: Span D, Beam 2, Pier 3 - Typical longitudinal beam haunch crack

CITY/TOWN LOWELL	B.I.N. 2BQ	BR. DEPT. NO. L-15-031	8.-STRUCTURE NO. L15031-2BQ-MUN-NBI	INSPECTION DATE SEP 28, 2015
---------------------	---------------	---------------------------	--	---------------------------------

**PHOTOS**

Photo 27: Span E, Beam 3 - 15 foot bottom flange delamination



Photo 28: Span D, Bay 3, Pier 3 - Typical diaphragm delamination

CITY/TOWN LOWELL	B.I.N. 2BQ	BR. DEPT. NO. L-15-031	8.-STRUCTURE NO. L15031-2BQ-MUN-NBI	INSPECTION DATE SEP 28, 2015
---------------------	---------------	---------------------------	--	---------------------------------

**PHOTOS**

Photo 29: Span D, Bay 5, Pier 3 - Diaphragm spall



Photo 30: Span F, Bay 7, Beam 8 - Typical efflorescence at beam/diaphragm interface

CITY/TOWN LOWELL	B.I.N. 2BQ	BR. DEPT. NO. L-15-031	8.-STRUCTURE NO. L15031-2BQ-MUN-NBI	INSPECTION DATE SEP 28, 2015
---------------------	---------------	---------------------------	--	---------------------------------

**PHOTOS**

Photo 31: West Abutment, Beam 4 - spall/efflorescence



Photo 32: West Abutment, Bay 5 - spall with 2 exposed bars

CITY/TOWN LOWELL	B.I.N. 2BQ	BR. DEPT. NO. L-15-031	8.-STRUCTURE NO. L15031-2BQ-MUN-NBI	INSPECTION DATE SEP 28, 2015
---------------------	---------------	---------------------------	--	---------------------------------

**PHOTOS**

Photo 33: East Abutment, Beam 2 - spall with 9 exposed bars



Photo 34: East Abutment, Beam 9 - spall with 3 exposed bars

CITY/TOWN LOWELL	B.I.N. 2BQ	BR. DEPT. NO. L-15-031	8.-STRUCTURE NO. L15031-2BQ-MUN-NBI	INSPECTION DATE SEP 28, 2015
---------------------	---------------	---------------------------	--	---------------------------------

**PHOTOS**

Photo 35: West Abutment, Beam 2 - spall with 9 exposed bars



Photo 36: West Abutment, Beam 3 - void at waterline

CITY/TOWN LOWELL	B.I.N. 2BQ	BR. DEPT. NO. L-15-031	8.-STRUCTURE NO. L15031-2BQ-MUN-NBI	INSPECTION DATE SEP 28, 2015
---------------------	---------------	---------------------------	--	---------------------------------

**PHOTOS**

Photo 37: Southwest wingwall - spall with 7 exposed bars



Photo 38: Pier 2, east face, Bay 9 - vertical crack in concrete cap

CITY/TOWN LOWELL	B.I.N. 2BQ	BR. DEPT. NO. L-15-031	8.-STRUCTURE NO. L15031-2BQ-MUN-NBI	INSPECTION DATE SEP 28, 2015
---------------------	---------------	---------------------------	--	---------------------------------

**PHOTOS**

Photo 39: Pier 3, west face, Beam 5 - spall



Photo 40: Pier 1, west face, Bay 9 - displaced stones at waterline

CITY/TOWN LOWELL	B.I.N. 2BQ	BR. DEPT. NO. L-15-031	8.-STRUCTURE NO. L15031-2BQ-MUN-NBI	INSPECTION DATE SEP 28, 2015
---------------------	---------------	---------------------------	--	---------------------------------

**PHOTOS**

Photo 41: Pier 1, north nose - split stone



Photo 42: Pier 3, south nose - significant concrete spall/delamination

CITY/TOWN <b>LOWELL</b>	B.I.N. <b>2BQ</b>	BR. DEPT. NO. <b>L-15-031</b>	8.-STRUCTURE NO. <b>L15031-2BQ-MUN-NBI</b>	INSPECTION DATE <b>SEP 28, 2015</b>
----------------------------	----------------------	----------------------------------	---	--

**PHOTOS**

**Photo 43: Pier 3, south nose, Beam 3 - significant concrete spall/delamination with beam bearing undermining**

# National Bridge Element Inspection

BDEPT# **L-15-031**

Date **09/28/2015**

B.I.N. **2BQ**

District Bridge Inspection Eng'r **Thomas G. Weil**

Item 8 **L15031-2BQ-MUN-NBI**

Inspecting Agency **Collins Engineers, Inc.**

Span Group **1**

Team Leader **Wallace Mosher**

Town **Lowell**

Team **Zachary D. Jenkins**

District **4**

Member(s)

