



Charles D. Baker, Governor
Karyn E. Polito, Lieutenant Governor
Stephanie Pollack, Secretary & CEO
Jonathan L. Gulliver, Highway Administrator



**The Board of Selectmen
Town Hall
10 Central Street
Manchester-by-the-Sea, MA 01944**

August 23, 2019

Attention: Chuck Dam, Public Works Director

SUBJECT: BRIDGE INSPECTION REPORT (NON-NBIS)

M-02-001 (8AM) ST 127 Central St. / Saw Mill Brook RA&SMI Dated: 11/15/18

Dear Members of the Board:

An inspection was performed on the referenced City/Town owned bridge. For your records, forwarded herewith is a copy of the bridge inspection report.

Repair, rehabilitation or reconstruction of any bridge to address the deficiencies reported is the owner/custodian's responsibility. Future inspections are not the responsibility of Massachusetts Department of Transportation – Highway Division.

Questions regarding the content of the reports may be directed to the District Bridge Inspection Engineer, Joseph Dideo, at (781) 674-2172.

Sincerely,

Paul D. Stedman
District Highway Director

JD / tl

cc: Brian Clang-BIE, D-4 DHD, D-4 DBIE
Enclosures

STRUCTURES INSPECTION FIELD REPORT

2-DIST 04 B.I.N. 8AM

ROUTINE ARCH & SPECIAL MEMBER INSPECTION

BR. DEPT. NO. M-02-001

CITY/TOWN MANCHESTER	8-STRUCTURE NO. M02001-8AM-MUN-BRI	11-Kilo. POINT 000.000	41-STATUS A:OPEN	90-ROUTINE INSP. DATE NOV 15, 2018
07-FACILITY CARRIED ST127 CENTRAL ST	MEMORIAL NAME/LOCAL NAME	27-YR BUILT 1850	106-YR REBUILT 1900	YR REHAB'D (NON 106) 0000
06-FEATURES INTERSECTED WATER SAW MILL BROOK	26-FUNCTIONAL CLASS Urban Minor Arterial	DIST. BRIDGE INSPECTION ENGINEER J. Dideo		
43-STRUCTURE TYPE 811 : Masonry Arch - Deck	22-OWNER Town Agency	21-MAINTAINER Town Agency	TEAM LEADER K. Doy	PROJ MGR Dewberry #35559
107-DECK TYPE N : Not applicable	WEATHER Cloudy	TEMP. (air) -1°C	TEAM MEMBERS E. LARKIN EL	

ITEM 58 **N**

DECK DEF

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

ITEM 59 **4**

SUPERSTRUCTURE DEF

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

ITEM 60 **7**

SUBSTRUCTURE DEF

1. Abutments	Dive	Cur	7	DEF
a. Pedestals	N	N		-
b. Bridge Seats	N	N		-
c. Backwalls	N	N		-
d. Breastwalls	N	H		-
e. Wingwalls	N	7		M-P
f. Slope Paving/Rip-Rap	N	N		-
g. Pointing	N	N		-
h. Footings	N	H		-
i. Piles	N	N		-
j. Scour	N	7		-
k. Settlement	N	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		-

CURB REVEAL (In millimeters)

N **55** S **72**

Year Painted **N**

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

APPROACHES DEF

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

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

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

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

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

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 ()

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

93B-U/W (DIVE) Insp **00/00/0000**

CITY/TOWN MANCHESTER	B.I.N. 8AM	BR. DEPT. NO. M-02-001	8.-STRUCTURE NO. M02001-8AM-MUN-BRI	INSPECTION DATE NOV 15, 2018
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ITEM 61 7

CHANNEL & CHANNEL PROTECTION

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

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

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

93b-U/W INSP. DATE:

ITEM 36 TRAFFIC SAFETY

	36	COND	DEF
A. Bridge Railing	0	5	S-P
B. Transitions	0	2	S-A
C. Approach Guardrail	0	2	S-A
D. Approach Guardrail Ends	0	2	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: EJDMT Date:

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

At bridge		Other Advance	
E	W	E	W
/	/	/	/

CLEARANCE POSTING

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

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

At bridge		Advance	
N	S	N	S
/	/	/	/

ACCESSIBILITY (Y/N/P)

	Needed	Used
Lift Bucket	N	N
Ladder	P	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:		
LOWTIDE	Y	Y

TOTAL HOURS 66

PLANS (Y/N): N

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

TAPE#: _____

List of field tests performed:

RATING

Rating Report (Y/N): N

Date:

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

(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	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 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].

