Curtisville Bridge
Three Rehabilitation Replacement Options

MassDOT Bridge No. S-26-022
Interlaken Cross Road Over Larrywaug Brook
Berkshire County, Massachusetts District 1

REHABILITATION RESTORATION CONSTRUCTION

Prepared for:
Town of Stockbridge
50 Main St.
Stockbridge, MA 01262

Prepared by:
JDB Consulting Engineers, Inc.
835 Samoset Rd.
Eastham, MA 02642

COMMONWEALTH OF MASSACHUSETTS
JOSEPH D. BIANCHI
STRUCTURAL
No. 40197
REGISTERED
PROFESSIONAL ENGINEER

April 11, 2024

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Appendix:

I DESCRIPTION OF EXISTING BRIDGE PERTAINING TO THREE REHABILITATION REPLACEMENT OPTIONS

The original Curtisville bridge is a single span dry laid stone masonry bridge structure. This span carry's Interlaken Cross Road over the Larrywaug Brook in the town of West Stockbridge, Massachusetts. A past MassDOT field structures inspection field report (Dated September 21, 2012) lists 1852 as the year this bridge was constructed.

Based on past field data collected and measured by this office the existing superstructure consists of a partial dry laid stone masonry arch ring with some cement mortar circling the existing hydraulic opening by approximately 37½ inches in depth and spanning approximately a square topographical bridge footprint span of 19 ft.-1½ in. distance from centerline to centerline of the stone masonry arch ring. A parge coat of cementitious mortar covers a majority of the exterior stone masonry joints along the interior face of the arch rings. The main arch ring consists of stones of various sizes.

The outer ends along the upstream and downstream arch ring areas along this bridge crossing are highly compromised structurally due to external natural forces i.e., debris damage resulting from past historic storm events. Several wide and worsening transverse cracks were found through the entire stone matrix within the arch ring of stones which consist of the main singular and critical supporting elements within the superstructure and acts as the main live and dead load carrying elements throughout this structure.

These severely cracked and damaged stone arch rings have moved beyond their normal concentric plane of which the internal service load path would be expected and can no longer can predictably distribute axial forces uniformly along and within these arch ring areas throughout this bridge.

After examining specific existing damaged areas found along the bridge superstructure, available reports, plans and data were provided and obtained by this office and others. Several field reconnaissance's were completed along the existing bridge superstructure and substructure and the critical dimensions were measured and the present structural condition of these bridge elements were also determined during our tactile inspections.

Since, the eccentric dead and live load distribution which occurs along two or possibly more damaged areas along the arch the main arch cannot accurately be rated to any degree of certainty. The live load capacity pertaining to these two and possibly more damaged areas in all probability is one ton or less based on the present condition with respect the main carring capability of these critical structural supporting bridge members found within the stone masonry arch superstruture.

Based on plans provided by the town of Stockbridge (Three Sheets Proposed Pipe Crossing completed by JF Moynihan & Associates, Inc., Not Dated) and past discussions with the towns DPW personnel, there is apparently one abandon 8 in. diameter ductile iron water line no longer in service along the northerly / upstream side of the bridge and one abandon 8 in. diameter ductile iron sewer line which are no longer in service along the southerly / downstream side of the bridge carried over and spanning along and just above the keystones along the main stone masonry arch ring of this bridge crossing. The precise locations of the water and sewer lines need to be confirmed prior to completing construction of the bridge betterment replacement options I or II evaluated herein.

II PAST INFORMATION USED THROUGHOUT INVESTIGATIVE EVALUATION

- Historic Curtisville Stone Bridge Study
  Willard Hill Road / Interlaken Cross Road - Date: 10.21.15
- MassDOT Field Bridge Report - Date: 09.21.12
- MassDOT National Bridge Inspection Standards Bridge Closure letter - Date: 09.28.12
- MassDOT Structures Inspection Field Report - Date: 09.21.12
- MassDOT Hydraulic Project Design Requirements for BRI Bridges Projects on Rural Minor Collector Roadway Functional Classifications / Spans Less than 10 ft. - Date: 06.29.23
- Historic Curtisville Stone Bridge Study / JDB Consulting Engineers, Inc. - Date: 12.21.15

III MGL CHAPTER 85 SECTION BRIDGE REVIEW AND DESIGN PROCESS

Based on current recent hydraulic opening requirements cited by MassDOT's state bridge department the present hydraulic opening located along the present bridge opening area through the existing superstructure will not need to accommodate a 25-year design storm event while maintaining a 2-foot upper freeboard clearance above this flood stage height for 25-year flood frequency.

However, bridge replacement Options I & II crossings will address and mitigate and eliminate the possibly of scour damage based on the impact produced by future 25-year flood events.

IV REHABILITATION REPLACEMENT OPTIONS

The bridge construction scheme options were evaluated with respect the continuing long-term future use and the needed structural load capacity required to maintain the bridge type and desired service use needed along its original and present location.

Three alternative bridge types options were evaluated and selected and were coordinated with the future needs and input provided by town representatives as this final bridge evaluation phase proceeded throughout the investigative study phase of this new bridge construction project.

Three preliminary construction and engineering design schemes associated along this present bridge crossing location were evaluated and an associated probable construction and design cost estimate for all three-bridge rehabilitation options along the presently closed Curtisville bridge crossing was completed with respect to the historic nature, configuration and structural safety for all bridge options as outlined and presented below.

OPTION I: REHABILITATED ARCH BRIDGE CROSSING FOR HL-93 AASHTO TRUCK/TANDUM LOADING AND RELOCATED UTILITIES

The present crossing is excessively settling and has been closed due to structural undermining due to past scour erosion along the foundation since September 28, 2012.

This bridge option is to include the dismantling the present stone masonry arch and replacing the existing superstructure with a new hybrid cast in place reinforced concrete / stone masonry arch superstructure.

The nearby structural steel utility bridge supporting the presently active water and sewer pipe lines will be removed after these utility pipe lines have safely been reinstalled on the newly rebuilt hybrid stone masonry bridge along the present bridge site for option I.

The new cast in place steel reinforced concrete arch will be hidden within and below the inner space between within the roadway surface and archways stones taken from the dismantled original stone masonry bridge at this site. All the original stones within this bridge will be reused while maintaining the present aesthetic appearance of the visible exterior areas of the existing stone masonry

archway opening and both upper spandrel side walls will be caried and supported on a newly rebuilt lower stone masonry and steel reinforced concrete bridge found below these two walls.

The nearby structural steel utility bridge will be dismantled and completely removed from its present nearby site location and the entire surrounding site will be regraded upon final completion of construction pertaining to bridge option I.

The newly rebuilt stone masonry bridge superstructure, steel reinforced inner concrete arch and foundation is to be designed for HL-93 American Association of State Highway and Transportation Officials (AASHTO) standard truck loading for structural adequacy the estimated construction cost for this option is:

OPTION I: ESTIMATED DESIGN & CONSTRUCTION COST: $1,182,400.00

For additional information: Preliminary SK Rehabilitation Construction Plans

- Sheet 1: Options 1,2 & 3, Index, Key Plan, Existing Elevation & Locus - Page 16
- Sheet 2: Option 1, Rehabilitated Arch Bridge Crossing for HL-93 AASHTO Truck Loading and Utilities - Page 17

OPTION II: REHABILITATED ARCH BRIDGE CROSSING FOR AASHTO PEDESTRIAN LOADING AND RELOCATED UTILITIES

Similarly, to Option I, the present stone masonry arch bridge crossing is excessively settling and is structural undermined due to past scour erosion damage along the present foundation. This bridge option will include the dismantling the present stone masonry arch and replacing the existing superstructure with a new hybrid cast in place reinforced concrete / stone masonry arch superstructure.

Again, similar to Option I the nearby structural steel utility bridge supporting the present water and sewer pipe lines will be removed after these utility pipe lines have safely been reinstalled on the newly rebuilt stone masonry bridge along the present bridge site for option II.

The new cast in place steel reinforced concrete arch will be hidden within and below the inner space between within the roadway surface and archways stones taken from the dismantled original stone masonry bridge at this site. All the original stones within this bridge will be reused while maintaining the present aesthetic appearance of the visible exterior areas of the existing stone masonry archway opening and both upper spandrel side walls will be caried and supported on a newly rebuilt lower stone masonry and steel reinforced concrete bridge found below these two walls.

The nearby structural steel utility bridge will be dismantled and completely removed from its present nearby site location and the entire surrounding site will be regraded upon final completion of construction pertaining to bridge option II.

The newly rebuilt bridge superstructure and foundation is to be designed for minimum pedestrian live load as recommended per "Guide Specification for Design of Pedestrian Bridge" published by American Association of State Highway and Transportation Officials (AASHTO) for structural adequacy the estimated construction cost for this option is:

OPTION II: ESTIMATED DESIGN & CONSTRUCTION COST: $1,040,600.00

For additional information: Preliminary SK Rehabilitation Construction Plans

- Sheet 1: Options 1,2 & 3, Index, Key Plan, Existing Elevation & Locus - Page 16
- Sheet 3: Option 2, Rehabilitated Arch Bridge Crossing for AASHTO Pedestrian Loading and Utilities - Page 18

OPTION III: MODIFIED EXISTING UTILITY BRIDGE CROSSING FOR AASHTO PEDESTRIAN LOADING WITH UTILITIES

The present nearby structural steel utility bridge will be redesigned with respect to upgrading this water and sewer utility bridge crossing to include and accommodate pedestrian bridge loading with a new pedestrian safety railing system while the present nearby stone masonry bridge will be completely dismantled and removed from its present location and entire surrounding site will be regraded upon final completion of construction pertaining to this bridge option.

The newly rebuilt utility bridge to pedestrian / utility superstructure and foundation conversion will be designed for minimum pedestrian live load as recommended per "Guide Specification for Design of Pedestrian Bridge" American Association of State Highway and Transportation Officials (AASHTO) for structural adequacy the estimated construction cost for this option is:

OPTION III: ESTIMATED DESIGN & CONSTRUCTION COST: $506,000.00

For additional information: Preliminary SK Rehabilitation Construction Plans

- Sheet 1: Options 1,2 & 3, Index, Key Plan, Existing Elevation & Locus - Page 16
- Sheet 4: Option 3, Modified Existing Utility Bridge Crossing for AASHTO Pedestrian Load Rating and Utilities - Page19

V BRIDGE RECOMMENDATIONS

Based on the life cycle duration cost of: $1,182,400.00 for 75 years pertaining to Option I this design scheme is recommended for construction.

This newly rebuilt bridge option will provide the use for municipal roadway traffic for 75 years and after adequate safety signage is installed along this site pedestrian traffic could also use this crossing when needed.

This option also permits access, repairs and upgrades as needed with respect to future long-term service maintenance life for the newly installed water and sewer pipe lines needed over the next 75 years of which Option III does not provide for, since access to these utility pipes requires the removal and replacement of the new concrete deck slab being proposed for this particular option.

Although the present-day cost for Option III is less than the other two options, future maintenance and replacement of the critical utility service pipe lines will be costly due to the removal and reinstallation of the pedestrian deck slab required for this proposed bridge option.

Option I will provide both the statutory vehicular truck load traffic and intermittent pedestrian use as needed after adequate pedestrian safety signage is installed along the site, while future maintenance for public water and sewer distribution line can be readily serviced and repaired when needed.

Finally, Option I will maintain and reuse all the current cast iron ornamental railings and posts found within and present surrounding bridge site. This is achieved by way of the installation of MassDOT Type SS highway safety traffic railing system inbound of the historic cast iron ornamental railings and posts which are presently found each side of the closed roadway and lower stone arch bridge during the course on this replacement option. Thus, maintaining the current historic appearance of the old stone masonry bridge while allowing traffic to utilize the present crossing for the next 75 years or more.

VI CONSTRUCTION COST ESTIMATE OPTION I

ESTIMATE: QUANTITIES AND COST - BRIDGE BETTERMENTS

ENGINEER: JDB Consulting Engineers, Inc.
PROJECT: Option 1 -REHABILITATION REPLACEMENT HL-93 AASHTO TRUCK LOADING AND UTILITIES
LOCATION: (S-26-022) OVER LARRYWAUG BROOK, Stockbridge, MA

March. 15, 2024

ESTIMATE OF QUANTITIES AND COST - BRIDGE BETTERMENTS					ESTIMATE	
REF. No.	ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	AMOUNT
1	101.000	CLEARING AND GRUBBING	0.1653	ACRE	8300	$ 1,371.99
2	103.000	TREE REMOVED-DIAMETER UNDER 24 INCHES	1	EA	1400	$ 1,400.00
3	107.640	REMOVAL AND REPLACEMENT OF BRIDGE RAILING	240	FT	83	$ 19,920.00
4	107.641	REMOVAL AND REPLAC. METAL ORNAMENTAL BRIDGE POSTS	2	EA	1200	$ 2,400.00
5	114.100	DEMOLITION SUPERSTRUCTURE OF BRIDGE S-26-022	384	SF	58	$ 22,272.00
6	129.600	BRIDGE PAVEMENT EXCAVATION	89	SY	66	$ 5,874.00
7	151.200	GRAVEL BORROW FOR BACKFILLING STRUCTURE & PIPES	45	CY	70	$ 3,150.00
8	472.000	HOT MIX ASPHALT FOR MISCELLANEOUS BRIDGE WORK	72	TON	250	$ 18,000.00
9	482.310	SAWING & SEALING JOINTS ASPHALT PAVEMENT AT BRIDGES	136	FT	42	$ 5,712.00
10	690.000	STONE MASONRY WALL REMOVED REBUILT/DRY LAID	135	CY	1250	$ 168,750.00
11	690.010	STONE MAS. ARCH SPANDREL WALLS REMOVED & REBUILT	110	CY	1250	$ 137,500.00
12	626.220	STEEL W BEAM HIGHWAY GUARD (CIP CONC. BASE ANCHOR)	140	FT	90	$ 12,600.00
13	751.000	LOAM BORROW	40	CY	80	$ 3,200.00
14	765.000	SEEDING	180	SY	3	$ 540.00
15	851.100	SAFETY CONTROLS & CONES FOR CONSTRUCT. OPERATIONS	120	UNIT DAY	100	$ 12,000.00
16	852.000	SAFETY SIGING FOR CONSTRUCTION OPERATIONS	128	SF	25	$ 3,200.00
17	853.210	TEMPORARY CONCRETE BARRIER REMOVED & RESET	64	FT	33	$ 2,112.00
18	859.000	REFLECTORIZED DRUM	800	UNIT DAY	0.5	$ 400.00
19	904.000	4000 PSI, 3/4 IN., 610 CEMENT CONCRETE - 2 ARCH FOOTINGS	26	CY	900	$ 23,400.00
20	904.010	4000 PSI, 3/4 IN., 610 CEMENT CONCRETE - WALL FOOTINGS	45	CY	1050	$ 47,250.00
21	904.020	4000 PSI, 3/4 IN., 610 CEM. CONC. - NEW UTIL. PIPE FOUND.	7	CY	500	$ 3,500.00
22	904.030	4000 PSI, 3/4 IN., 585 HP CEM. CONC. - ARCH SUPERSTRUCT.	170	CY	1050	$ 178,500.00
23	910.100	STEEL REINFORCEMENT FOR STRUCTURE-EPOXY COATED	3900	LB	5.5	$ 21,450.00
24	910.111	STEEL REINFORCEMENT FOR UTILITY PIPE FOUND.-EPOXY CO.	125	LB	5.5	$ 687.50
25	910.101	STAINLESS STEEL REINFORCEMENT FOR STRUCTURE	100	LB	20	$ 2,000.00
26	913.400	3/4"x 3" CORED HOLES & GROUT STAINLESS STEEL REINF.	90	EA	125	$ 11,250.00
27	991.100	CONTROL OF WATER-STRUCTURE NO. 2-26-022	1	LS	12000	$ 12,000.00
28	992.300	TEMPORARY SUPPORTS FOR BRIDGE STRUCTURE	1	LS	5000	$ 5,000.00
29	992.001	BRIDGE & GEOTECH. ENGINEERING: INSPECTION ETC.	1	LS	80,000	$ 80,000.00
30	992.009	REMOVE UTILITY BRIDGE RELOCATE WATER & SEWER	1	LS	80,000	$ 80,000.00
31	992.003	SUBSURFACE SOIL BORINGS	1	LS	12,000	$ 12,000.00
32	992.002	CIVIL ENGINEERING: SURVEY, PERMITS & CONST. INSPECTION	1	LS	165,000	$ 165,000.00
33	992.004	15% CONTINGENCY CONSTRUCTION	1	LS	120,000	$ 120,000.00

	TOTAL		$	1,182,439.49
	TOTAL AMOUNT		$	1,182,439.49

VII CONSTRUCTION COST ESTIMATE OPTION II

ESTIMATE: QUANTITIES AND COST - BRIDGE BETTERMENTS

ENGINEER: JDB Consulting Engineers, Inc.
PROJECT: Option 2 -REHABILITATION REPLACEMENT AASHTO PEDESTRAIN LOADING AND UTILITIES
LOCATION: (S-26-022) OVER LARRYWAUG BROOK, Stockbridge, MA

March. 15, 2024

					ESTIMATE	
ESTIMATE OF QUANTITIES AND COST - BRIDGE BETTERMENTS						
REF. No.	ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	AMOUNT
1	101.000	CLEARING AND GRUBBING	0.1653	ACRE	8300	$ 1,371.99
2	103.000	TREE REMOVED-DIAMETER UNDER 24 INCHES	1	EA	1400	$ 1,400.00
3	107.640	REMOVAL AND REPLACEMENT OF BRIDGE RAILING	240	FT	83	$ 19,920.00
4	107.641	REMOVAL AND REPLAC. METAL ORNAMENTAL BRIDGE POSTS	2	EA	1200	$ 2,400.00
5	114.100	DEMOLITION SUPERSTRUCTURE OF BRIDGE S-26-022	384	SF	58	$ 22,272.00
6	129.600	BRIDGE PAVEMENT EXCAVATION	89	SY	66	$ 5,874.00
7	151.200	GRAVEL BORROW FOR BACKFILLING STRUCTURE & PIPES	45	CY	70	$ 3,150.00
8	690.000	STONE MASONRY WALL REMOVED REBUILT/DRY LAID	135	CY	1250	$ 168,750.00
9	690.010	STONE MAS. ARCH SPANDREL WALLS REMOVED & REBUILT	110	CY	1250	$ 137,500.00
10	751.000	LOAM BORROW	40	CY	80	$ 3,200.00
11	765.000	SEEDING	180	SY	3	$ 540.00
12	851.100	SAFETY CONTROLS & CONES FOR CONSTRUCT. OPERATIONS	120	UNIT DAY	100	$ 12,000.00
13	852.000	SAFETY SIGING FOR CONSTRUCTION OPERATIONS	128	SF	25	$ 3,200.00
14	853.210	TEMPORARY CONCRETE BARRIER REMOVED & RESET	64	FT	33	$ 2,112.00
15	859.000	REFLECTORIZED DRUM	800	UNIT DAY	0.5	$ 400.00
16	904.000	4000 PSI, 3/4 IN., 610 CEMENT CONCRETE - 2 ARCH FOOTINGS	26	CY	900	$ 23,400.00
17	904.010	4000 PSI, 3/4 IN., 610 CEMENT CONCRETE - WALL FOOTINGS	45	CY	1050	$ 47,250.00
18	904.020	4000 PSI, 3/4 IN., 610 CEM. CONC. - NEW UTIL. PIPE FOUND.	7	CY	500	$ 3,500.00
19	904.030	4000 PSI, 3/4 IN., 585 HP CEM. CONC. - ARCH SUPERSTRUCT.	105	CY	1050	$ 110,250.00
20	910.100	STEEL REINFORCEMENT FOR STRUCTURE-EPOXY COATED	2800	LB	5.5	$ 15,400.00
21	910.111	STEEL REINFORCEMENT FOR UTILITY PIPE FOUND.-EPOXY CO.	125	LB	5.5	$ 687.50
22	991.100	CONTROL OF WATER-STRUCTURE NO. 2-26-022	1	LS	12000	$ 12,000.00
23	992.300	TEMPORARY SUPPORTS FOR BRIDGE STRUCTURE	1	LS	5000	$ 5,000.00
24	992.001	BRIDGE & GEOTECH. ENGINEERING: INSPECTION ETC.	1	LS	80,000	$ 80,000.00
25	992.009	REMOVE UTILITY BRIDGE RELOCATE WATER & SEWER	1	LS	80,000	$ 80,000.00
26	992.003	SUBSURFACE SOIL BORINGS	1	LS	12000	$ 12,000.00
27	992.002	CIVIL ENGINEERING: SURVEY, PERMITS & CONST. INSPECTION	1	LS	165,000	$ 165,000.00
28	992.004	15% CONTINGENCY CONSTRUCTION	1	LS	101,000	$ 101,000.00