El #	Element Name	Units	Env.	Total Q.	% or Q	State 1	State 2	State 3	State 4
<b>12</b>	<b>Re Concrete Deck</b>	sq feet	2	9,853.000	<input type="checkbox"/> %	6,573.000	2,993.000	16.000	271.000
> 1080	<i>Delamination/Spall/Patched Area</i>	sq feet	2	446.000	<input type="checkbox"/> %		174.000	1.000	271.000
> 1120	<i>Efflorescence/Rust Staining</i>	sq feet	2	173.000	<input type="checkbox"/> %		173.000		
> 1130	<i>Cracking (RC and Other)</i>	sq feet	2	2,661.000	<input type="checkbox"/> %		2,646.000	15.000	
> 510	Wearing Surfaces	sq feet	2	7,364.000	<input type="checkbox"/> %	7,113.000		251.000	
> > 3210	<i>Del/Spall/Patch/Pot(Wear Surf)</i>	sq feet	2	134.000	<input type="checkbox"/> %			134.000	
> > 3220	<i>Crack (Wearing Surface)</i>	sq feet	2	352.000	<input type="checkbox"/> %	235.000		117.000	
<b>110</b>	<b>Re Conc Opn Girder/Beam</b>	feet	2	1,997.000	<input type="checkbox"/> %	1,784.000	186.000	27.000	
> 1080	<i>Delamination/Spall/Patched Area</i>	feet	2	93.000	<input type="checkbox"/> %		69.000	24.000	
> 1120	<i>Efflorescence/Rust Staining</i>	feet	2	23.000	<input type="checkbox"/> %		20.000	3.000	
> 1130	<i>Cracking (RC and Other)</i>	feet	2	151.000	<input type="checkbox"/> %	54.000	97.000		
<b>210</b>	<b>Re Conc Pier Wall</b>	feet	2	75.000	<input type="checkbox"/> %	33.000		42.000	
> 1080	<i>Delamination/Spall/Patched Area</i>	feet	2	42.000	<input type="checkbox"/> %			42.000	
<b>213</b>	<b>Masonry Pier Wall</b>	feet	2	280.000	<input type="checkbox"/> %	227.000	11.000	42.000	
> 1620	<i>Split/Spall (Masonry)</i>	feet	2	5.000	<input type="checkbox"/> %		5.000		
> 1640	<i>Masonry Displacement</i>	feet	2	48.000	<input type="checkbox"/> %		6.000	42.000	
<b>215</b>	<b>Re Conc Abutment</b>	feet	2	175.000	<input type="checkbox"/> %	39.000	97.000	39.000	
> 1080	<i>Delamination/Spall/Patched Area</i>	feet	2	45.000	<input type="checkbox"/> %		7.000	38.000	
> 1130	<i>Cracking (RC and Other)</i>	feet	2	1.000	<input type="checkbox"/> %			1.000	

# National Bridge Element Inspection

BDEPT# **L-15-031**  
 B.I.N. **2BQ**  
 Item 8 **L15031-2BQ-MUN-NBI**  
 Span Group **1**  
 Town **Lowell**  
 District **4**

Date **09/28/2015**  
 District Bridge Inspection Eng'r **Thomas G. Weil**  
 Inspecting Agency **Collins Engineers, Inc.**  
 Team Leader **Wallace Mosher**  
 Team Member(s) **Zachary D. Jenkins**

El #	Element Name	Units	Env.	Total Q.	% or Q	State 1	State 2	State 3	State 4
> 1190	<i>Abrasion(PSC/RC)</i>	feet	2	90.000	<input type="checkbox"/> %		90.000		
<b>217</b>	<b>Masonry Abutment</b>	feet	3	25.000	<input type="checkbox"/> %	9.000		16.000	
> 1640	<i>Masonry Displacement</i>	feet	3	16.000	<input type="checkbox"/> %			16.000	
<b>330</b>	<b>Metal Bridge Railing</b>	feet	2	408.000	<input type="checkbox"/> %	8.000	368.000		32.000
> 1000	<i>Corrosion</i>	feet	2	360.000	<input type="checkbox"/> %		344.000		16.000
> 7000	<i>Damage</i>	feet	2	40.000	<input type="checkbox"/> %		24.000		16.000