2-DIST
04

B.I.N.
8AM

STRUCTURES INSPECTION FIELD REPORT

ROUTINE ARCH & SPECIAL MEMBER INSPECTION

BR. DEPT. NO.
M-02-001

CITY/TOWN MANCHESTER	8.-STRUCTURE NO. M02001-8AM-MUN-BRI	11-Kilo. POINT 000.000	90-ROUTINE INSP. DATE Nov 15, 2018	93*-SPEC. MEMB. INSP. DATE Nov 15, 2018
07-FACILITY CARRIED ST127 CENTRAL ST	MEMORIAL NAME/LOCAL NAME		27-YR BUILT 1850	106-YR REBUILT 1900
06-FEATURES INTERSECTED WATER SAW MILL BROOK	26-FUNCTIONAL CLASS Urban Minor Arterial	DIST. BRIDGE INSPECTION ENGINEER J. Dideo		
43-STRUCTURE TYPE 811 : Masonry Arch - Deck	22-OWNER Town Agency	21-MAINTAINER Town Agency	TEAM LEADER R. Doy	PROJ MGR. Dewberry # 3659
107-DECK TYPE N : Not applicable	WEATHER Cloudy	TEMP. (air) -1°C	TEAM MEMBERS E. LARKIN EL	

WEIGHT POSTING *Not Applicable* X

Actual Posting	H	3	3S2	Single
	N	N	N	N
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)

At bridge		Advance	
E	W	E	W

Legibility/Visibility

PLANS (Y/N): N

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


TAPE#:

RATING

Rating Report (Y/N): N Date: ----

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

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

REASON: 

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

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 59.2 - Keystone Area	N		See remarks in comments section.	4	4	Not Rated			S-A
B										
C										
D										
E										

List of field tests performed:

	I-58	I-59	I-60	I-62
(Overall Previous Condition)	-	5	7	-
(Overall Current Condition)	-	4	7	-

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

CITY/TOWN MANCHESTER	B.I.N. 8AM	BR. DEPT. NO. M-02-001	8.-STRUCTURE NO. M02001-8AM-MUN-BRI	INSPECTION DATE NOV 15, 2018
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REMARKS

BRIDGE ORIENTATION

Bridge M-02-001 (8AM) carries State Route 127 (Central Street) over Saw Mill Brook in the town of Manchester, MA. The bridge is oriented in the east/west direction. The elevations are labeled north and south. The approaches and abutments are labeled east and west. Saw Mill Brook is tidal beneath the bridge.

See **Sketch 1** for a location map, **Sketch 2** for an elevation and streambed profile, and **Photos 1-6** for general photos of the bridge.

GENERAL REMARKS

The structure consists of a dry laid stone masonry arch supported by stone masonry breastwalls. There is a concrete slab section supporting the south sidewalk. The north (upstream) wingwalls consist of dry laid masonry and the south (downstream) wingwalls are reinforced concrete extending to a tide gate downstream of the bridge.

ACCESS REMARKS

The bridge was inspected during the day at low tide using waders and hand tools. The underside was accessed by climbing down the northeast embankment wall approximately 50yds upstream and walking down to the bridge.

ITEM 58 - DECK

Item 58.1 - Wearing surface

The bituminous wearing surface exhibits scattered cracks up to 1/2in wide, some that have been sealed. The eastbound lane has an area of heavy wear up to 18in wide x 0.5in deep for the full length of the bridge (see **Photo 7**).

Item 58.4 - Curbs

On the south curb near the west abutment, two sections of granite curb are misaligned up to 2in high.

Item 58.6 - Sidewalks

Both the north and south sidewalks have an uneven surface throughout. The north sidewalk has scattered cracks up to 1/4in wide. The south sidewalk exhibits scattered areas of delamination and cracks up to 1.5in wide around previous patchwork throughout (see **Photo 8**).

Item 58.8 - Railing

Both the north and south edges of the bridge have a chain-link fence with moderate to heavy surface corrosion to the rails. On the north railing, the first post from the west end and the top rail are bent away from the roadway, but all posts are firmly stable into the headwall. At the northwest corner, the bottom rail is detached at the corner post and zip ties are holding the chain link fence to the post (see **Photo 9**).

Item 58.10 - Drainage System

The drainage grate at the north curb has heavy debris build-up on the cover and within the drain.

APPROACHES

Approaches a - Appr. pavement condition

The approach roadways have scattered longitudinal and transverse cracking throughout, some of which have been sealed.