	TOTAL		$	1,039,577.49
	TOTAL AMOUNT		$	1,039,577.49

VIII CONSTRUCTION COST ESTIMATE OPTION III

ESTIMATE: QUANTITIES AND COST - BRIDGE BETTERMENTS

ENGINEER: JDB Consulting Engineers, Inc.
PROJECT: OPTION 3 EXISTING UTILITY BRIDGE CROSSING FOR PEDESTRIAN FOR AASHTO PEDESTRIAN LOAD RATING AND UTILITIES
LOCATION: (S-26-022) OVER LARRYWAUG BROOK, Stockbridge, MA

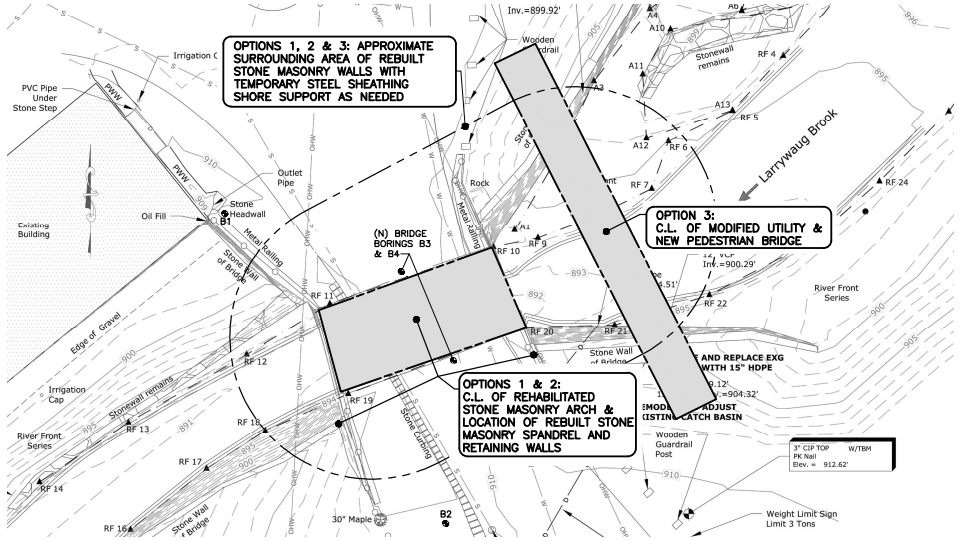
March. 15, 2024

ESTIMATE OF QUANTITIES AND COST - BRIDGE BETTERMENTS					ESTIMATE	
REF. No.	ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	AMOUNT
1	101.000	CLEARING AND GRUBBING	0.1653	ACRE	8300	$ 1,371.99
2	103.000	TREE REMOVED-DIAMETER UNDER 24 INCHES	1	EA	1400	$ 1,400.00
3	114.100	DEMOLITION SUPERSTRUCTURE OF BRIDGE S-26-022	384	SF	58	$ 22,272.00
4	129.600	BRIDGE PAVEMENT EXCAVATION	89	SY	66	$ 5,874.00
5	151.200	GRAVEL BORROW FOR BACKFILLING STRUCTURE & PIPES	45	CY	70	$ 3,150.00
6	690.000	STONE MASONRY WALL REMOVED REBUILT/DRY LAID	80	CY	1250	$ 100,000.00
7	751.000	LOAM BORROW	40	CY	80	$ 3,200.00
8	765.000	SEEDING	180	SY	3	$ 540.00
9	851.000	SAFETY CONTROLS & CONES FOR CONSTRUCT. OPERATIONS	120	UNIT DAY	100	$ 12,000.00
10	852.000	SAFETY SIGING FOR CONSTRUCTION OPERATIONS	128	SF	25	$ 3,200.00
11	853.210	TEMPORARY CONCRETE BARRIER REMOVED & RESET	64	FT	33	$ 2,112.00
12	859.000	REFLECTORIZED DRUM	800	UNIT DAY	0.5	$ 400.00
13	904.000	4000 PSI, 3/4 IN., 610 CEMENT CONCRETE - WALL FOOTINGS	24	CY	1050	$ 25,200.00
14	904.010	STEEL REINFORCED CONCRETE PEDESTRIAN BRIDGE SLAB	20	CY	1600	$ 32,000.00
15	960.111	STEEL ORNAMENTAL PEDESTRIAN BRIDGE HANDRAIL	140	LF	350	$ 49,000.00
16	991.100	CONTROL OF WATER-STRUCTURE NO. 2-26-022	1	LS	12000	$ 12,000.00
17	992.001	BRIDGE & GEOTECH. ENGINEERING, INSPECTION ETC.	1	LS	42000	$ 42,000.00
18	992.002	CIVIL ENGINEERING: SURVEY, PERMITS & INSPECTION	1	LS	150000	$ 150,000.00
19	992.004	15% CONTINGENCY CONSTRUCTION	1	LS	40000	$ 40,000.00

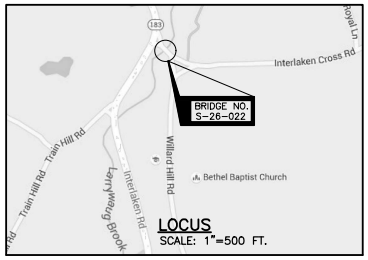
	TOTAL		$	505,719.99
	TOTAL AMOUNT		$	505,719.99

IX PRELIMINARY SK REHABILITATION CONSTRUCTION PLANS

PRELIMINARY SK DRAWINGS NOT FOR CONSTRUCTION 04.08.24



PLAN
SCALE: 1"=10'



LOCUS
SCALE: 1"=500 FT.

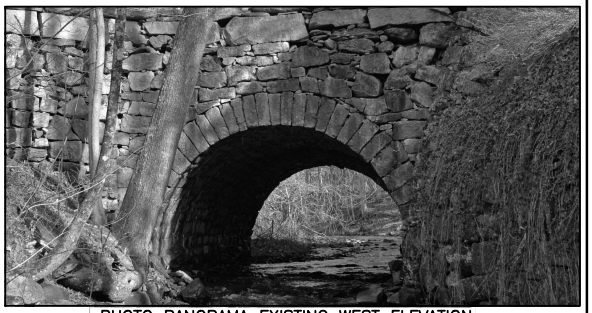
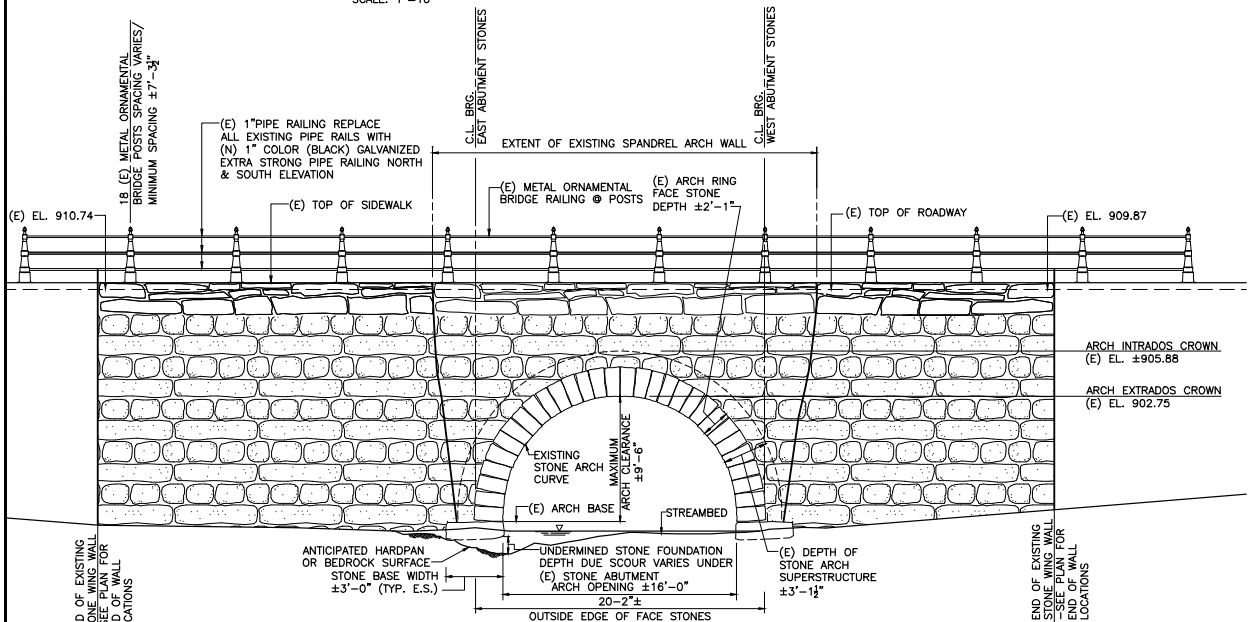
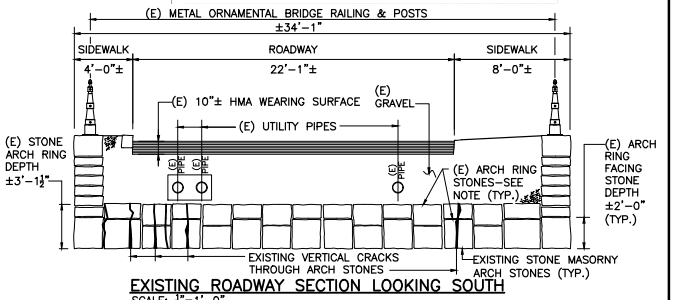


PHOTO PANORAMA EXISTING WEST ELEVATION
SCALE: ¼"=1'-0"



SQUARE LONGITUDINAL SECTION–EAST ELEVATION
EXISTING & PROPOSED NEW REHABILITATED CIRCULAR STONE ARCH BRIDGE
(WEST ELEVATION SIMILAR)
SCALE: ¼"=1'-0"



EXISTING ROADWAY SECTION LOOKING SOUTH
SCALE: ¼"=1'-0"

NOTES:
1. (E) DENOTES EXISTING CONSTRUCTION USED THROUGHOUT SHEETS 1–4.
2. ALL EXISTING ARCH RINGS STONES VARY IN SIZE. SIZE VARIABILITY OF ALL EXISTING ARCH RING STONES ARE: 23"±4" WIDE x 12"±2" x 23"±4" DEEP.

INDEX OF SHEETS

SHEET 1: KEY PLAN, EXISTING ELEVATION, LOCUS, EXISTING PHOTO PANORAMA EAST ELEVATION & INDEX OF REHABILITATION OPTIONS

SHEET 2: OPTION 1 – REHABILITATED ARCH BRIDGE CROSSING FOR HL-93 AASHTO TRUCK LOADING AND UTILITIES / EXISTING UTILITY BRIDGE REMOVED FROM SITE

SHEET 3: OPTION 2 – REHABILITATED ARCH BRIDGE CROSSING FOR AASHTO PEDESTRIAN LOADING AND UTILITIES / EXISTING UTILITY BRIDGE REMOVED FROM SITE

SHEET 4: OPTION 3 – MODIFIED EXISTING UTILITY BRIDGE CROSSING FOR AASHTO PEDESTRIAN LOAD RATING AND UTILITIES / EXISTING STONE ARCH REMOVED FROM SITE

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.			
PROJECT FILE NO.			

OPTIONS 1, 2 & 3
INDEX, KEY PLAN, EXISTING ELEVATIONS & LOCUS

PRELIMINARY | ACCEPTED FOR CONSTRUCTION

COMMONWEALTH OF MASSACHUSETTS — JOSEPH D. BRANCHI — STRUCTURAL — No. 40197 — REGISTERED PROFESSIONAL ENGINEER
04.08.24

JDB Consulting Engineers Inc.
835 Samoset Rd., Eastham, MA 02642

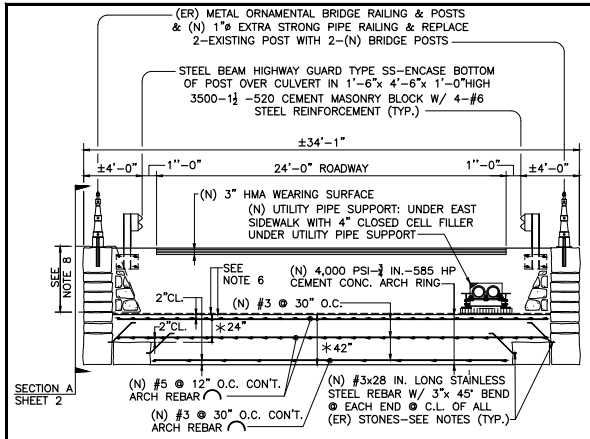
PROPOSED BRIDGE EVALUATION STUDY

STOCKBRIDGE
INTERLAKEN CROSS RD.
OVER LARRYWAUG BROOK

TOWN OF STOCKBRIDGE
50 MAIN STREET
STOCKBRIDGE, MA 01262

SHEET 1 OF 4 SHEETS BRIDGE NO. S-26-022 (A4Q)

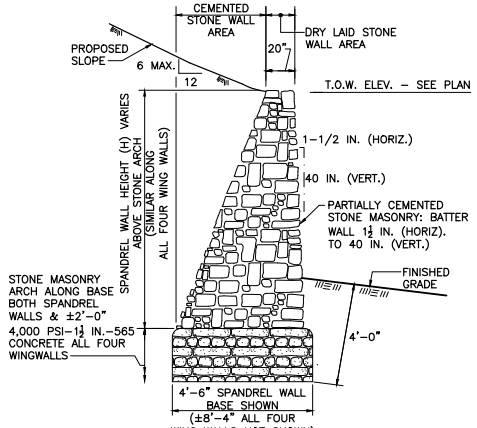
PRELIMINARY SK DRAWINGS NOT FOR CONSTRUCTION 04.08.24



PROPOSED SECTION AT CENTERLINE OF CROWN LOOKING SOUTH

SCALE: ¼"=1'-0"

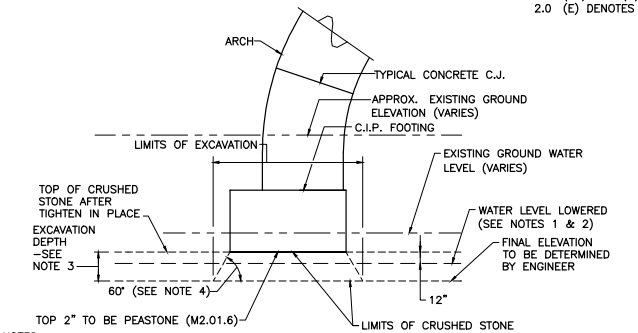
NOTES:
1. INSTALL ONE #3 STAINLESS STEEL REBAR PER ARCH STONE AT THE CENTERLINE OF EACH STONE.
2. 3" LONG – 90° HOOK END SHALL BE IMBEDDED IN A WET CORED DRILLED HOLE-SEE NOTE 3.
3. WET CORE DRILL ¾"ø x 3" DEEP HOLE IN STONE: FILLED SOLID WITH ADHESIVE SIKA ANCHORFIX-1 MANUF. BY SIKA AS PER MANUF. SPECIFICATIONS.
4. ALL STEEL REINFORCEMENT SHALL BE EPOXY COATED.
5. FILL ALL (ER) VERTICAL ARCH STONES JOINTS TO A DEPTH OF 6" FROM THE INNER INTRADOS FACE OF ALL (ER) ARCH STONES SOLID ADJACENT TO THE (N) UPPER CONCRETE STEEL REINFORCED ARCH SUPERSTRUCTURE WITH SIKAGROUT 328 AT MORTAR CONSISTENCY MANUF. BY SIKA AS PER MANUF. SPECIFICATIONS.
6. POWER ROTOR WASH AT 1,450 PSI TOP SURFACE OF (N) CONCRETE STEEL REINFORCED ARCH SUPERSTRUCTURE 30 DAYS AFTER INSTALLATION AND WHEN DRY APPLY 30 MIL. HAND ROLLED COAT OF SIKADUR 32 HI-MOD EPOXY MEMBRANE MANUF. BY SIKA AS PER MANUF. SPECIFICATIONS.
7. * DENOTES UNIFORM (N) STEEL REINFORCED CONCRETE ARCH DEPTH FROM BASE TO CROWN.
8. PARTIALLY CEMENTED STONE MASONRY ON SOUTH AND NORTH RING ARCHWAY RING ABUTMENT TO TOP SIDE OF ROADWAY SIMILAR ALL FOUR WING WALLS ALONG EACH APPROACH.



TYPICAL PARTIALLY CEMENTED STONE MASONRY WALL SPANDREL & WINGWALL SECTION (SIMILAR FOR NEARBY REBUILT STONE MASONRY WALLS WITH TEMPORARY STEEL SHEATHING SHORE SUPPORT NOT SHOWN)

NO SCALE

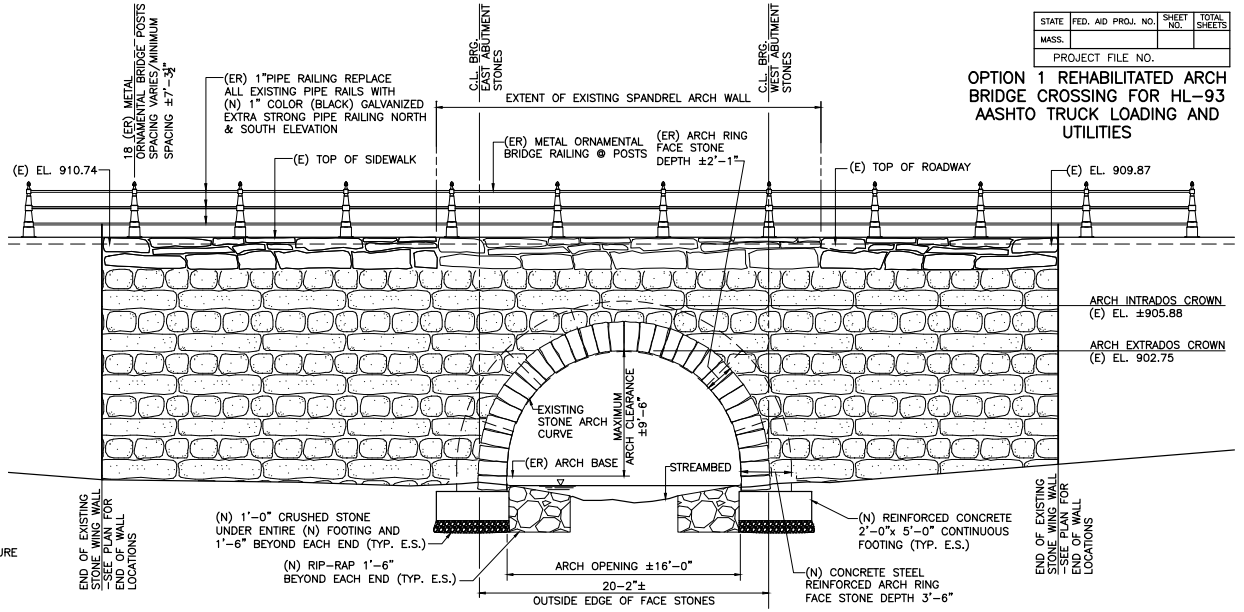
NOTES:
1. COMPACT NATIVE INORGANIC SOIL OR GRAVEL BORROW FOR BRIDGE FOUNDATIONS (MHD 1.51.1) UNDER FOOTING AS PER MHD SECTION 150.66.
2. ALL UNSUITABLE MATERIAL SHALL BE REMOVED WITHIN THE LIMITS OF THE FOUNDATION OF THE OF THE STRUCTURE, AS DIRECTED BY THE ENGINEER.



NOTES:
1.0 LOWER WATER LEVEL AS MUCH AS POSSIBLE WITHOUT DISTURBING THE GRANULAR SOIL (SIDES AND BOTTOM) AND TIGHTEN THE CRUSHED STONE IN PLACE BY USING A PNEUMATIC-TIRED EARTH ROLLER HAVING 4 WHEELS ABREAST AND LOADED TO 35 TONS OR BY OTHER MEANS APPROVED BY THE ENGINEER PRIOR TO THE INSTALLATION OF ALL C.I.P. FOOTINGS. WATER LEVEL MAY BE RAISED AFTER ALL C.I.P. FOOTINGS ARE INSTALLED.
2.0 WATER CONTROL REQUIREMENTS:
1. SUBMIT WATER CONTROL PLAN FOR CHANNEL PRIOR TO REMOVAL OF EXISTING BRIDGE AND WINGWALLS FOR FINAL APPROVAL AND PRIOR TO THE INSTALLATION OF EACH FOOTING AND UPPER ARCH FRAME.
2. EXCAVATED FOOTING AREA SHALL CONTINUE TO BE DEWATERED UNTIL FORMS ARE REMOVED.
3. RIPRAP SHALL BE PLACED IN THE DRY AFTER DEWATERING ALL AREAS-SEE KEY PLAN.
3.0 MINIMUM DEPTH 1'-6"
4.0 45°, IF DEPTH IS 5'-0" OR LESS.

CRUSHED STONE FOR BRIDGE FOUNDATIONS UNDER ALL C.I.P. FOOTINGS

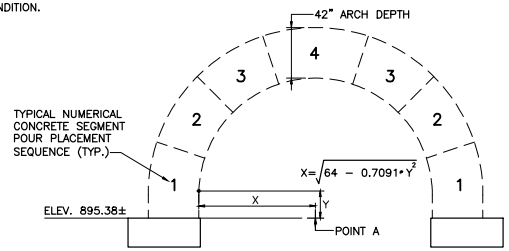
NO SCALE



SECTION A SQUARE LONGITUDINAL EAST ELEVATION
PROPOSED NEW REHABILITATED CIRCULAR STONE ARCH BRIDGE
(WEST ELEVATION SIMILAR)

SCALE: ¼"=1'-0"

NOTES:
1.0 (ER) AND (N) DENOTES EXISTING REUSED AND NEWLY PROPOSED CONSTRUCTION RESPECTIVELY.
2.0 (E) DENOTES EXISTING CONDITION.



TYPICAL REINFORCED ARCH RING CONCRETE PLACEMENT SEQUENCE

SCALE: ¼"=1'-0"

CONSTRUCTION NOTES:
1.0 CONTRACTOR SHALL SUBMIT CONSTRUCTION SEQUENCE OF WHICH SHALL INCLUDE THE RECONSTRUCTION OF THE ARCH, SPANDREL WALLS, WING WALLS, EXISTING BACK FILL REMOVAL AND REPLACEMENT.
2.0 CONTRACTOR SHALL UNDERPIN AND SUPPORT THE ENTIRE NEW ARCH RING SHOWN ABOVE WITH TEMPORARY SUPPORT SHORING FORM SYSTEM DESIGNED BY PROFESSIONAL ENGINEER LICENSED IN MASSACHUSETTS-SEE NOTES 3, 4, 5 & 6.
3.0 ALL CONCRETE PLACEMENT SHALL BE INSTALLED IN ONE CONTINUOUS SEQUENCE FROM THE WESTERN INTERIOR SPANDREL WALL FACE TO THE EASTERN INTERIOR SPANDREL WALL FACE AND SHALL BE FULLY CONSOLIDATED WITH A FLEXIBLE CONCRETE VIBRATOR THROUGHOUT THE CONTINUOUS PLACEMENT OF EACH ARCH SEGMENT DURING THE CONCRETE PLACEMENT STAGE.
4.0 CONTRACTOR SHALL PROVIDE A STRUCTURAL FORM SUPPORT DESIGN FOR ALL TEMPORARY ARCH TOP EXTRADOS, BOTTOM INTRADOS AND THE SPANDREL WALL SIDES FORM SIDES FOR ALL C.I.P. CONCRETE AND STONES AS DETAILED AND SHOWN ON THE PLANS TO THE ENGINEER PRIOR TO CONSTRUCTION.
5.0 IN ONE CONTINUOUS CONCRETE PLACEMENT SEQUENCE ALL CEMENT CONCRETE MASONRY SHALL BE PLACED IN THE 1 TO 4 ORDER SHOWN ABOVE WITH RESPECT THE FOUR SEQUENCES SHOWN.
6.0 INTERIOR COORDINATES X & Y AS SHOWN ABOVE ARE OF THE EXISTING INTERIOR ARCH CURVE FACE SHOWN IN FEET AS SHOWN IN THE EQUATION ABOVE.

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.			
PROJECT FILE NO.			

OPTION 1 REHABILITATED ARCH BRIDGE CROSSING FOR HL-93 AASHTO TRUCK LOADING AND UTILITIES

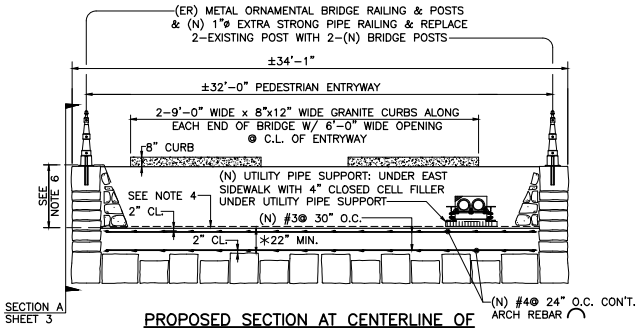
DATE	DESCRIPTION
APR. 8, 2024	ACCEPTED FOR CONSTRUCTION
USE ONLY PRINTS OF LATEST DATE	

SHEET 2 OF 4 SHEETS BRIDGE NO. S-26-022 (A4Q)

PRELIMINARY SK DRAWINGS NOT FOR CONSTRUCTION 04.08.24

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.			
PROJECT FILE NO.			

OPTION 2 REHABILITATED ARCH BRIDGE CROSSING FOR AASHTO PEDESTRIAN LOADING AND UTILITIES

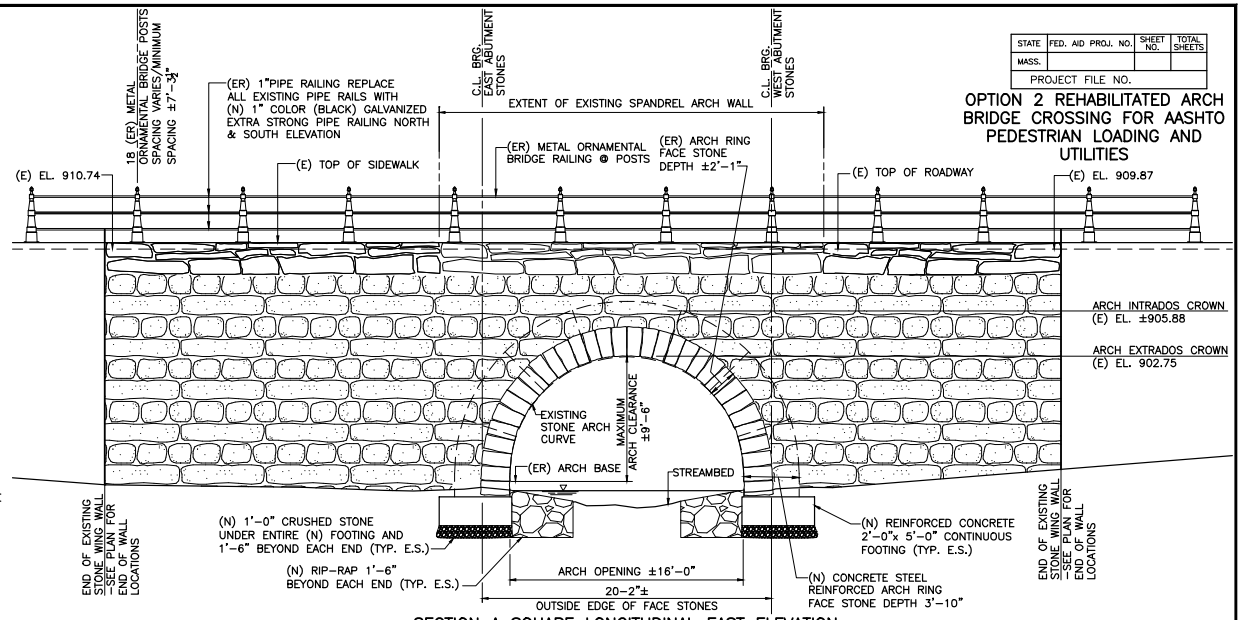


PROPOSED SECTION AT CENTERLINE OF CROWN LOOKING SOUTH

SCALE: 1/2"=1'-0"

NOTES:

1. ALL STEEL REINFORCEMENT SHALL BE EPOXY COATED.
2. CAULK ALL (ER) ARCH STONES JOINTS TO A DEPTH OF 1" FROM THE INNER INTRADOS FACE OF ALL ARCH STONES SOLID ADJACENT TO THE (N) UPPER CONCRETE STEEL REINFORCED ARCH SUPERSTRUCTURE WITH SIKAGROUT 328 OR APPROVED EQUAL AS A MORTAR CONSISTENCY MANUF. BY SIKA AS PER MANUF. SPECIFICATIONS.
3. ALL (ER) ARCH STONES SHALL BE EPOXY BONDED TO THE (N) CONCRETE STEEL ARCH SLAB BY THE APPLICATION OF SIKADUR 32 HI-MOD EPOXY MANUF. BY SIKA TO ALL DRY LAID MASONRY STONES AS PER MANUF. SPECIFICATIONS.
4. POWER ROTOR WASH AT 1,450 PSI TOP SURFACE OF (N) CONCRETE STEEL REINFORCED ARCH SUPERSTRUCTURE 30 DAYS AFTER INSTALLATION WHEN DRY APPLY 30 MIL. COAT HAND ROLLED COAT OF SIKADUR 32 HI-MOD EPOXY MEMBRANE MANUF. BY SIKA AS PER MANUF. SPECIFICATIONS.
5. * DENOTES UNIFORM (N) STEEL REINFORCED CONCRETE ARCH DEPTH FROM BASE TO CROWN.
6. PARTIALLY CEMENTED STONE MASONRY ON SOUTH AND NORTH RING ARCHWAY RING ABUTMENT TO TOP SIDE OF ROADWAY SIMILAR ALL FOUR WING WALLS ALONG EACH APPROACH.

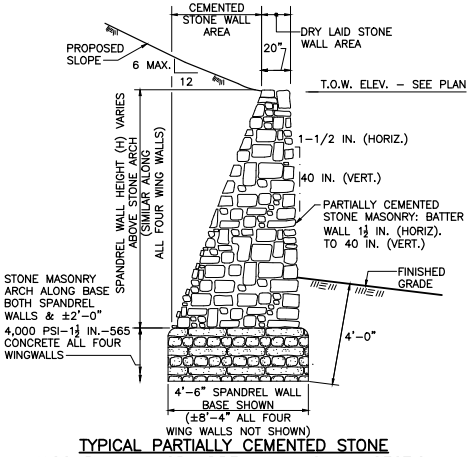


SECTION A SQUARE LONGITUDINAL EAST ELEVATION PROPOSED NEW REHABILITATED CIRCULAR STONE ARCH BRIDGE (WEST ELEVATION SIMILAR)

SCALE: 1/2"=1'-0"

NOTES:

1.0 (ER) AND (N) DENOTES EXISTING REUSED AND NEWLY PROPOSED CONSTRUCTION RESPECTIVELY.
2.0 (E) DENOTES EXISTING CONDITION.

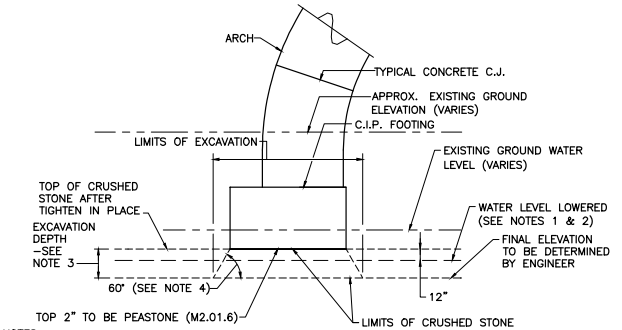


TYPICAL PARTIALLY CEMENTED STONE MASONRY WALL SPANDREL & WINGWALL SECTION (SIMILAR FOR NEARBY REBUILT STONE MASONRY WALLS WITH TEMPORARY STEEL SHEATHING SHORE SUPPORT NOT SHOWN)

NO SCALE

NOTES:

1. COMPACT NATIVE INORGANIC SOIL OR GRAVEL BORROW FOR BRIDGE FOUNDATIONS (MHD 1.51.1) UNDER FOOTING AS PER MHD SECTION 150.66.
2. ALL UNSUITABLE MATERIAL SHALL BE REMOVED WITHIN THE LIMITS OF THE FOUNDATION OF THE OF THE STRUCTURE, AS DIRECTED BY THE ENGINEER.



NOTES:

1.0 LOWER WATER LEVEL AS MUCH AS POSSIBLE WITHOUT DISTURBING THE GRANULAR SOIL (SIDES AND BOTTOM) AND TIGHTEN THE CRUSHED STONE IN PLACE BY USING A PNEUMATIC-TIRED EARTH ROLLER HAVING 4 WHEELS ABREAST AND LOADED TO 35 TONS OR BY OTHER MEANS APPROVED BY THE ENGINEER PRIOR TO THE INSTALLATION OF ALL C.I.P. FOOTINGS. WATER LEVEL MAY BE RAISED AFTER ALL C.I.P. FOOTINGS ARE INSTALLED.

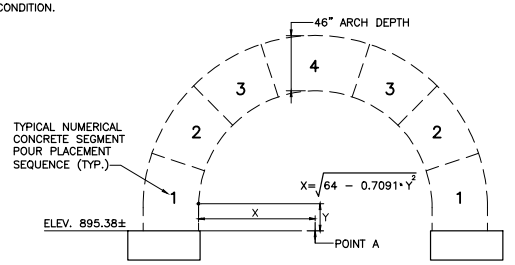
2.0 WATER CONTROL REQUIREMENTS:
   1. SUBMIT WATER CONTROL PLAN FOR CHANNEL PRIOR TO REMOVAL OF EXISTING BRIDGE AND WINGWALLS FOR FINAL APPROVAL AND PRIOR TO THE INSTALLATION OF EACH FOOTING AND UPPER ARCH FRAME.
   2. EXCAVATED FOOTING AREA SHALL CONTINUE TO BE DEWATERED UNTIL FORMS ARE REMOVED.
   3. RIPRAP SHALL BE PLACED IN THE DRY AFTER DEWATERING ALL AREAS-SEE KEY PLAN.

3.0 MINIMUM DEPTH 1'-6"

4.0 45', IF DEPTH IS 5'-0" OR LESS.

CRUSHED STONE FOR BRIDGE FOUNDATIONS UNDER ALL C.I.P. FOOTINGS

NO SCALE



TYPICAL REINFORCED ARCH RING CONCRETE PLACEMENT SEQUENCE

SCALE: 1/2"=1'-0"

CONSTRUCTION NOTES:

1.0 CONTRACTOR SHALL SUBMIT CONSTRUCTION SEQUENCE OF WHICH SHALL INCLUDE THE RECONSTRUCTION OF THE ARCH, SPANDREL WALLS, WING WALLS, EXISTING BACK FILL REMOVAL AND REPLACEMENT.

2.0 CONTRACTOR SHALL UNDERPIN AND SUPPORT THE ENTIRE NEW ARCH RING SHOWN ABOVE WITH TEMPORARY SUPPORT SHORING FORM SYSTEM DESIGNED BY PROFESSIONAL ENGINEER LICENSED IN MASSACHUSETTS-SEE NOTES 3, 4, 5 & 6.

3.0 ALL CONCRETE PLACEMENT SHALL BE INSTALLED IN ONE CONTINUOUS SEQUENCE FROM THE WESTERN INTERIOR SPANDREL WALL FACE TO THE EASTERN INTERIOR SPANDREL WALL FACE AND SHALL BE FULLY CONSOLIDATED WITH A FLEXIBLE CONCRETE VIBRATOR THROUGHOUT THE CONTINUOUS PLACEMENT OF EACH ARCH SEGMENT DURING THE CONCRETE PLACEMENT STAGE.

4.0 CONTRACTOR SHALL PROVIDE A STRUCTURAL FORM SUPPORT DESIGN FOR ALL TEMPORARY ARCH TOP EXTRADOS, BOTTOM INTRADOS AND THE SPANDREL WALL SIDES FORM SIDES FOR ALL C.I.P. CONCRETE AND STONES AS DETAILED AND SHOWN ON THE PLANS TO THE ENGINEER PRIOR TO CONSTRUCTION.

5.0 IN ONE CONTINUOUS CONCRETE PLACEMENT SEQUENCE ALL CEMENT CONCRETE MASONRY SHALL BE PLACED IN THE 1 TO 4 ORDER SHOWN ABOVE WITH RESPECT THE FOUR SEQUENCES SHOWN.

6.0 INTERIOR COORDINATES X & Y AS SHOWN ABOVE ARE OF THE EXISTING INTERIOR ARCH CURVE FACE SHOWN IN FEET AS SHOWN IN THE EQUATION ABOVE.