CITY/TOWN MANCHESTER	B.I.N. 8AM	BR. DEPT. NO. M-02-001	8.-STRUCTURE NO. M02001-8AM-MUN-BRI	INSPECTION DATE NOV 15, 2018
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REMARKS

ITEM 59 - SUPERSTRUCTURE

Item 59.1 - Arch/Arch Ring

Item 59.1 has been changed from condition state 4 to condition state 5 as the major deficiencies which warrant the lower condition are covered under Item 59.2 - Keystone Area.

A majority of the arch is coated in shotcrete repairs which exhibit scattered hairline cracks, efflorescence, rust staining, moisture staining, and is hollow sounding. There are icicles hanging between the stones at both fascias. Masonry stones exhibit hairline cracking throughout the arch barrel. Specific deficiencies and locations are as follows:

- 14ft south of north fascia: 6in wide x 12in high x 24in deep void near the west spring line.
- 18ft south of north fascia: 10in diameter x up to 60in deep void near the west spring line (**see Photo 10**).
- 7ft north of south fascia: Full arch length x up to 1/2in wide crack in the shotcrete along arch section interface. At the west spring line, the crack ends at a 4in wide x 32in deep void between the north and south arch sections. The south edge is 3in lower than the north (**see Photo 11**).

Item 59.2 - Keystone Area

(S-A Deficiency) Keystones are missing throughout the arch barrel, primarily towards the north fascia (**see Photo 12**). The missing keystone areas are covered in shotcrete which appears unchanged since the previous inspection. Specific deficiencies relating to the missing keystones are as follows:

- 14ft south of north fascia: Several stones surrounding void/missing keystone settled up to 6in; shotcrete repairs are covering stones (**see Photo 13**).
- 20ft south of north fascia: 6in wide x 12in long x 9in deep void/missing keystone (**see Photo 14**).

Item 59.5 - Spandrel Walls

The spandrel walls are primarily coated in shotcrete which exhibit scattered cracks up to 1/16in wide with efflorescence and scattered hollow areas throughout (**see Photos 1-2**). Specific deficiencies are as follows:

- West end of north wall: 2ft wide x 2ft high x 3.5in deep spall in the shotcrete with exposed wire mesh below drain pipe (**see Photo 15**).
- Center of north wall: 18in high crack up to 1/2in wide at top of wall.

Item 59.6 - Spring Lines

The east spring line has a 2ft wide x 10in high x 4in deep void due to a missing stone 9ft south of the north fascia.

ITEM 60 - SUBSTRUCTURE

Item 60.1 - Abutments

Item 60.1.d - Breastwalls

The breastwalls were below the water line at the time of inspection, no visible signs of distress were observed.

Item 60.1.e - Wingwalls

The wingwalls on the north side of the bridge exhibit scattered hollow areas of shotcrete (**see Photo 16**).

CITY/TOWN MANCHESTER	B.I.N. 8AM	BR. DEPT. NO. M-02-001	8.-STRUCTURE NO. M02001-8AM-MUN-BRI	INSPECTION DATE NOV 15, 2018
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REMARKS

Item 60.1.g - Pointing

Arch construction appears to be dry laid masonry, no pointing found on structure.

Item 60.1.j - Scour

There is a concrete pad drop-off to the channel bed 18ft south of the north fascia.

TRAFFIC SAFETY

Item 36a - Bridge Railing

The chain-link fences on both sides of the bridge are non-standard. See Item 58.8 – Railing for deficiencies.

Item 36b - Transitions

There are no transitions as there are no approach guardrails for this bridge.

Item 36c - Approach Guardrail

There are no approach guardrails for this bridge. The bridge is abutted by a structure at the northeast corner, a street at the northwest corner, and a structure at the southwest corner.

Item 36d - Approach Guardrail Ends

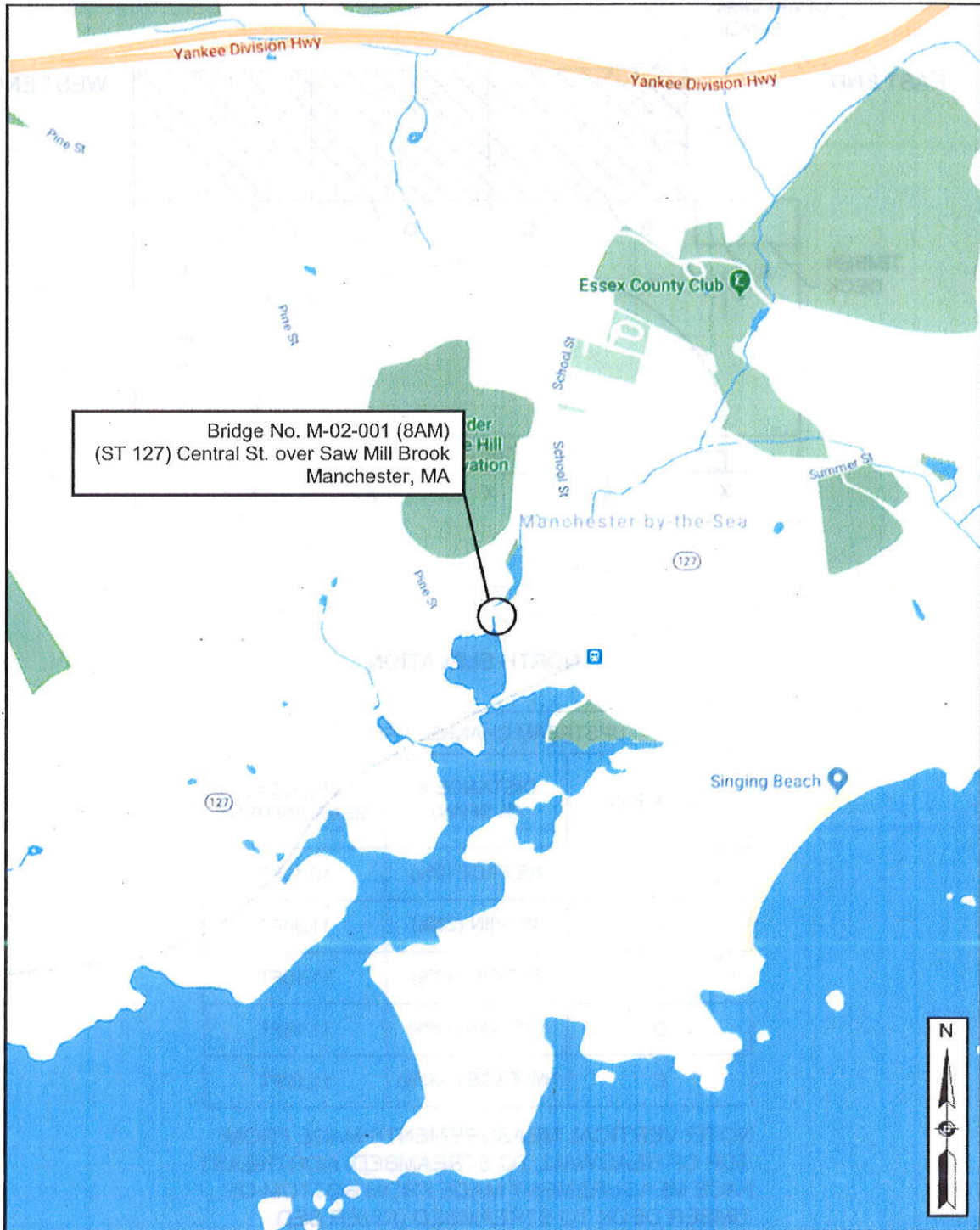
There are no approach guardrail ends for this bridge as there is no approach guardrail.

Sketch / Photo Log

- Sketch 1 : Location Map
- Sketch 2 : Upstream Channel Profile.
- Photo 1 : General - North elevation.
- Photo 2 : General - South elevation.
- Photo 3 : General - Downstream, looking south from center of arch.
- Photo 4 : General - Upstream, looking north.
- Photo 5 : General - East approach, looking west.
- Photo 6 : General - West approach, looking east.
- Photo 7 : Wearing Surface - Eastbound lane: Heavy wear with typical scattered cracks, some sealed.
- Photo 8 : Sidewalks - South sidewalk: Scattered areas of delamination and cracking.
- Photo 9 : Railing - Northwest corner: Detached bottom rail with zip ties holding chain link fence to rail post.
- Photo 10 : Arch/Arch Ring - 18ft south of north fascia: Void up to 60in deep near the west spring line.
- Photo 11 : Arch/Arch Ring - 7ft north of south fascia from west spring line: Void between arch sections with the south edge lower than the north. Also note full arch crack in shotcrete with efflorescence and rust staining.
- Photo 12 : Keystone Area - 3ft south of north fascia: Area of missing keystones with shotcrete filling voids.
- Photo 13 : Keystone Area - 14ft south of north fascia: Settled stones surrounding void/missing keystone.
- Photo 14 : Keystone Area - 20ft south of north fascia: Void/missing keystone.
- Photo 15 : Spandrel Walls - West end of north wall: Spall in shotcrete with exposed wire mesh below drain pipe. Also note scattered cracks with efflorescence.
- Photo 16 : Wingwalls - Northeast wingwall: Typical scattered hollow areas of shotcrete.