7.0 CRITICAL: CONTRACTOR SHALL INSTALL NEW CONCRETE C.I.P. CONCRETE ARCH SLAB SUPERSTRUCTURE SEGMENTS POURS IN 12" LIFTS OR LESS WHILE EPOXY BONDING COATING IS INSTALLED "WET" AS PER MAUNF. SPECIFICATIONS WHILE EACH CONCRETE LIFT IS POURED IN PLACE AND FORMED-REFER AND SEE "SECTION A" & NOTE 3 SHOWN ON "PROPOSED SECTION AT CENTERLINE OF CROWN LOOKING SOUTH" FOR ADDITIONAL INFORMATION.

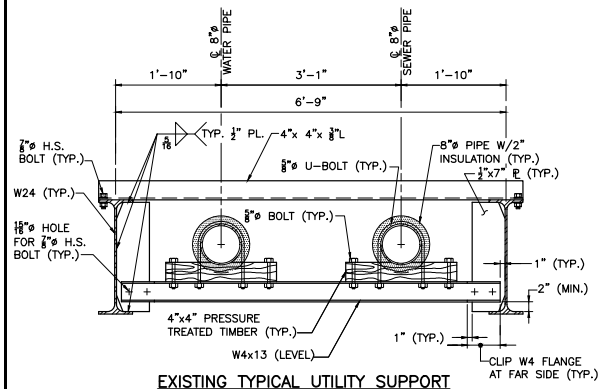
DATE	DESCRIPTION
APR. 8, 2024	ACCEPTED FOR CONSTRUCTION
USE ONLY PRINTS OF LATEST DATE	

SHEET 3 OF 4 SHEETS BRIDGE NO. S-26-022 (XXX)

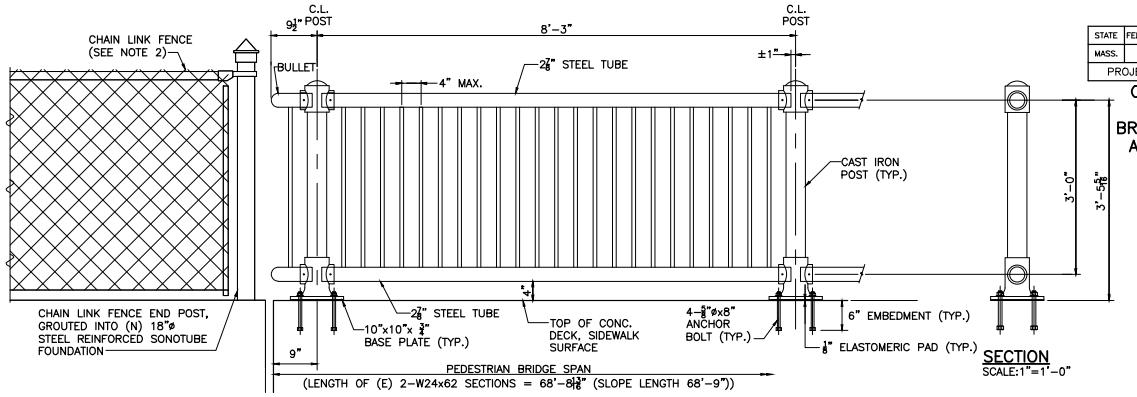
PRELIMINARY SK DRAWINGS NOT FOR CONSTRUCTION 04.08.24

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.			
PROJECT FILE NO.			

OPTION 3 MODIFIED EXISTING UTILITY BRIDGE CROSSING FOR AASHTO PEDESTRIAN LOAD RATING AND UTILITIES



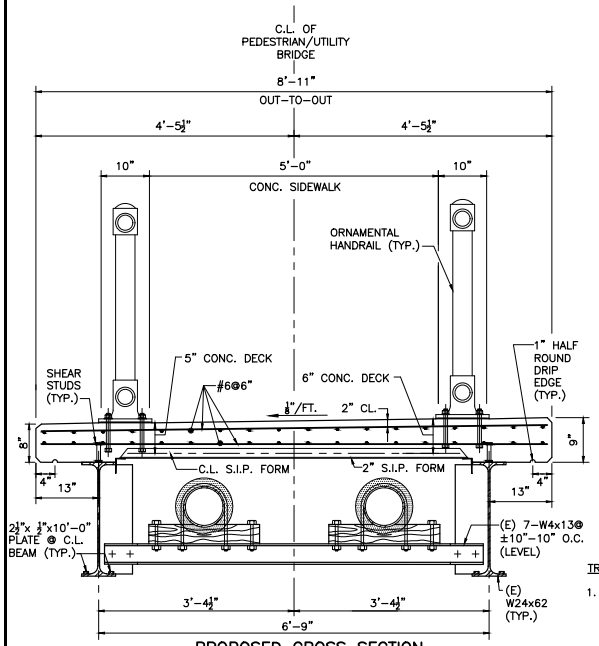
EXISTING TYPICAL UTILITY SUPPORT CROSS SECTION DETAIL
SCALE:1"=1'-0"



SECTION
SCALE:1"=1'-0"

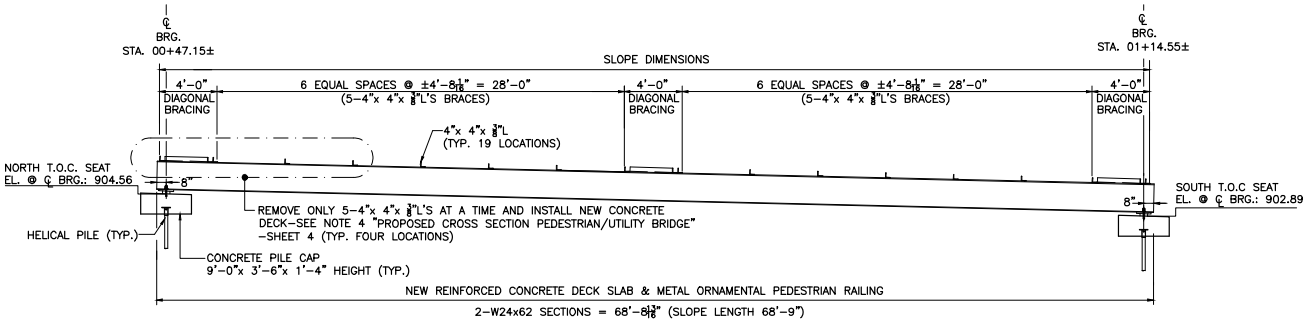
ORNAMENTAL HANDRAIL ON CONCRETE SIDEWALK DECK DETAIL
SCALE:1"=1'-0"

NOTES:
1. STEEL SHAPES SHALL CONFORM TO ASTM A-36.
2 PIPE SHALL CONFORM TO ASTM A-53 GR. B, A500, OR A501.
3. POSTS SHALL BE GREY IRON CASTINGS CONFORMING TO ASTM A-48, CLASS # 30. PAINTED ONLY.
4. WORKMANSHIP SHALL BE SMOOTH AND BURR-FREE.
5. RAILS TO BE GALVANIZED TO ASTM A123 THEN PAINTED FED STD 595B BLACK #17038 (COLORGALV).
6. ANCHOR BOLTS SHALL BE SET WITH TEMPLATES.
7. THE NUT SECURING THE POST BASE PLATE TO THE CONCRETE DECK SLAB SHALL BE TIGHTENED A SNUG FIT, AND THEN GIVEN AN ADDITIONAL ⅛ TURN AFTER THE STEEL IS IN PLACE.
8. BOTTOM OF THE POST BASE PLATE TO BE SET ON A ¼" MOLDED FABRIC BEARING PAD (M9.16.2). THE THICKNESS OF THE PAD SHALL BE IGNORED BY THE DETAILER.
9. POSTS SHALL BE SET PLUMB. RAILS SHALL BE PARALLEL TO THE PROFILE GRADE LINE.
10. MAXIMUM POST POST SPACING 8'-0"
11. HORIZONTAL RAILING COMPONENTS ARE TO HAVE FIXED CONNECTIONS AT ONE POST AND SLIDING AT THE OTHER. EACH POST AND SLIDING CONNECTIONS ON ONE SIDE AND HAVE FIXED CONNECTIONS ON THE OTHER.
12. ENDS OF TUBES SECTIONS SHALL BE SAWED. GRIND SMOOTH EXPOSED EDGES. ALL CUT ENDS SHALL BE PLUMB AND SMOOTH.
13. ALL STEEL FOR THE ORNAMENTAL RAILINGS SHALL BE GALVANIZED AND PAINTED BLACK. ALL STEEL, INCLUDING HEADS OF EXPOSED BOLTS, SHALL HAVE A FINISH COAT COLOR BLACK, FEDERAL COLOR ID #17038.
14. PROPOSED CHAIN LINK FENCE SHALL HAVE A BLACK VINYL FINISH COATING.



PROPOSED CROSS SECTION PEDESTRIAN/UTILITY BRIDGE
SCALE:1"=1'-0"

NOTES:
1. ALL STEEL REINFORCEMENT SHALL BE EPOXY COATED.
2. CONCRETE DECK SLAB SHALL 4,000 PSI, ¾ IN., 120 LIGHTWEIGHT CEMENT CONCRETE.
3. BRIDGE DECK SHALL BE BROOM FINISHED, TRANSVERSELY.
4. CONCRETE DECK SLAB SHALL BE INSTALLED IN FOUR SEPARATE POURS--SEE "TRANSVERSE CONSTRUCTION JOINT DETAIL IN DECK SLAB" FOR ADDITIONAL INFORMATION. ONLY FIVE CONSECUTIVE 4"x 4"x ⅜"L TOP CHORD BRACING MEMBERS SHALL BE REMOVED AT A TIME FOR EACH OF THE FOUR SEPARATE DECK SLAB POURS
5. REFER TO "EXISTING TYPICAL UTILITY SUPPORT CROSS SECTION DETAIL" THIS SHEET FOR ADDITIONAL INFORMATION.

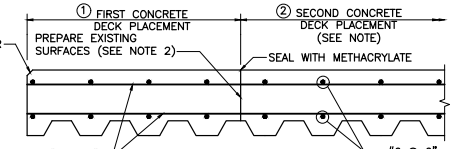


EXISTING UTILITY BRIDGE WEST ELEVATION
SCALE: ½"=1'-0"

NOTE:
NEW REINFORCED CONCRETE DECK SLAB & METAL ORNAMENTAL PEDESTRIAN RAILING NOT SHOWN FOR CLARITY.

TRANSVERSE PEDESTRIAN CONCRETE DECK JOINT NOTES:

1. BRIDGE DECK SLAB SHALL BE PLACED IN ACCORDANCE WITH THE PLACEMENT SEQUENCE SHOWN ON THE PLANS. EACH SEQUENTIAL DECK SLAB POUR SHALL NOT BE INSTALLED UNTIL 3 DAYS HAVE PAST AFTER THE PRECEDING DECK SLAB POUR.
2. THE SURFACE OF THE PREVIOUSLY CAST CONCRETE SHALL BE BLAST CLEANED, ROUGHENED, WETTED WITH CLEAN WATER, AND THEN FLUSHED WITH A MORTAR COMPOSED OF EQUAL PARTS OF THE CEMENT AND SAND SPECIFIED FOR THE NEW CONCRETE, BEFORE NEW CONCRETE IS PLACED ADJACENT THERETO.
3. IN LIEU OF THE MORTAR, AN EPOXY ADHESIVE SUITABLE FOR BONDING FRESH CONCRETE TO HARDENED CONCRETE FOR LOAD BEARING APPLICATIONS MAY BE USED. THE EPOXY ADHESIVE SHALL CONFORM TO AASHTO M 235 TYPE V AND SHALL BE APPLIED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
4. DOWEL BAR SPLICERS SHALL BE USED WHERE USE OF LAP SPLICES IS NOT FEASIBLE.



TRANSVERSE CONSTRUCTION JOINT DETAIL IN DECK SLAB
NOT TO SCALE

NOTE:
SIMILAR FOR CONCRETE DECK SLAB PLACEMENT POURS 1 THROUGH 5

DATE	DESCRIPTION
APR. 8, 2024	ACCEPTED FOR CONSTRUCTION
USE ONLY PRINTS OF LATEST DATE	

SHEET 4 OF 4 SHEETS BRIDGE NO. S-26-022 (A4Q)

X LIMITATIONS OF INVESTIGATION

All the recommended structural replacement upgrade option schemes as outlined above are conceptual in nature. The evaluation contained herein was based on observed measurements and conditions found when a field reconnaissance, visual inspection was completed by others and the engineer and existing engineering data, plans, reports and tests performed by and provided by others.

If additional engineering information is brought to the engineer's attention in the future, the analysis, results, recommendations and restoration repairs presented herein may be altered as determined by the engineer.

APPENDIX:

A MISCELLANEOUS NOTES AND DATA

MASSDOT BRIDGE CLOSURE LETTER & SI&A REPORT

MGL CHAPTER 85 SECTION BRIDGE HYDRAULIC DESIGN REVIEW

FIELD NOTES AND MEASUREMENTS

MASSDOT STRUCTURES INSPECTION FIELD REPORT

Deval L. Patrick, Governor
Timothy P. Murray, Lt. Governor
Richard A. Davey, Secretary & CEO
Frank DePaola, Administrator

massDOT
Massachusetts Department of Transportation
Highway Division

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

September 28, 2012

Town of Stockbridge
Board of Selectmen
P.O. Box 417 / 50 Main St.
Stockbridge, MA 01262

Attn: Clinton Schneyer, Jr., Highway Superintendent

SUBJECT: NATIONAL BRIDGE INSPECTION STANDARDS (NBIS)
BRIDGE CLOSURE

Stockbridge: INTERLAKEN CROSSROAD / LARRYWAUG BROOK
Bridge No: S-26-022
BIN No: A4Q
Structure No: S26022-A4Q-MUN-BRI

Dear Select Board:

The Massachusetts Department of Transportation (MassDOT) - Highway Division has undertaken the inventory, inspection, and rating of locally-owned bridges to assist the cities and towns in complying with State and Federal Legislation.

The above bridge was inspected on September 21, 2012, and it is recommended that the bridge be **CLOSED** to vehicular traffic.

The reason for this recommendation is cracking in the arch, arch ring, and foundation stones.

This letter confirms the notification to close the subject bridge per a telephone conversation on September 21, 2012 between Peter Niles, District Highway Director, of our office and Jorja-Ann Marsden, Town Administrator for the Town of Stockbridge.

Your immediate action is requested. Please respond in writing confirming your action not later than October 5, 2012.

A copy of the Inspection Report regarding this recommendation is enclosed. Peter A. Niles, P.E., the District Highway Director, will be pleased to review the report with you and advise you of any programs available regarding this bridge.

Thank you for your cooperation.

Sincerely,

Thomas F. Broderick, P.E.
Chief Engineer

JM/jm
cc: DHD, D-1 & DBIE, D-1
Duplicate sent by Regular First Class Mail

Report Date: September 21, 2012 Old Curtisville Stone

State Information

BDEPT#= S26022 Agency Br.No.
Town= Stockbridge L.O.
B.I.N= A4Q AASHTO= 033.2
RANK= 0 H.I.= 27.6 % FHWA Select List= N

Identification

(8) Structure Number	S26022A4QMUNBRI
(5) Inventory Route	180000000
(2) State Highway Department District	01
(3) County Code 003 (4) Place code	67595
(6) Features Intersected	WATER LARRYWAUG BROOK
(7) Facility Carried	HWY INTRLKN CRSS
(9) Location	AT CURTISVILLE
(11) Kilometerpoint	0000.000
(12) Base Highway Network	N
(13) LRS Inventory Route & Subroute	000000000000
(16) Latitude	42DEG 19MIN 07.00SEC
(17) Longitude	73DEG 19MIN 00.00SEC
(98) Border Bridge State Code	Share %
(99) Border Bridge Structure No. #	

Structure Type and Material

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

Age and Service

(27) Year Built	1852
(106) Year Reconstructed	0000
(42) Type of Service: On - Highway	
Under - Waterway	Code 15
(28) Lanes: On Structure 02	Under structure 00
(29) Average Daily Traffic	000200
(30) Year of ADT 2007 (109) Truck ADT	01 %
(19) Bypass, detour length	008 KM

Geometric Data

(48) Length of maximum span	0004.9M
(49) Structure Length	00005.8M
(50) Curb or sidewalk: Left 00.6 M	Right 01.5M
(51) Bridge Roadway Width Curb to Curb	007.4M
(52) Deck Width Out to Out	010.2M
(32) Approach Roadway Width (w/shoulders)	007.4M
(33) Bridge Median - No median	Code 0
(34) Skew 00 DEG (35) Structure Flared	N
(10) Inventory Route MIN Vert Clear	99.99M
(47) Inventory Route Total Horiz Clear	07.4M
(53) Min Vert Clear Over Bridge Rdwy	99.99M
(54) Min Vert Underclear ref N	00.00M
(55) Min Lat Underclear RT ref N	00.0M
(56) Min Lat Underclear LT	00.0M

Navigation Data

(38) Navigation Control - No navigation control on waterway	Code 0
(111) Pier Protection	Code
(39) Navigation Vertical Clearance	000.0M
(116) Vert-lift Bridge Nav Min Vert Clear	M
(40) Navigation Horizontal Clearance	0000.0M

Classification

	Code
(112) NBIS Bridge Length	N
(104) Highway System	N
(26) Functional Class - Rural Local	09
(100) Defense Highway	0
(101) Parallel Structure	N
(102) Direction of Traffic - 2-way traffic	2
(103) Temporary Structure	N
(105) Federal Lands Highways	0
(110) Designated National Network	N
(20) Toll - On free road	3
(21) Maintain - Town Agency	03
(22) Owner - Town Agency	03
(37) Historical Significance	?

Condition

	Code
(58) Deck	N
(59) Superstructure	3
(60) Substructure	4
(61) Channel & Channel Protection	6
(62) Culverts	N

Load Rating and Posting

	Code
(31) Design Load - Other/Unknown	0
(63) Operating Rating Method - Allowable Stress (AS)	2
(64) Operating Rating	00.0
(65) Inventory Rating Method - Allowable Stress (AS)	2
(66) Inventory Rating	00.0
(70) Bridge Posting	0
(41) Structure - Posted for load	K P

Appraisal

	Code
(67) Structural Evaluation	2
(68) Deck Geometry	5
(69) Underclearances, vert. and horiz.	N
(71) Waterway adequacy	7
(72) Approach Roadway Alignment	4
(36) Traffic Safety Features	0 0 0 0
(113) Scour Critical Bridges	6

Inspections

(90) Inspection Date 09/22/11 (91) Frequency 24 MO

(92) Critical Feature Inspection:				(93) CFI DATE
(A) Fracture Critical Detail	N	00	MO A)	00/00/00
(B) Underwater Inspection	N	00	MO B)	00/00/00
(C) Other Special Inspection	N	~~CD~~ ~~12~~	MO C)	09/21/12
(*) Other Inspection ()	N	00	MO *)	00/00/00
(*) Closed Bridge	Y	~~12~~ ~~00~~	MO *)	00/00/00
(*) UW Special Inspection	N	00	MO *)	00/00/00
(*) Damage Inspection			MO *)	00/00/00

Rating Loads

Report Date 00/00/00	H20	Type 3	Type 3S2	Type HS
Operating	0.0	0.0	0.0	0.0
Inventory	0.0	0.0	0.0	0.0

Field Posting

Status LEGAL Posting Date 00/00/00

	2 Axle	3 Axle	5 Axle
Actual	03	03	03
Recommended			

Missing Signs N

Misc.

Bridge Name Old Curtisville Stone

N Anti-missile fence N Acrow Panel N Jointless Bridge

Freeze/Thaw N : Not Applicable

Accessibility (Needed/Used)

N / N Liftbucket	N / N Rigging	N / N Other
N / N Ladder	N / N Staging	
N / N Boat	N / N Traffic Control	
Y / Y Wader	N / N RR Flagperson	Inspection Hours: 006
N / N Inspector 50	N / N Police	

Joseph Bianchi June 29, 2023 at 8:40 PM

Fwd: Hydraulic considerations effecting future Chapter 85 funded town bridge replacements

To: Joseph Bianchi

From: "Bardow, Alexander K. (DOT)" <alexander.bardow@state.ma.us>
Date: June 29, 2023 at 5:25:50 PM EDT
To: Joseph Bianchi <joe@jdbse.com>
Subject: RE: Hydraulic considerations effecting future Chapter 85 funded town bridge replacements

Joe,

For those bridges on the following roadway functional classifications:

- Rural Minor Collector
- Rural Local Road
- Urban Collector
- Urban Local Road

MassDOT will only be performing a structural adequacy and highway safety review. MassDOT will not be reviewing either the Hydraulic Report or the Geotechnical Report, although we will require that they be submitted for informational purposes only. For bridges on the listed roadway functional classifications, the Design Engineer will be fully responsible for the adequacy and accuracy of those reports.

Alex

From: Joseph Bianchi <joe@jdbse.com>
Sent: Thursday, June 29, 2023 2:19 PM
To: Bardow, Alexander K. (DOT) <Alexander.Bardow@dot.state.ma.us>
Subject: Hydraulic considerations effecting future Chapter 85 funded town bridge replacements

Good afternoon Alex:

After a few of our past telephone conversations will MassDOT be issuing a general directive or some formal response regarding hydraulic bridge opening design considerations as discussed.

Primarily all these town bridge projects conform all Chapter 85, AASHTO and MassDOT design criteria with respect to structural adequacy but not all the hydraulic related criteria and issues in design?

Could you please respond to this question, thank you for your advice and input on this matter.

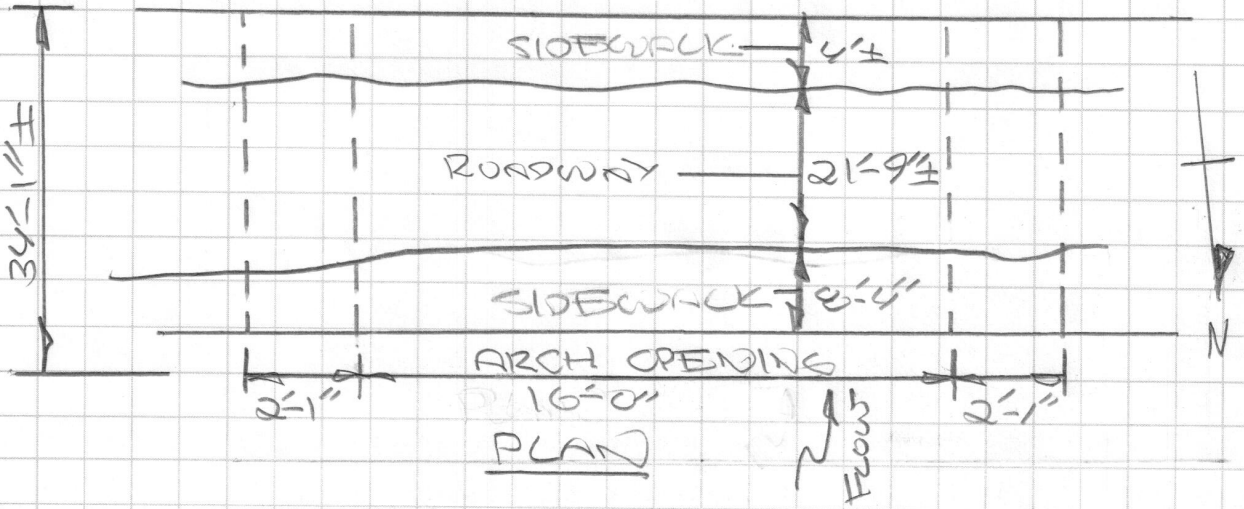
Have a great day.

Joe

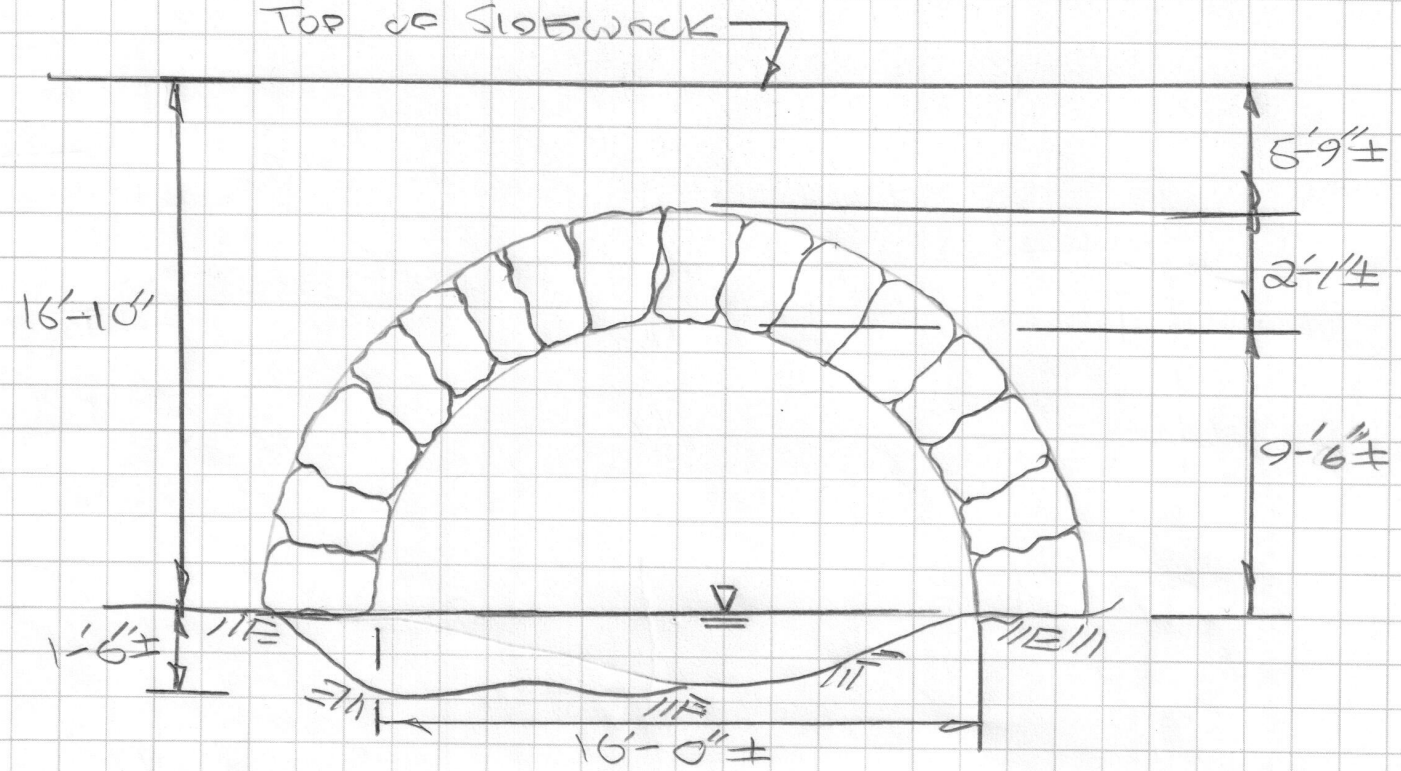
Joseph Bianchi, P.E., S.E., M.ASCE
WEBSITE I JOE@JDBSE.COM I 508.255.1422
JDB Consulting Engineers, Inc.
835 Samoset Rd., Eastham, MA 02642

JDB Consulting Engineers, Inc.
835 Samoset Rd.
Eastham, MA 02642
(508) 255-1422
jdbse.com

JOB CURTISWOOD ARCH
SHEET NO. 1 OF 4
CALCULATED BY JDB DATE 10/23/15
SCALE



PLAN

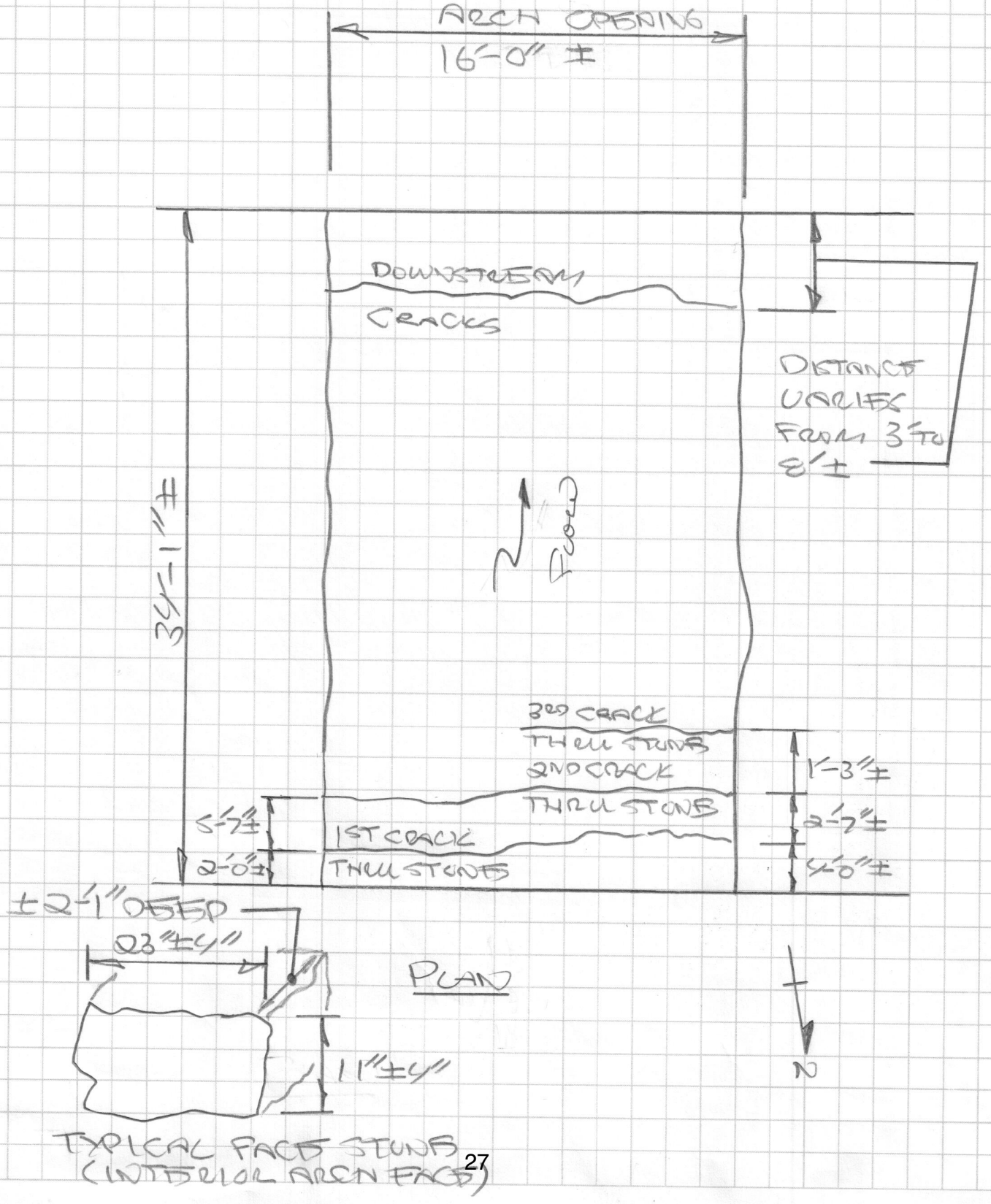


NORTH ELEVATION
(SOUTH ELEVATION SIMILAR)

NOTES:
ALL PLAN DIMENSIONS TAKEN AT CENTERLINE OF ARCH OPENING UNLESS ALONG CROSSING

JDB Consulting Engineers, Inc.
835 Samoset Rd.
Eastham, MA 02642
(508) 255-1422
jdbse.com

JOB Continuous Arch
SHEET NO. 2 OF 4
CALCULATED BY JDB DATE 10/23/15
SCALE



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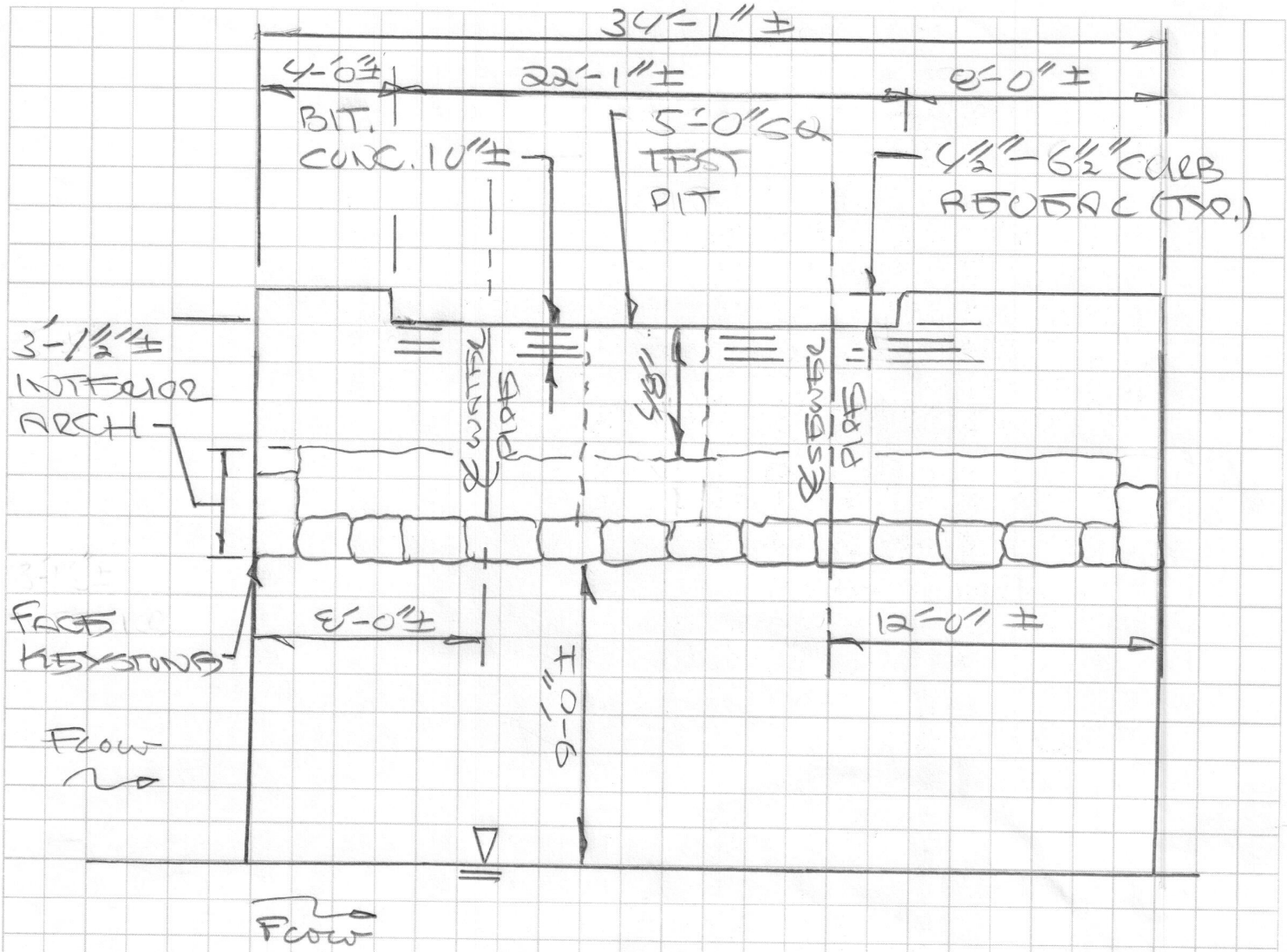
Eastham, MA 02642
(508) 255-1422
jdbse.com

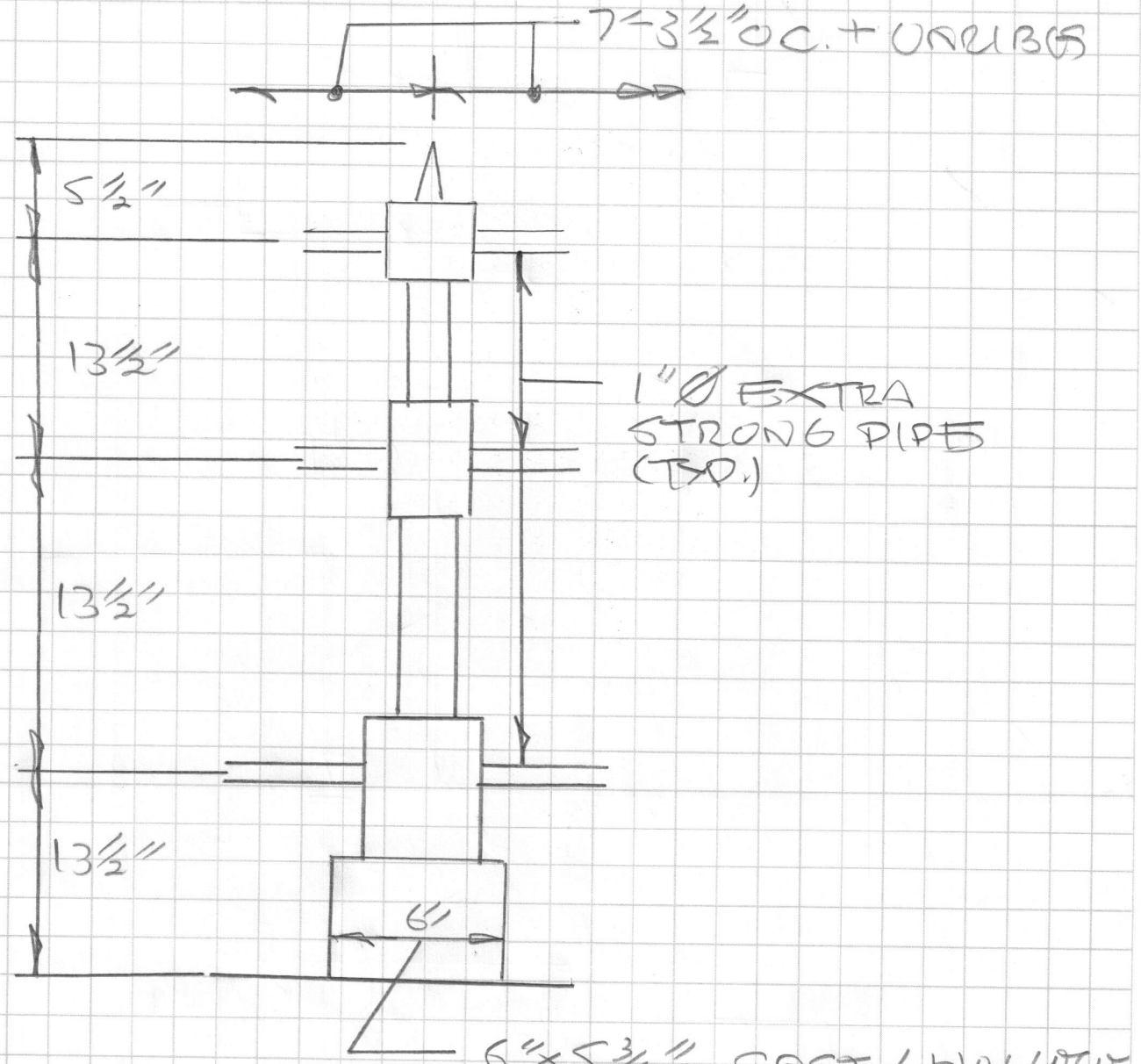
JOB CURTIS/WICKS ARCH
SHEET NO. 3 OF 4
CALCULATED BY JDB DATE 11/3/15
SCALE