CITY/TOWN MANCHESTER	B.I.N. 8AM	BR. DEPT. NO. M-02-001	8.-STRUCTURE NO. M02001-8AM-MUN-BRI	INSPECTION DATE NOV 15, 2018
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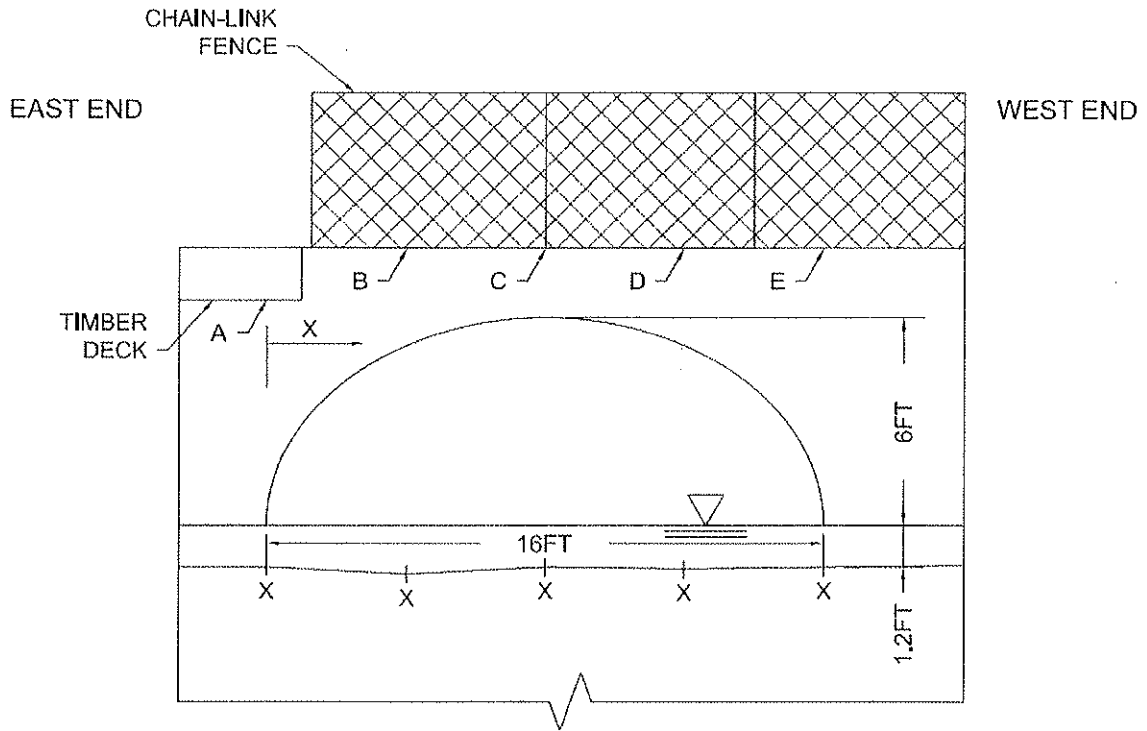
SKETCHES



Sketch 1: Location Map

CITY/TOWN MANCHESTER	B.I.N. 8AM	BR. DEPT. NO. M-02-001	8.-STRUCTURE NO. M02001-8AM-MUN-BRI	INSPECTION DATE NOV 15, 2018
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SKETCHES



NORTH ELEVATION

UPSTREAM CHANNEL PROFILE		
LOCATION	DISTANCE X (% SPAN)	VERTICAL MEASUREMENT
A	NE FACE (0%)	10.10FT
B	4FT-0IN (25%)	11.30FT
C	8FT-0IN (50%)	11.10FT
D	12FT-0IN (75%)	11.15FT
E	NW FACE (100%)	11.10FT

NOTE: VERTICAL MEASUREMENTS MADE FROM TOP OF HEADWALL TO STREAMBED. NORTHEAST FACE MEASUREMENT MADE FROM BOTTOM OF TIMBER DECK TO STREAMBED (RIVER BED APPROXIMATELY LEVEL).