SECTION LOOKING WEST
AT CENTER OF ARCH

JDB Consulting Engineers, Inc.
835 Samoset Rd.
Eastham, MA 02642
(508) 255-1422
jdbse.com

JOB CURTISUCKER ASH
SHEET NO. 4 OF 4
CALCULATED BY JDB DATE 11/3/15
SCALE



TYPICAL BUDDY POST

STRUCTURES INSPECTION FIELD REPORT

SPECIAL MEMBER INSPECTION

2-DIST	B.I.N.	BR. DEPT. NO.
01	A4Q	S-26-022

CITY/TOWN	8.-STRUCTURE NO.	11-Kilo. POINT	90-ROUTINE INSP. DATE	93*-SPEC. MEMB. INSP. DATE
STOCKBRIDGE	S26022-A4Q-MUN-BRI	000.000	Sep 22, 2011	Sep 21, 2012

07-FACILITY CARRIED	MEMORIAL NAME/LOCAL NAME	27-YR BUILT	106-YR REBUILT	*YR REHAB'D (NON 106)
HWY INTRLKN CRSS	Old Curtisville Stone	1852	0000	0000

06-FEATURES INTERSECTED	26-FUNCTIONAL CLASS	DIST. BRIDGE INSPECTION ENGINEER
WATER LARRYWAUG BROOK	Rural Local	J. Marauszwski

43-STRUCTURE TYPE	22-OWNER	21-MAINTAINER	TEAM LEADER
811 : Masonry Arch - Deck	Town Agency	Town Agency	L. A. Briggs

107-DECK TYPE	WEATHER	TEMP. (air)	TEAM MEMBERS
N : Not applicable	Sunny	15°C	M. P.E. MCCABE

WEIGHT POSTING — *Not Applicable* X

	H	3	3S2	Single
Actual Posting	03	03	03	03
Recommended Posting	N	N	N	N

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

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

Legibility/ Visibility

	At bridge E	At bridge W	Advance E	Advance W
Signs In Place				
Legibility/ Visibility	7 / 7	7 / 7	/	/

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 :00/00/00

SPECIAL MEMBER(S):

	MEMBER	CRACK (Y/N):	WELD'S CONDITION (0-9)	LOCATION OF CORROSION, SECTION LOSS (%), CRACKS, COLLISION DAMAGE, STRESS CONCENTRATION, ETC.	CONDITION PREVIOUS (0-9)	CONDITION PRESENT (0-9)	INV. RATING OF MEMBER FROM RATING ANALYSIS H-20	3	3S2	Deficiencies
A	Item 59.1 - Arch/Arch Ring	N	N	See remarks in comments section.	4	3	Not Rated			S-A
B	Item 59.2 - Keystone Area	N	N	See remarks in comments section.	4	3	Not Rated			S-A
C	Item 59.10 - Masonry Joints	N	N	See remarks in comments section.	4	4	Not Rated			S-A
D	Item 60.1.d - Breastwalls	N	N	See remarks in comments section.	4	4	Not Rated			S-P
E	Item 60.1.h - Footings	N	N	See remarks in comments section.	4	3	Not Rated			S-A

List of field tests performed:
Visual and probe.

	I-58	I-59	I-60	I-62
(Overall Previous Condition)	-	4	4	-
(Overall Current Condition)	-	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	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
STOCKBRIDGE	**A4Q**	**S-26-022**	**S26022-A4Q-MUN-BRI**	**SEP 21, 2012**

REMARKS

BRIDGE ORIENTATION
Interlaken Cross Rd. travels west and east. Larrywaug Brook flows north to south.

GENERAL REMARKS
Note: Jean Marauszwski, Bridge Inspection Area Engineer and Mark Devylder, District Bridge Engineer were notified due to the severity of the deterioration of the structure. It was determined that the structure should be closed. The town was notified and barriers were placed to closed the structure.

ITEM 59 - SUPERSTRUCTURE

Item 59.1 - Arch/Arch Ring
The ring has separated at both of the edge courses. This is allowing fill to fall through (up to 3' penetration in several areas).

At 2' from the north end, there is a separation of the arch ring with several stones that have fallen out. The gap is up to 7" wide at it's widest area on the east side of the arch. See photo 1. The separation and crack continues through the crown area and through the west side of the arch. The west side is cracked in two places. The first is 18" to 2' from the north edge and is separated 2" from top to bottom. The second is a separation at 4' from the north edge and is 4" wide from the crown to the bottom of the west side. See photos 1 - 3.

At 6' from the north end, there is a third separation. At the crown the separation is 2" wide and continues down both sides to hairline at the bottom.

The south ring is separated 1.25" at the top to 0.25" on the west side and 1" on the east side. This is 18" to 2' from the south edge. See photo 4 & 5.

There are two other separations at the south end. One is 3' from the south edge. This is a 1/8" wide crack that is continuous to both sides. The other is 5' from the south edge. This is 1/2" wide at the top to 1/4" on either side.

There are several cracked stones in the arch ring at the northwest corner. See photo 6.

Also, there is active leakage throughout the arch.

Item 59.2 - Keystone Area
There are several cracked stones in the north arch ring keystone area. Three stones are completely cracked through and the keystone at the center is broken off and falling out. See photo 7.

Item 59.10 - Masonry Joints
The joints in the arch ring and breastwalls are losing mortar and are allowing fill material to fall through. See photos 1 - 5.

ITEM 60 - SUBSTRUCTURE

Item 60.1 - Abutments
Item 60.1.d - Breastwalls
The breastwalls have settled on the ends causing a separation of the arch ring. See photo 7.

Both sides have mortar and stones missing along the water line allowing penetration of up to 2' in several areas along the east breastwall and up to 18" along the west breastwall.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
STOCKBRIDGE	**A4Q**	**S-26-022**	**S26022-A4Q-MUN-BRI**	**SEP 21, 2012**

REMARKS

Item 60.1.h - Footings

The footing has settled on the ends of the east side. This has caused the arch rings to pitch away from the structure.

The northeast corner and the southeast corner stones are now cracked through in several areas. See photo 8.

Photo Log

Photo 1 : North end, east side of the arch.
Photo 2 : North end, east side of the arch. Close view.
Photo 3 : Crown at the north end.
Photo 4 : South end, east side of the arch.
Photo 5 : South end, crown of the arch.
Photo 6 : Cracked stones in the arch ring.
Photo 7 : Cracked stones and broken stone falling out of the keystone.
Photo 8 : Cracked stones in the footing at the northeast corner.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
STOCKBRIDGE	**A4Q**	**S-26-022**	**S26022-A4Q-MUN-BRI**	**SEP 21, 2012**

PHOTOS

Photo 1: North end, east side of the arch.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
STOCKBRIDGE	**A4Q**	**S-26-022**	**S26022-A4Q-MUN-BRI**	**SEP 21, 2012**

PHOTOS

Photo 2: North end, east side of the arch. Close view.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
STOCKBRIDGE	**A4Q**	**S-26-022**	**S26022-A4Q-MUN-BRI**	**SEP 21, 2012**

PHOTOS

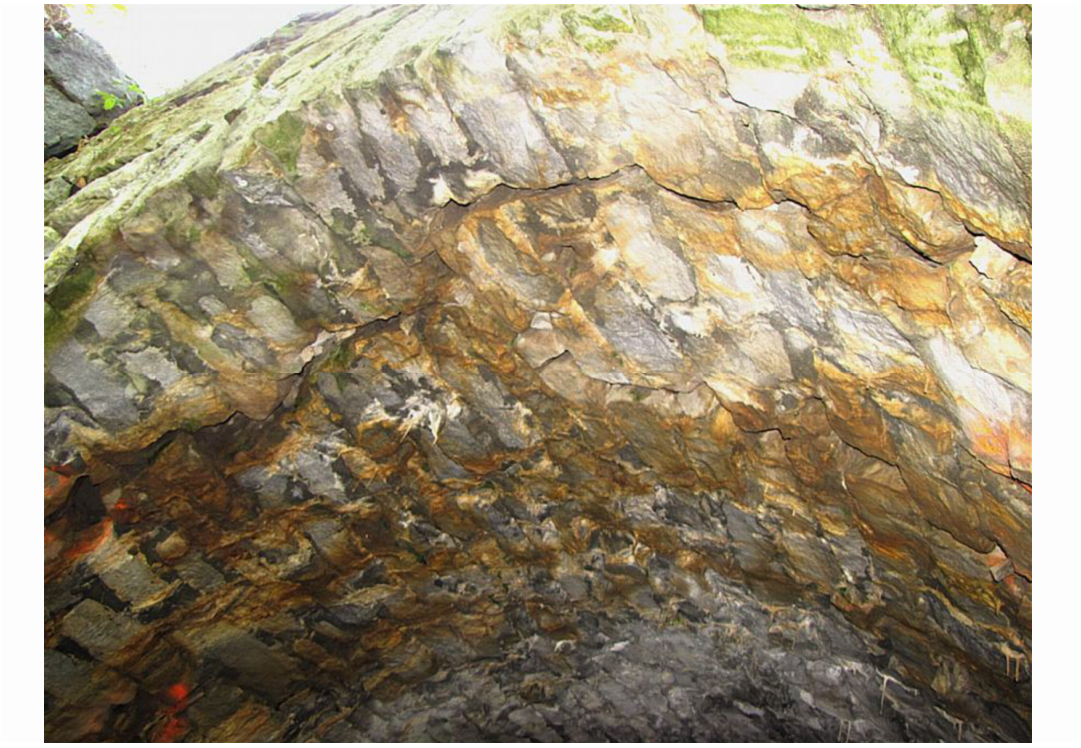


Photo 3: Crown at the north end.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
STOCKBRIDGE	**A4Q**	**S-26-022**	**S26022-A4Q-MUN-BRI**	**SEP 21, 2012**

PHOTOS

Photo 4: **South end, east side of the arch.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
STOCKBRIDGE	**A4Q**	**S-26-022**	**S26022-A4Q-MUN-BRI**	**SEP 21, 2012**

PHOTOS

Photo 5: **South end, crown of the arch.**

Photo 6: **Cracked stones in the arch ring.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
STOCKBRIDGE	**A4Q**	**S-26-022**	**S26022-A4Q-MUN-BRI**	**SEP 21, 2012**

PHOTOS

Photo 7: **Cracked stones and broken stone falling out of the keystone.**

Photo 8: **Cracked stones in the footing at the northeast corner.**

B CONSTRUCTION QUANTITIES BASED ON COST ESTIMATE OPTION I

Curtisville Arch Bridge Construction Estimate

THE COMMONWEALTH OF MASSACHUSETTS
MassDOT
HIGHWAY DIVISION
BRIDGE SECTION

Project No.: : 02311-061-02
Location : BRIDGE (S-26-022) - INTERLAKEN CROSS ROAD OVER LARRYWAUG BROOK, STOCKBRIDGE MA
Description : OPTION 1 REHABILITATION REPLACEMENT OF EXISTING ARCH BRIDGE CROSSING FOR HL-93 AASHTO TRUCK LOADING AND UTILITIES
Date : March. 15, 2024

TOWN: STOCKBRIDGE
STATION: --------
OVER: LARRYWAUG BROOK
ROAD: INTERLAKEN CROSS ROAD
TYPE: Stone Masonry Arch
ROADWAY WIDTH: Varies Curb to Curb WALKS: 2
SPANS: 1
ROADWAY LENGTH:
CLEARANCE: 16'-0"

MEDIAN: na

OPTION 1
ESTIMATE OF QUANTITIES AND COST - BRIDGE BETTERMENTS
STOCKBRIDGE
Bridge No. S-26-022 (A4Q)

- 101.0 CLEARING AND GRUBBING (ACRE) - Quantity x Unit Price = Total Item Cost

In[591]:=

$$TC_{101.0} = N[(((60\,FT \times 60\,FT) + (60\,FT \times 60\,FT)) \times \frac{Acre}{43\,560\,FT^2}) \times 8300.00\,\frac{Dollars}{Acre}]$$

Out[591]=

1371.9 Dollars

In[592]:=

$$Q_{101.0} = N[\frac{TC_{101.0}}{8300.00\ \frac{Dollars}{Acre}}]$$

Out[592]=

0.165289 Acre

- 103.0 TREE REMOVED-DIAMETER UNDER 24 INCHES (EA) - Quantity x Unit Price = Total Item Cost

In[593]:=

$$TC_{103.0} = N[(1\ EA) \times 1400.00\ \frac{Dollars}{EA}]$$

Out[593]=

1400. Dollars

In[594]:=

$$Q_{103.0} = N[\frac{TC_{103.0}}{1400.00\ \frac{Dollars}{EA}}]$$

Out[594]=

1. EA

- *107.64 REMOVAL AND REPLACEMENT OF BRIDGE RAILING (FT) - Quantity x Unit Price = Total Item Cost

In[595]:=

$$TC_{107.64} = N[(240\ FT) \times 83.00\ \frac{Dollars}{FT}]$$

Out[595]=

19920. Dollars

In[596]:=

$$Q_{107.64} = N[\frac{TC_{107.64}}{83.00\ \frac{Dollars}{FT}}]$$

Out[596]=

240. FT

- *107.641 REMOVAL AND REPLACEMENT OF METAL ORNAMENTAL BRIDGE POSTS (EA) - Quantity x Unit Price = Total Item Cost

In[597]:=

$$TC_{107.641} = N[(2\ EA) \times 1200\ \frac{Dollars}{EA}]$$

Out[597]=

2400. Dollars

In[598]:=

$$Q_{107.641} = N[\frac{TC_{107.641}}{1200.00\ \frac{Dollars}{EA}}]$$

Out[598]=

2. EA

- 114.1 DEMOLITION SUPERSTRUCTURE OF BRIDGE S-26-022 (SF) - Quantity x Unit Price = Total Item Cost

In[599]:=

$$TC_{114.1} = N[(24\ ft) \times (16\ ft) \times 58.00\ \frac{Dollars}{ft^2}]$$

Out[599]=

22272. Dollars

In[600]:=

$$Q_{114.1} = N[\frac{TC_{114.1}}{58.00\ \frac{Dollars}{ft^2}}]$$

Out[600]=

384. ft^2

- *129.6 BRIDGE PAVEMENT EXCAVATION (SY) - Quantity x Unit Price = Total Item Cost

In[601]:=

$$TC_{129.6} = N[(40\ ft) \times (20\ ft) \times \frac{sy^2}{9\ ft^2} \times 66.00\ \frac{Dollars}{sy^2}]$$

Out[601]=

5866.67 Dollars

In[602]:=

$$Q_{129.6} = N[\frac{TC_{129.6}}{66.00\ \frac{Dollars}{sy^2}}]$$

Out[602]=

88.8889 sy^2

- 151.2 GRAVEL BORROW FOR BACKFILLING STRUCTURE & PIPES (CY) - Quantity x Unit Price = Total Item Cost

In[603]:=

$$TC_{151.2} = N[(((90\ ft) \times (4\ ft)\ (\frac{40\ in}{12\ \frac{in}{ft}}))) \times (\frac{cy^3}{27\ ft^3}) \times (70.00\ \frac{Dollars}{cy^3})]$$

Out[603]=

3111.11 Dollars

In[604]:=

$$Q_{151.2} = N[\frac{TC_{151.2}}{70.00\ \frac{Dollars}{cy^3}}]$$

Out[604]=

44.4444 cy^3

- 472 HOT MIX ASPHALT FOR MISCELLANEOUS BRIDGE WORK (TON) - Quantity x Unit Price = Total Item Cost

In[605]:=

$$TC_{472} = N[(30\ ft) \times (20\ ft) \times (10\ in) \times \frac{ft}{12\ in} \times \frac{144\ lbs}{ft^3} \times \frac{ton}{2000\ lbs} / approach \times 2\ approach \times 250.00\ \frac{Dollars}{ton}]$$

Out[605]=

18 000. Dollars

In[606]:=

$$Q_{472} = N[\frac{TC_{472}}{250.00\ \frac{Dollars}{ton}}]$$

Out[606]=

72. ton

- *482.31 SAWING & SEALING JOINTS IN ASPHALT PAVEMENT AT BRIDGES (LF) - Quantity x Unit Price = Total Item Cost

In[607]:=

$$TC_{482.31} = N[\frac{(68\ ft)}{joint} \times 2\ joint \times 42.00\ \frac{Dollars}{ft}]$$

Out[607]=

5712. Dollars

In[608]:=

$$Q_{482.31} = N[\frac{TC_{482.31}}{42.00\ \frac{Dollars}{ft}}]$$

Out[608]=

136. ft

- 690.0 STONE MASONRY WALL REMOVED AND REBUILT IN CEMENT MORTAR AND DRY LAID (CY) - Quantity x Unit Price = Total Item Cost

In[609]:=

$$TC_{690.0} = N[(((7.8\ ft) \times (80\ ft)\ (\frac{70\ in}{12\ \frac{in}{ft}}))) \times (\frac{cy^3}{27\ ft^3}) \times (1250.00\ \frac{Dollars}{cy^3})]$$

Out[609]=

168 519. Dollars

In[610]:=

$$Q_{690.0} = N[\frac{TC_{690.0}}{1250.00\ \frac{Dollars}{cy^3}}]$$

Out[610]=

134.815 cy^3

- *690.01 STONE MASONRY ARCH AND SPANDREL WALLS REMOVED AND REBUILT IN PARTIALLY CEMENTED MORTAR JOINTS (CY) - Quantity x Unit Price = Total Item Cost

In[611]:=

$$TC_{690.01} = N[((2\,(14\,ft) \times (14\,ft)\,(\frac{64\,in}{12\,\frac{in}{ft}}))) \times (\frac{cy^3}{27\,ft^3}) \times (1250.00\,\frac{Dollars}{cy^3}) +$$
$$(\frac{\pi\,((12.625\,ft)^2 - (9.5\,ft)^2)}{2})\,(8\,ft)) \times (\frac{cy^3}{27\,ft^3}) \times (1250.00\,\frac{Dollars}{cy^3})]$$

Out[611]=

137 015. Dollars

In[612]:=

$$Q_{690.01} = N[\frac{TC_{690.01}}{1250.00\ \frac{Dollars}{cy^3}}]$$

Out[612]=

109.612 cy^3

- 626.22 STEEL W BEAM HIGHWAY GUARD (DOUBLE FACED/ CIP CONCRETE BASE ANCHOR) (CY) - Quantity x Unit Price = Total Item Cost