Sketch 2: Upstream Channel Profile.

CITY/TOWN MANCHESTER	B.I.N. 8AM	BR. DEPT. NO. M-02-001	8.-STRUCTURE NO. M02001-8AM-MUN-BRI	INSPECTION DATE NOV 15, 2018
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PHOTOS



Photo 1: General - North elevation.



Photo 2: General - South elevation.

CITY/TOWN MANCHESTER	B.I.N. 8AM	BR. DEPT. NO. M-02-001	8.-STRUCTURE NO. M02001-8AM-MUN-BRI	INSPECTION DATE NOV 15, 2018
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PHOTOS



Photo 3: General - Downstream, looking south from center of arch.



Photo 4: General - Upstream, looking north.

CITY/TOWN MANCHESTER	B.I.N. 8AM	BR. DEPT. NO. M-02-001	8.-STRUCTURE NO. M02001-8AM-MUN-BRI	INSPECTION DATE NOV 15, 2018
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PHOTOS



Photo 5: General - East approach, looking west.



Photo 6: General - West approach, looking east.

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PHOTOS



Photo 7: Wearing Surface - Eastbound lane: Heavy wear with typical scattered cracks, some sealed.



Photo 8: Sidewalks - South sidewalk: Scattered areas of delamination and cracking.

CITY/TOWN MANCHESTER	B.I.N. 8AM	BR. DEPT. NO. M-02-001	8.-STRUCTURE NO. M02001-8AM-MUN-BRI	INSPECTION DATE NOV 15, 2018
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PHOTOS



Photo 9: Railing - Northwest corner: Detached bottom rail with zip ties holding chain link fence to rail post.

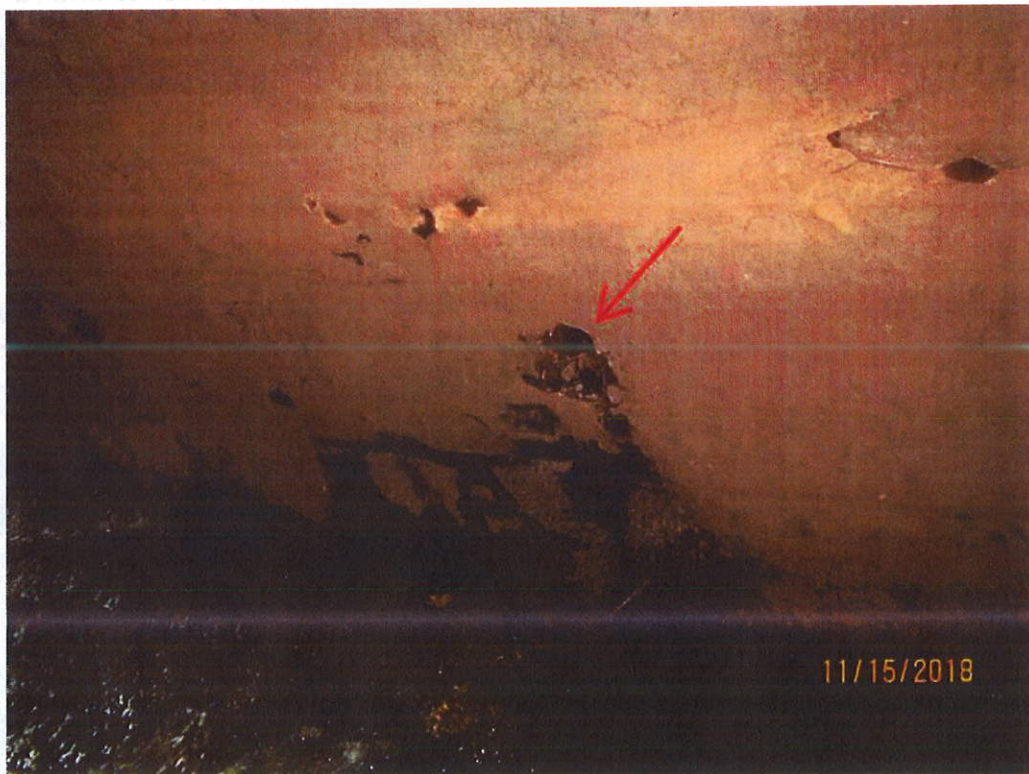


Photo 10: Arch/Arch Ring - 18ft south of north fascia: Void up to 60in deep near the west spring line.

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PHOTOS

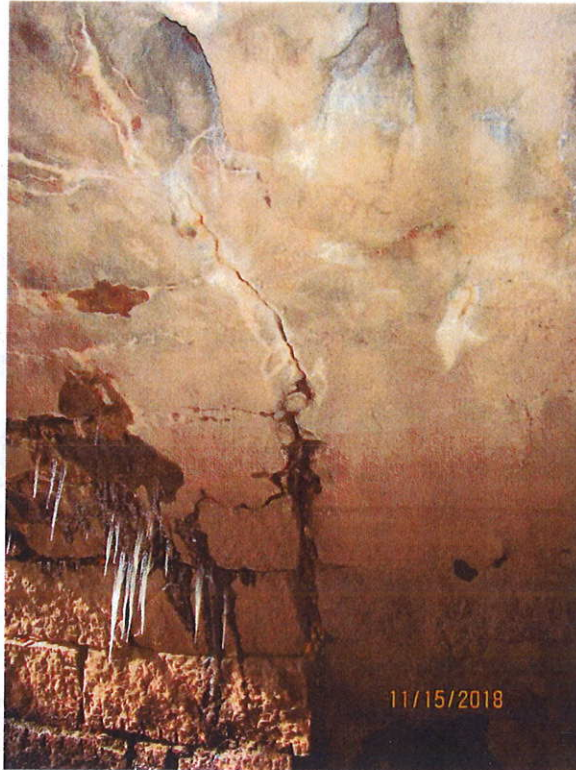


Photo 11: Arch/Arch Ring - 7ft north of south fascia from west spring line: Void between arch sections with the south edge lower than the north. Also note full arch crack in shotcrete with efflorescence and rust



Photo 12: Keystone Area - 3ft south of north fascia: Area of missing keystones with shotcrete filling voids.

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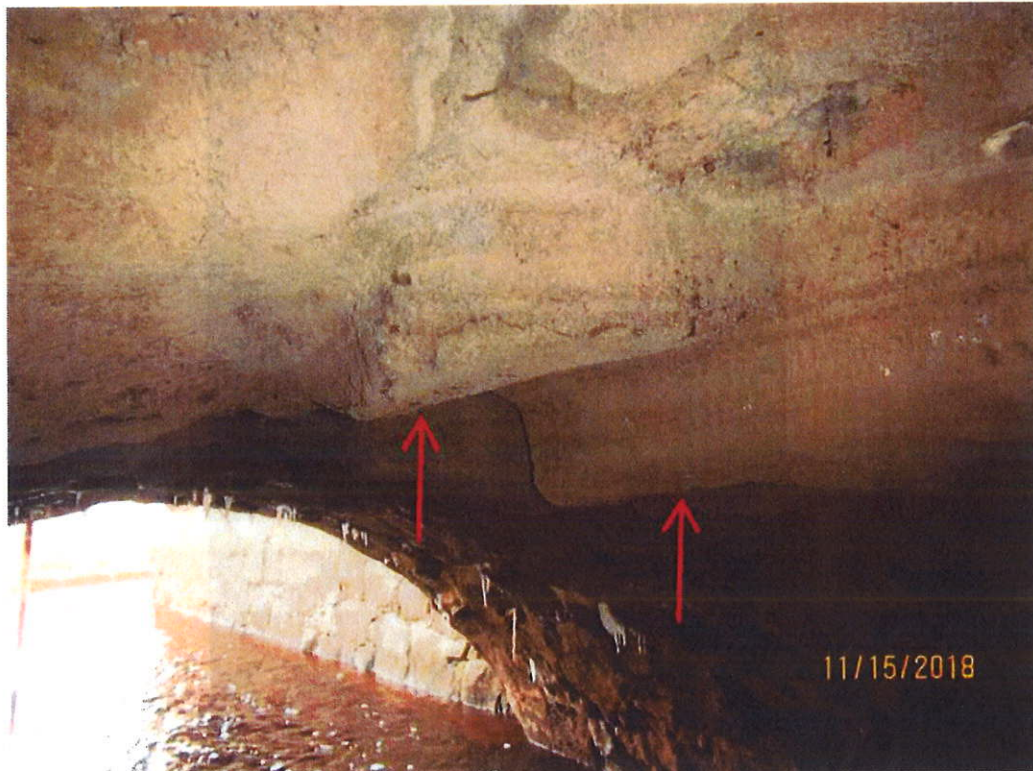
PHOTOS

Photo 13: Keystone Area - 14ft south of north fascia: Settled stones surrounding void/missing keystone.