In[613]:=

$$TC_{626.22} = N[(140\,ft) \times (90.00\,\frac{Dollars}{ft})]$$

Out[613]=

12 600. Dollars

In[614]:=

$$Q_{626.22} = N[\frac{TC_{626.22}}{90.00\ \frac{Dollars}{ft}}]$$

Out[614]=

140. ft

751.0 LOAM BORROW (CY) - Quantity x Unit Price = Total Item Cost

In[615]:=

$$TC_{751.0} = N[(((80\ ft) \times (20\ ft)\ (\frac{8\ in}{12\ \frac{in}{ft}}))) \times (\frac{cy^3}{27\ ft^3}) \times (80.00\ \frac{Dollars}{cy^3})]$$

Out[615]=

3160.49 Dollars

In[616]:=

$$Q_{751.0} = N[\frac{TC_{751.0}}{80.00\ \frac{Dollars}{cy^3}}]$$

Out[616]=

$39.5062\ cy^3$

765.0 SEEDING (SY) - Quantity x Unit Price = Total Item Cost

In[617]:=

$$TC_{765.0} = N[((80\ ft) \times (20\ ft)) \times (\frac{cy^2}{9\ ft^2}) \times (3.00\ \frac{Dollars}{cy^2})]$$

Out[617]=

533.333 Dollars

In[618]:=

$$Q_{765.0} = N[\frac{TC_{765.0}}{3.00\ \frac{Dollars}{cy^2}}]$$

Out[618]=

$177.778\ cy^2$

851.1 SAFETY CONTROLS (CONES) FOR CONSTRUCTION OPERATIONS (UD) - Quantity x Unit Price = Total Item Cost

In[619]:=

$$TC_{851.1} = N[(120\ UD) \times 100.00\ \frac{Dollars}{UD}]$$

Out[619]=

12000. Dollars

In[620]:=

$$Q_{851.1} = N[\frac{TC_{851.1}}{100.00\ \frac{Dollars}{UD}}]$$

Out[620]=

120. UD

852 SAFETY SIGING FOR CONSTRUCTION OPERATIONS (SF) - Quantity x Unit Price = Total Item Cost

In[621]:=

$$TC_{852} = N[(4\,ft \times 4\,ft) \times 8 \times (25.00\,\frac{Dollars}{ft^2})]$$

Out[621]=

3200. Dollars

In[622]:=

$$Q_{852} = N[\frac{TC_{852}}{25.00\,\frac{Dollars}{ft^2}}]$$

Out[622]=

$128.\,ft^2$

853.21 TEMPORARY CONCRETE BARRIER REMOVED & RESET (LF) - Quantity x Unit Price = Total Item Cost

In[623]:=

$$TC_{853.21} = N[(32\,ft) \times 2 \times 33.00\,\frac{Dollars}{ft}]$$

Out[623]=

2112. Dollars

In[624]:=

$$Q_{853.21} = N[\frac{TC_{853.21}}{33.00\,\frac{Dollars}{ft}}]$$

Out[624]=

64. ft

859 REFLECTORIZED DRUM (UD) - Quantity x Unit Price = Total Item Cost

In[625]:=

$$TC_{859} = N[(800\,UD) \times 0.50\,\frac{Dollars}{UD}]$$

Out[625]=

400. Dollars

In[626]:=

$$Q_{859} = N[\frac{TC_{859}}{0.50\,\frac{Dollars}{UD}}]$$

Out[626]=

800. UD

904.0 4000 PSI, 3/4 IN., 610 CEMENT CONCRETE - TWO ARCH FOOTINGS (CY) - Quantity x Unit Price = Total Item Cost

In[627]:=

$$TC_{904.0} = N[2\,(((35\,ft)\times(5\,ft)\,(\frac{24\,in}{12\,\frac{in}{ft}}))\times(\frac{cy^3}{27\,ft^3})\times(900.00\,\frac{Dollars}{cy^3})\,]$$

Out[627]=

23 333.3 Dollars

In[628]:=

$$Q_{904.0} = N[\frac{TC_{904.0}}{900.00\,\frac{Dollars}{cy^3}}]$$

Out[628]=

$25.9259\ cy^3$

904.01 4000 PSI, 3/4 IN., 610 CEMENT CONCRETE - TWO FOOTINGS FOR TWO SPANDREL ARCH WALLS (CY) - Quantity x Unit Price = Total Item Cost

In[629]:=

$$TC_{904.01} = N[2\,(((60\,ft)\times(5\,ft)\,(\frac{24\,in}{12\,\frac{in}{ft}}))\times(\frac{cy^3}{27\,ft^3})\times(1050.00\,\frac{Dollars}{cy^3})\,]$$

Out[629]=

46 666.7 Dollars

In[630]:=

$$Q_{904.01} = N[\frac{TC_{904.01}}{1050.00\,\frac{Dollars}{cy^3}}]$$

Out[630]=

$44.4444\ cy^3$

904.02 4000 PSI, 3/4 IN., 610 CEMENT CONCRETE - NEW UTILITY PIPE FOUNDATION (CY) - Quantity x Unit Price = Total Item Cost

In[631]:=

$$TC_{904.02} = N[(21\,ft^2)\,(8\,ft)\,(\frac{cy^3}{27\ ft^3})\times(500.00\,\frac{Dollars}{cy^3})]$$

Out[631]=

3111.11 Dollars

In[632]:=

$$Q_{904.02} = N[\frac{TC_{904.02}}{500.00\,\frac{Dollars}{cy^3}}]$$

Out[632]=

$6.22222\ cy^3$

904.03 4000 PSI, 3/4 IN., 585 HP CEMENT CONCRETE - ARCH SUPERSTRUCTURE (CY) - Quantity x Unit Price = Total Item Cost

In[633]:=

$$TC_{904.03} = N[(((130\ ft^2) \times (35\ ft))) \times (\frac{cy^3}{27\ ft^3}) \times (1050.00\ \frac{Dollars}{cy^3})]$$

Out[633]=

176 944. Dollars

In[634]:=

$$Q_{904.03} = N[\frac{TC_{904.03}}{1050.00\ \frac{Dollars}{cy^3}}]$$

Out[634]=

168.519 cy^3

910.1 STEEL REINFORCEMENT FOR SUPERSTRUCTURE-EPOXY COATED (LB) - Quantity x Unit Price = Total Item Cost

In[635]:=

$$TC_{910.1} = N[(\frac{2.7\ lbs}{ft^2}) \times (45\ ft) \times 32\ ft \times (5.50\ \frac{Dollars}{lbs})]$$

Out[635]=

21 384. Dollars

In[636]:=

$$Q_{910.1} = N[\frac{TC_{910.1}}{5.50\ \frac{Dollars}{lbs}}]$$

Out[636]=

3888. lbs

910.111 STEEL REINFORCEMENT FOR STRUCTURE-EPOXY COATED - NEW UTILITY PIPE FOUNDATION (LB) - Quantity x Unit Price = Total Item Cost

In[637]:=

$$TC_{910.111} = N[(\frac{23\ ft}{bar}) \times (\frac{0.668\ lbs}{ft}) \times 8\ bar\ (5.50\ \frac{Dollars}{lbs})]$$

Out[637]=

676.016 Dollars

In[638]:=

$$Q_{910.111} = N[\frac{TC_{910.111}}{5.50\ \frac{Dollars}{lbs}}]$$

Out[638]=

122.912 lbs

- *910.101 STAINLESS STEEL REINFORCEMENT FOR STRUCTURE (LB) - Quantity x Unit Price = Total Item Cost

In[639]:=

$$TC_{910.101} = N[(\frac{3\ ft}{bar}) \times (\frac{0.376\ lbs}{ft}) \times 90\ bar\ (20\ \frac{Dollars}{lbs})]$$

Out[639]=

2030.4 Dollars

In[640]:=

$$Q_{910.101} = N[\frac{TC_{910.101}}{20\ \frac{Dollars}{lbs}}]$$

Out[640]=

101.52 lbs

- *913.4 CORING 3/4" DIAMETER x 3 " CORED HOLES AND GROUTING STAINLESS STEEL REINFORCEMENT (EA) - Quantity x Unit Price = Total Item Cost

In[641]:=

$$TC_{913.4} = N[(90\ EA) \times 125.00\ \frac{Dollars}{EA}]$$

Out[641]=

11 250. Dollars

In[642]:=

$$Q_{913.4} = N[\frac{TC_{913.4}}{125.00\ \frac{Dollars}{EA}}]$$

Out[642]=

90. EA

- *991.1 CONTROL OF WATER-STRUCTURE NO. S-26-022 (LS) - Quantity x Unit Price = Total Item Cost

In[643]:=

$$TC_{991.1} = N[(1\ ls)\ 12\,000.00\ \frac{Dollars}{ls}]$$

Out[643]=

12 000. Dollars

In[644]:=

$$Q_{991.1} = N[\frac{TC_{991.1}}{12\,000.00\ \frac{Dollars}{ls}}]$$

Out[644]=

1. ls

- *992.3 TEMPORARY SUPPORTS FOR BRIDGE STRUCTURE (LS) - Quantity x Unit Price = Total Item Cost

In[645]:=

$$TC_{992.3} = N[(1\ ls)\ 5000.00\ \frac{Dollars}{ls}]$$

Out[645]=

5000. Dollars

In[646]:=

$$Q_{992.3} = N[\frac{TC_{992.3}}{5000.00\ \frac{Dollars}{ls}}]$$

Out[646]=

1. ls

- *992.001 STRUCTURAL & GEOTECHNICAL ENGINEERING BRIDGE DESIGN, SHOP DRAWING AND TESTING REVIEWS & CONSTRUCTION INSPECTION (LS) - Quantity x Unit Price = Total Item Cost

In[647]:=

$$TC_{992.001} = N[(0.085\ ls)\ 900\,000\ \frac{Dollars}{ls}]$$

Out[647]=

76 500. Dollars

In[648]:=

$$Q_{992.001} = N[\frac{TC_{992.001}}{76\,500\ \frac{Dollars}{ls}}]$$

Out[648]=

1. ls

- *992.009 REMOVE EXISTING UTILITY BRIDGE AND RELOCATION EXISTING WATER AND SEWER LINE OVER NEW CROSSING (LS) - Quantity x Unit Price = Total Item Cost

In[649]:=

$$TC_{992.009} = N[(1\ ls)\ 80\,000.00\ \frac{Dollars}{ls}]$$

Out[649]=

80 000. Dollars

In[650]:=

$$Q_{992.009} = N[\frac{TC_{992.009}}{80\,000.00\ \frac{Dollars}{ls}}]$$

Out[650]=

1. ls

- *992.003 FINAL SUBSURFACE SOIL BORINGS (LS) - Quantity x Unit Price = Total Item Cost

In[651]:=

$$TC_{992.003} = N[(1\ ls)\ 12\,000.00\ \frac{Dollars}{ls}]$$

Out[651]=

12 000. Dollars

In[652]:=

$$Q_{992.003} = N[\frac{TC_{992.003}}{12\,000.00\ \frac{Dollars}{ls}}]$$

Out[652]=

1. ls

- *992.002 CIVIL ENGINEERING, SURVEYING, PERMITING & CONSTRUCTION INSPECTION (LS) - Quantity x Unit Price = Total Item Cost

In[653]:=

$$TC_{992.002} = N[(0.135\ ls)\ 1\,200\,000\ \frac{Dollars}{ls}]$$

Out[653]=

162 000. Dollars

In[654]:=

$$Q_{992.002} = N[\frac{TC_{992.002}}{162\,000\ \frac{Dollars}{ls}}]$$

Out[654]=

1. ls

- *992.004 ADDITIONAL 15% CONTINGENCY CONSTRUCTION COST 15% (LS) - Quantity x Unit Price = Total Item Cost

In[655]:=

$$TC_{992.004} = (TC_{101.0} + TC_{103.0} + TC_{107.64} + TC_{107.641} + TC_{114.1} + TC_{129.6} + TC_{151.2} + TC_{472} + TC_{482.31} + TC_{690.0} + TC_{690.01} + TC_{626.22} + TC_{751.0} + TC_{765.0} + TC_{851.1} + TC_{852} + TC_{853.21} + TC_{859} + TC_{904.0} + TC_{904.01} + TC_{904.02} + TC_{904.03} + TC_{910.1} + TC_{910.111} + TC_{910.101} + TC_{913.4} + TC_{991.1} + TC_{992.3} + TC_{992.009})\ 0.15$$

Out[655]=

120 298. Dollars

In[656]:=

$$Q_{992.004} = N[\frac{TC_{992.004}}{120\,298\ \frac{Dollars}{ls}}]$$

Out[656]=

1. ls

TOTAL CONSTRUCTION COST ESTIMATE FOR - OPTION 1- Bridge No.

S-26-002 (A4Q)

In[657]:=

$$\text{TotalCost} = \text{AccountingForm}[TC_{101.0} + TC_{103.0} + TC_{107.64} + TC_{107.641} + TC_{114.1} + TC_{129.6} + TC_{151.2} + TC_{472} + TC_{482.31} + TC_{690.0} + TC_{690.01} + TC_{626.22} + TC_{751.0} + TC_{765.0} + TC_{851.1} + TC_{852} + TC_{853.21} + TC_{859} + TC_{904.0} + TC_{904.01} + TC_{904.02} + TC_{904.03} + TC_{910.1} + TC_{910.111} + TC_{910.101} + TC_{913.4} + TC_{991.1} + TC_{992.3} + TC_{992.001} + TC_{992.002} + TC_{992.003} + TC_{992.009} + TC_{992.004}, 12]$$

Out[657]//AccountingForm=

1172786.78006 Dollars

C CONSTRUCTION QUANTITIES BASED ON COST ESTIMATE OPTION II

Curtisville Arch Bridge Construction Estimate

THE COMMONWEALTH OF MASSACHUSETTS
MassDOT
HIGHWAY DIVISION
BRIDGE SECTION

Project No.: : 02311-061-02
Location : BRIDGE (S-26-022) - INTERLAKEN CROSS ROAD OVER LARRYWAUG BROOK, STOCKBRIDGE MA
Description : OPTION 2 REHABILITATION REPLACEMENT OF EXISTING ARCH BRIDGE CROSSING FOR AASHTO PEDESTRIAN LOAD RATING AND UTILITIES
Date : March. 15, 2024

TOWN: STOCKBRIDGE
STATION: --------
OVER: LARRYWAUG BROOK
ROAD: INTERLAKEN CROSS ROAD
TYPE: Stone Masonry Arch
ROADWAY WIDTH: Varies Curb to Curb WALKS: 2
SPANS: 1
ROADWAY LENGTH:
CLEARANCE: 16'-0"

MEDIAN: na

OPTION 2
ESTIMATE OF QUANTITIES AND COST - BRIDGE BETTERMENTS STOCKBRIDGE
Bridge No. S-26-022 (A4Q)

- 101.0 CLEARING AND GRUBBING (ACRE) - Quantity x Unit Price = Total Item Cost

In[115]:=

$$TC_{101.0} = N[(((60\,FT \times 60\,FT) + (60\,FT \times 60\,FT)) \times \frac{Acre}{43\,560\,FT^2}) \times 8300.00\,\frac{Dollars}{Acre}]$$

Out[115]=

1371.9 Dollars

In[116]:=

$$Q_{101.0} = N[\frac{TC_{101.0}}{8300.00\ \frac{Dollars}{Acre}}]$$

Out[116]=

0.165289 Acre

- 103.0 TREE REMOVED-DIAMETER UNDER 24 INCHES (EA) - Quantity x Unit Price = Total Item Cost

In[117]:=

$$TC_{103.0} = N[(1\ EA) \times 1400.00\ \frac{Dollars}{EA}]$$

Out[117]=

1400. Dollars

In[118]:=

$$Q_{103.0} = N[\frac{TC_{103.0}}{1400.00\ \frac{Dollars}{EA}}]$$

Out[118]=

1. EA

- *107.64 REMOVAL AND REPLACEMENT OF BRIDGE RAILING (FT) - Quantity x Unit Price = Total Item Cost

In[119]:=

$$TC_{107.64} = N[(240\ FT) \times 83.00\ \frac{Dollars}{FT}]$$

Out[119]=

19920. Dollars

In[120]:=

$$Q_{107.64} = N[\frac{TC_{107.64}}{83.00\ \frac{Dollars}{FT}}]$$

Out[120]=

240. FT

- *107.641 REMOVAL AND REPLACEMENT OF METAL ORNAMENTAL BRIDGE POSTS (EA) - Quantity x Unit Price = Total Item Cost

In[121]:=

$$TC_{107.641} = N[(2\ EA) \times 1200\ \frac{Dollars}{EA}]$$

Out[121]=

2400. Dollars

In[122]:=

$$Q_{107.641} = N[\frac{TC_{107.641}}{1200.00\ \frac{Dollars}{EA}}]$$

Out[122]=

2. EA

- 114.1 DEMOLITION SUPERSTRUCTURE OF BRIDGE S-26-022 (SF) - Quantity x Unit Price = Total Item Cost

In[123]:=

$$TC_{114.1} = N[(24\ ft) \times (16\ ft) \times 58.00\ \frac{Dollars}{ft^2}]$$

Out[123]=

22272. Dollars

In[124]:=

$$Q_{114.1} = N[\frac{TC_{114.1}}{58.00\ \frac{Dollars}{ft^2}}]$$

Out[124]=

384. ft^2

- *129.6 BRIDGE PAVEMENT EXCAVATION (SY) - Quantity x Unit Price = Total Item Cost

In[125]:=

$$TC_{129.6} = N[(40\ ft) \times (20\ ft) \times \frac{sy^2}{9\ ft^2} \times 66.00\ \frac{Dollars}{sy^2}]$$

Out[125]=

5866.67 Dollars

In[126]:=

$$Q_{129.6} = N[\frac{TC_{129.6}}{66.00\ \frac{Dollars}{sy^2}}]$$

Out[126]=

88.8889 sy^2

- 151.2 GRAVEL BORROW FOR BACKFILLING STRUCTURE & PIPES (CY) - Quantity x Unit Price = Total Item Cost

In[127]:=

$$TC_{151.2} = N[(((90\ ft) \times (4\ ft)\ (\frac{40\ in}{12\ \frac{in}{ft}}))) \times (\frac{cy^3}{27\ ft^3}) \times (70.00\ \frac{Dollars}{cy^3})]$$

Out[127]=

3111.11 Dollars

In[128]:=

$$Q_{151.2} = N[\frac{TC_{151.2}}{70.00\ \frac{Dollars}{cy^3}}]$$

Out[128]=

$$44.4444\ cy^3$$

- 690.0 STONE MASONRY WALL REMOVED AND REBUILT IN CEMENT MORTAR AND DRY LAID (CY) - Quantity x Unit Price = Total Item Cost

In[129]:=

$$TC_{690.0} = N[(((7.8\ ft) \times (80\ ft)\ (\frac{70\ in}{12\ \frac{in}{ft}}))) \times (\frac{cy^3}{27\ ft^3}) \times (1250.00\ \frac{Dollars}{cy^3})]$$

Out[129]=

168 519. Dollars

In[130]:=

$$Q_{690.0} = N[\frac{TC_{690.0}}{1250.00\ \frac{Dollars}{cy^3}}]$$

Out[130]=

$$134.815\ cy^3$$

- *690.01 STONE MASONRY ARCH AND SPANDREL WALLS REMOVED AND REBUILT IN PARTIALLY CEMENTED MORTAR JOINTS (CY) - Quantity x Unit Price = Total Item Cost