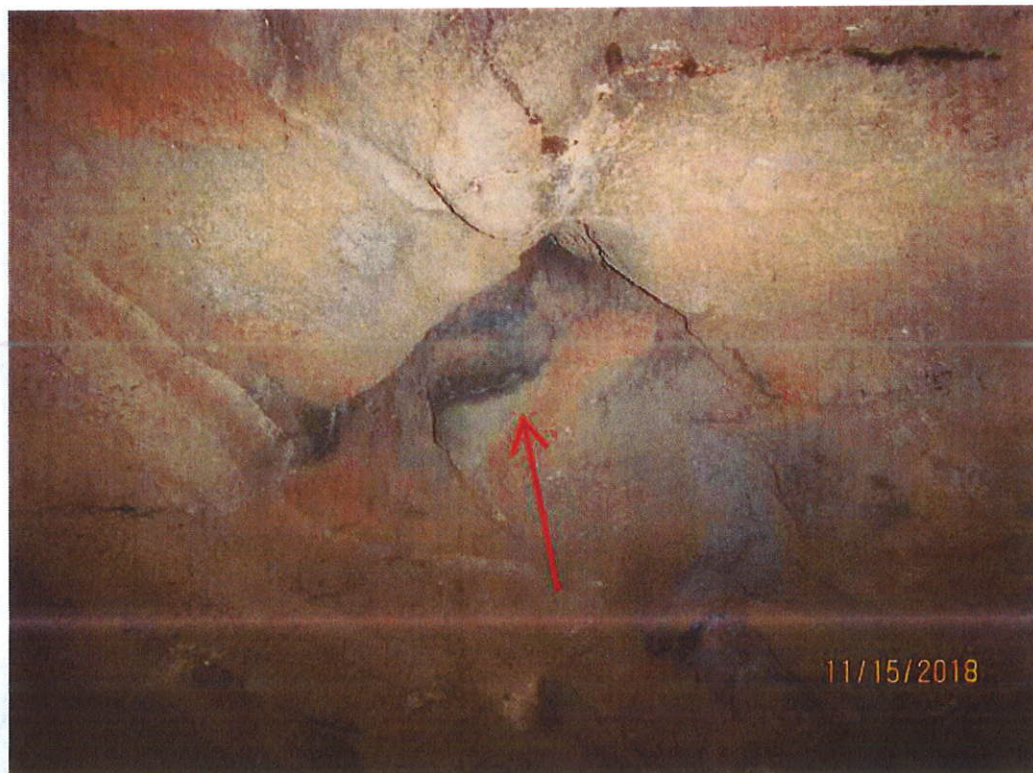


Photo 14: Keystone Area - 20ft south of north fascia: Void/missing keystone.

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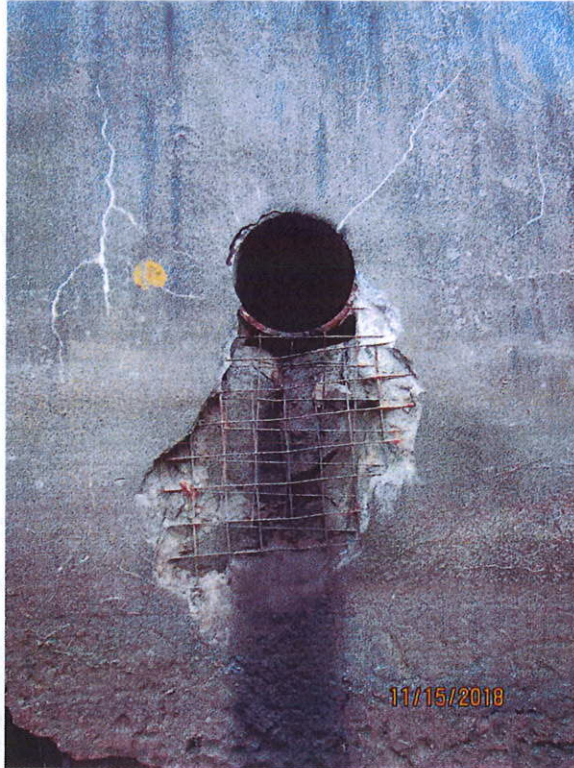
PHOTOS

Photo 15: Spandrel Walls - West end of north wall: Spall in shotcrete with exposed wire mesh below drain pipe. Also note scattered cracks with efflorescence.



Photo 16: Wingwalls - Northeast wingwall: Typical scattered hollow areas of shotcrete.