In[131]:=

$$TC_{690.01} = N[((2\ (14\ ft) \times (14\ ft)\ (\frac{64\ in}{12\ \frac{in}{ft}}))) \times (\frac{cy^3}{27\ ft^3}) \times (1250.00\ \frac{Dollars}{cy^3}) +$$

$$((\frac{\pi\ ((12.625\ ft)^2 - (9.5\ ft)^2)}{2})\ (8\ ft)) \times (\frac{cy^3}{27\ ft^3}) \times (1250.00\ \frac{Dollars}{cy^3})]$$

Out[131]=

137 015. Dollars

In[132]:=

$$Q_{690.01} = N[\frac{TC_{690.01}}{1250.00\ \frac{Dollars}{cy^3}}]$$

Out[132]=

$$109.612\ cy^3$$

751.0 LOAM BORROW (CY) - Quantity x Unit Price = Total Item Cost

In[133]:=

$$TC_{751.0} = N[(((80\,ft) \times (20\,ft)\,(\frac{8\,in}{12\,\frac{in}{ft}}))) \times (\frac{cy^3}{27\,ft^3}) \times (80.00\,\frac{Dollars}{cy^3})]$$

Out[133]=

3160.49 Dollars

In[134]:=

$$Q_{751.0} = N[\frac{TC_{751.0}}{80.00\,\frac{Dollars}{cy^3}}]$$

Out[134]=

39.5062 cy^3

765.0 SEEDING (SY) - Quantity x Unit Price = Total Item Cost

In[135]:=

$$TC_{765.0} = N[((80\,ft) \times (20\,ft)) \times (\frac{cy^2}{9\,ft^2}) \times (3.00\,\frac{Dollars}{cy^2})]$$

Out[135]=

533.333 Dollars

In[136]:=

$$Q_{765.0} = N[\frac{TC_{765.0}}{3.00\,\frac{Dollars}{cy^2}}]$$

Out[136]=

177.778 cy^2

851.1 SAFETY CONTROLS (CONES) FOR CONSTRUCTION OPERATIONS (UD) - Quantity x Unit Price = Total Item Cost

In[137]:=

$$TC_{851.1} = N[(120\,UD) \times 100.00\,\frac{Dollars}{UD}]$$

Out[137]=

12000. Dollars

In[138]:=

$$Q_{851.1} = N[\frac{TC_{851.1}}{100.00\,\frac{Dollars}{UD}}]$$

Out[138]=

120. UD

852 SAFETY SIGING FOR CONSTRUCTION OPERATIONS (SF) - Quantity x Unit Price = Total Item Cost

In[139]:=

$$TC_{852} = N[(4\,ft \times 4\,ft) \times 8 \times (25.00\,\frac{Dollars}{ft^2})]$$

Out[139]=

3200. Dollars

In[140]:=

$$Q_{852} = N[\frac{TC_{852}}{25.00\,\frac{Dollars}{ft^2}}]$$

Out[140]=

128. ft^2

853.21 TEMPORARY CONCRETE BARRIER REMOVED & RESET (LF) - Quantity x Unit Price = Total Item Cost

In[141]:=

$$TC_{853.21} = N[(32\,ft) \times 2 \times 33.00\,\frac{Dollars}{ft}]$$

Out[141]=

2112. Dollars

In[142]:=

$$Q_{853.21} = N[\frac{TC_{853.21}}{33.00\,\frac{Dollars}{ft}}]$$

Out[142]=

64. ft

859 REFLECTORIZED DRUM (UD) - Quantity x Unit Price = Total Item Cost

In[143]:=

$$TC_{859} = N[(800\,UD) \times 0.50\,\frac{Dollars}{UD}]$$

Out[143]=

400. Dollars

In[144]:=

$$Q_{859} = N[\frac{TC_{859}}{0.50\,\frac{Dollars}{UD}}]$$

Out[144]=

800. UD

904.0 4000 PSI, 3/4 IN., 610 CEMENT CONCRETE - TWO ARCH FOOTINGS (CY) - Quantity x Unit Price = Total Item Cost

In[145]:=

$$TC_{904.0} = N[2\,(((35\,ft)\times(5\,ft)\,(\frac{24\,in}{12\,\frac{in}{ft}}))\times(\frac{cy^3}{27\,ft^3})\times(900.00\,\frac{Dollars}{cy^3})\,]$$

Out[145]=

23 333.3 Dollars

In[146]:=

$$Q_{904.0} = N[\frac{TC_{904.0}}{900.00\,\frac{Dollars}{cy^3}}]$$

Out[146]=

$$25.9259\ cy^3$$

904.01 4000 PSI, 3/4 IN., 610 CEMENT CONCRETE - TWO FOOTINGS FOR TWO SPANDREL ARCH WALLS (CY) - Quantity x Unit Price = Total Item Cost

In[147]:=

$$TC_{904.01} = N[2\,(((60\,ft)\times(5\,ft)\,(\frac{24\,in}{12\,\frac{in}{ft}}))\times(\frac{cy^3}{27\,ft^3})\times(1050.00\,\frac{Dollars}{cy^3})\,]$$

Out[147]=

46 666.7 Dollars

In[148]:=

$$Q_{904.01} = N[\frac{TC_{904.01}}{1050.00\,\frac{Dollars}{cy^3}}]$$

Out[148]=

$$44.4444\ cy^3$$

904.02 4000 PSI, 3/4 IN., 610 CEMENT CONCRETE - NEW UTILITY PIPE FOUNDATION (CY) - Quantity x Unit Price = Total Item Cost

In[149]:=

$$TC_{904.02} = N[(21\,ft^2)\,(8\,ft)\,(\frac{cy^3}{27\ ft^3})\times(500.00\,\frac{Dollars}{cy^3})]$$

Out[149]=

3111.11 Dollars

In[150]:=

$$Q_{904.02} = N[\frac{TC_{904.02}}{500.00\,\frac{Dollars}{cy^3}}]$$

Out[150]=

$$6.22222\ cy^3$$

904.03 4000 PSI, 3/4 IN., 585 HP CEMENT CONCRETE - ARCH SUPERSTRUCTURE (CY) - Quantity x Unit Price = Total Item Cost

In[151]:=

$$TC_{904.03} = N[(((80\ ft^2) \times (35\ ft))) \times (\frac{cy^3}{27\ ft^3}) \times (1050.00\ \frac{Dollars}{cy^3})]$$

Out[151]=

108 889. Dollars

In[152]:=

$$Q_{904.03} = N[\frac{TC_{904.03}}{1050.00\ \frac{Dollars}{cy^3}}]$$

Out[152]=

103.704 cy^3

910.1 STEEL REINFORCEMENT FOR SUPERSTRUCTURE-EPOXY COATED (LB) - Quantity x Unit Price = Total Item Cost

In[153]:=

$$TC_{910.1} = N[0.70\ (\frac{2.7\ lbs}{ft^2}) \times (45\ ft) \times 32\ ft\ \times (5.50\ \frac{Dollars}{lbs})]$$

Out[153]=

14 968.8 Dollars

In[154]:=

$$Q_{910.1} = N[\frac{TC_{910.1}}{5.50\ \frac{Dollars}{lbs}}]$$

Out[154]=

2721.6 lbs

910.111 STEEL REINFORCEMENT FOR STRUCTURE-EPOXY COATED - NEW UTILITY PIPE FOUNDATION (LB) - Quantity x Unit Price = Total Item Cost

In[155]:=

$$TC_{910.111} = N[(\frac{23\ ft}{bar}) \times (\frac{0.668\ lbs}{ft}) \times 8\ bar\ (5.50\ \frac{Dollars}{lbs})]$$

Out[155]=

676.016 Dollars

In[156]:=

$$Q_{910.111} = N[\frac{TC_{910.111}}{5.50\ \frac{Dollars}{lbs}}]$$

Out[156]=

122.912 lbs

*991.1 CONTROL OF WATER-STRUCTURE NO. S-26-022 (LS) - Quantity x Unit Price = Total Item Cost

In[157]:=

$$TC_{991.1} = N[(1\ ls)\ 12\,000.00\ \frac{Dollars}{ls}]$$

Out[157]=

12 000. Dollars

In[158]:=

$$Q_{991.1} = N[\frac{TC_{991.1}}{12\,000.00\ \frac{Dollars}{ls}}]$$

Out[158]=

1. ls

*992.3 TEMPORARY SUPPORTS FOR BRIDGE STRUCTURE (LS) - Quantity x Unit Price = Total Item Cost

In[159]:=

$$TC_{992.3} = N[(1\ ls)\ 5000.00\ \frac{Dollars}{ls}]$$

Out[159]=

5000. Dollars

In[160]:=

$$Q_{992.3} = N[\frac{TC_{992.3}}{5000.00\ \frac{Dollars}{ls}}]$$

Out[160]=

1. ls

*992.001 STRUCTURAL & GEOTECHNICAL ENGINEERING BRIDGE DESIGN, SHOP DRAWING AND TESTING REVIEWS & CONSTRUCTION INSPECTION (LS) - Quantity x Unit Price = Total Item Cost

In[161]:=

$$TC_{992.001} = N[(0.085\ ls)\ 900\,000\ \frac{Dollars}{ls}]$$

Out[161]=

76 500. Dollars

In[162]:=

$$Q_{992.001} = N[\frac{TC_{992.001}}{76\,500\ \frac{Dollars}{ls}}]$$

Out[162]=

1. ls

- *992.009 REMOVE EXISTING UTILTITY BRIDGE AND RELOCATION EXISTING WATER AND SEWER LINE OVER NEW CROSSING (LS) - Quantity x Unit Price = Total Item Cost

In[163]:=

$$TC_{992.009} = N[(1\ ls)\ 80\,000.00\ \frac{Dollars}{ls}]$$

Out[163]=

80 000. Dollars

In[164]:=

$$Q_{992.009} = N[\frac{TC_{992.009}}{80\,000.00\ \frac{Dollars}{ls}}]$$

Out[164]=

1. ls

- *992.003 FINAL SUBSURFACE SOIL BORINGS (LS) - Quantity x Unit Price = Total Item Cost

In[165]:=

$$TC_{992.003} = N[(1\ ls)\ 12\,000.00\ \frac{Dollars}{ls}]$$

Out[165]=

12 000. Dollars

In[166]:=

$$Q_{992.003} = N[\frac{TC_{992.003}}{12\,000.00\ \frac{Dollars}{ls}}]$$

Out[166]=

1. ls

- *992.002 CIVIL ENGINEERING, SURVEYING, PERMITING & CONSTRUCTION INSPECTION (LS) - Quantity x Unit Price = Total Item Cost

In[167]:=

$$TC_{992.002} = N[(0.135\ ls)\ 1\,200\,000\ \frac{Dollars}{ls}]$$

Out[167]=

162 000. Dollars

In[168]:=

$$Q_{992.002} = N[\frac{TC_{992.002}}{162\,000\ \frac{Dollars}{ls}}]$$

Out[168]=

1. ls

- *992.004 ADDITIONAL 15% CONTINGENCY CONSTRUCTION COST 15% (LS) - Quantity x Unit Price = Total Item Cost

In[169]:=

$$TC_{992.004} = (TC_{101.0} + TC_{103.0} + TC_{107.64} + TC_{107.641} + TC_{114.1} + TC_{129.6} + TC_{151.2} + TC_{690.0} + TC_{690.01} + TC_{751.0} + TC_{765.0} + TC_{851.1} + TC_{852} + TC_{853.21} + TC_{859} + TC_{904.0} + TC_{904.01} + TC_{904.02} + TC_{904.03} + TC_{910.1} + TC_{910.111} + TC_{991.1} + TC_{992.3} + TC_{992.009})\ 0.15$$

Out[169]=

101 689. Dollars

In[170]:=

$$Q_{992.004} = N\left[\frac{TC_{992.004}}{101\,689\ \frac{\text{Dollars}}{\text{ls}}}\right]$$

Out[170]=

0.999998 ls

TOTAL CONSTRUCTION COST ESTIMATE FOR - OPTION 2- Bridge No. S-26-002 (A4Q)

In[171]:=

$$\text{TotalCost} = \text{AccountingForm}[TC_{101.0} + TC_{103.0} + TC_{107.64} + TC_{107.641} + TC_{114.1} + TC_{129.6} + TC_{151.2} + TC_{690.0} + TC_{690.01} + TC_{751.0} + TC_{765.0} + TC_{851.1} + TC_{852} + TC_{853.21} + TC_{859} + TC_{904.0} + TC_{904.01} + TC_{904.02} + TC_{904.03} + TC_{910.1} + TC_{910.111} + TC_{991.1} + TC_{992.3} + TC_{992.001} + TC_{992.002} + TC_{992.003} + TC_{992.009} + TC_{992.004}, 12]$$

Out[171]//AccountingForm=

1030114.15117 Dollars

D CONSTRUCTION QUANTITIES BASED ON COST ESTIMATE OPTION III

Curtisville Arch Bridge Construction Estimate

THE COMMONWEALTH OF MASSACHUSETTS
MassDOT
HIGHWAY DIVISION
BRIDGE SECTION

Project No.: : 02311-061-02
Location : BRIDGE (S-26-022) - INTERLAKEN CROSS ROAD OVER LARRYWAUG BROOK, STOCKBRIDGE MA
Description : OPTION 3 EXISTING UTILITY BRIDGE CROSSING FOR PEDESTRIAN FOR AASHTO PEDESTRIAN LOAD RATING AND UTILITIES
Date : March. 15, 2024

TOWN: STOCKBRIDGE
STATION: --------
OVER: LARRYWAUG BROOK
ROAD: INTERLAKEN CROSS ROAD
TYPE: Stone Masonry Arch
ROADWAY WIDTH: Varies Curb to Curb WALKS: 2
SPANS: 1
ROADWAY LENGTH:
CLEARANCE: 16'-0"

MEDIAN: na

OPTION 3
ESTIMATE OF QUANTITIES AND COST - BRIDGE BETTERMENTS
STOCKBRIDGE
Bridge No. S-26-022 (A4Q)

- 101.0 CLEARING AND GRUBBING (ACRE) - Quantity x Unit Price = Total Item Cost

In[40]:=

$$TC_{101.0} = N[(((60\,FT \times 60\,FT) + (60\,FT \times 60\,FT)) \times \frac{Acre}{43\,560\,FT^2}) \times 8300.00\,\frac{Dollars}{Acre}]$$

Out[40]=

1371.9 Dollars

In[41]:=

$$Q_{101.0} = N[\frac{TC_{101.0}}{8300.00\ \frac{Dollars}{Acre}}]$$

Out[41]=

0.165289 Acre

- 103.0 TREE REMOVED-DIAMETER UNDER 24 INCHES (EA) - Quantity x Unit Price = Total Item Cost

In[42]:=

$$TC_{103.0} = N[(1\ EA) \times 1400.00\ \frac{Dollars}{EA}]$$

Out[42]=

1400. Dollars

In[43]:=

$$Q_{103.0} = N[\frac{TC_{103.0}}{1400.00\ \frac{Dollars}{EA}}]$$

Out[43]=

1. EA

- 114.1 DEMOLITION SUPERSTRUCTURE OF BRIDGE S-26-022 (SF) - Quantity x Unit Price = Total Item Cost

In[44]:=

$$TC_{114.1} = N[(24\ ft) \times (16\ ft) \times 58.00\ \frac{Dollars}{ft^2}]$$

Out[44]=

22272. Dollars

In[45]:=

$$Q_{114.1} = N[\frac{TC_{114.1}}{58.00\ \frac{Dollars}{ft^2}}]$$

Out[45]=

384. ft^2

- *129.6 BRIDGE PAVEMENT EXCAVATION (SY) - Quantity x Unit Price = Total Item Cost

In[46]:=

$$TC_{129.6} = N[(40\ ft) \times (20\ ft) \times \frac{sy^2}{9\ ft^2} \times 66.00\ \frac{Dollars}{sy^2}]$$

Out[46]=

5866.67 Dollars

In[47]:=

$$Q_{129.6} = N[\frac{TC_{129.6}}{66.00\ \frac{Dollars}{sy^2}}]$$

Out[47]=

88.8889 sy^2

- 151.2 GRAVEL BORROW FOR BACKFILLING STRUCTURE & PIPES (CY) - Quantity x Unit Price = Total Item Cost

In[48]:=

$$TC_{151.2} = N[(((90\ ft) \times (4\ ft)\ (\frac{40\ in}{12\ \frac{in}{ft}}))) \times (\frac{cy^3}{27\ ft^3}) \times (70.00\ \frac{Dollars}{cy^3})]$$

Out[48]=

3111.11 Dollars

In[49]:=

$$Q_{151.2} = N[\frac{TC_{151.2}}{70.00\ \frac{Dollars}{cy^3}}]$$

Out[49]=

44.4444 cy^3

- 690.0 STONE MASONRY WALL REMOVED AND REBUILT IN CEMENT MORTAR AND DRY LAID (CY) - Quantity x Unit Price = Total Item Cost

In[50]:=

$$TC_{690.0} = N[(((8\ ft) \times (45\ ft)\ (\frac{70\ in}{12\ \frac{in}{ft}}))) \times (\frac{cy^3}{27\ ft^3}) \times (1250.00\ \frac{Dollars}{cy^3})]$$

Out[50]=

97 222.2 Dollars

In[51]:=

$$Q_{690.0} = N[\frac{TC_{690.0}}{1250.00\ \frac{Dollars}{cy^3}}]$$

Out[51]=

77.7778 cy^3

751.0 LOAM BORROW (CY) - Quantity x Unit Price = Total Item Cost

In[52]:=

$$TC_{751.0} = N[(((80\ ft) \times (20\ ft)\ (\frac{8\ in}{12\ \frac{in}{ft}}))) \times (\frac{cy^3}{27\ ft^3}) \times (80.00\ \frac{Dollars}{cy^3})]$$

Out[52]=

3160.49 Dollars

In[53]:=

$$Q_{751.0} = N[\frac{TC_{751.0}}{80.00\ \frac{Dollars}{cy^3}}]$$

Out[53]=

$39.5062\ cy^3$

765.0 SEEDING (SY) - Quantity x Unit Price = Total Item Cost

In[54]:=

$$TC_{765.0} = N[((80\ ft) \times (20\ ft)) \times (\frac{cy^2}{9\ ft^2}) \times (3.00\ \frac{Dollars}{cy^2})]$$

Out[54]=

533.333 Dollars

In[55]:=

$$Q_{765.0} = N[\frac{TC_{765.0}}{3.00\ \frac{Dollars}{cy^2}}]$$

Out[55]=

$177.778\ cy^2$

851.1 SAFETY CONTROLS (CONES) FOR CONSTRUCTION OPERATIONS (UD) - Quantity x Unit Price = Total Item Cost

In[56]:=

$$TC_{851.1} = N[(120\ UD) \times 100.00\ \frac{Dollars}{UD}]$$

Out[56]=

12000. Dollars

In[57]:=

$$Q_{851.1} = N[\frac{TC_{851.1}}{100.00\ \frac{Dollars}{UD}}]$$

Out[57]=

120. UD

852 SAFETY SIGING FOR CONSTRUCTION OPERATIONS (SF) - Quantity x Unit Price = Total Item Cost

In[58]:=

$$TC_{852} = N[(4\,ft \times 4\,ft) \times 8 \times (25.00\,\frac{Dollars}{ft^2})]$$

Out[58]=

3200. Dollars

In[59]:=

$$Q_{852} = N[\frac{TC_{852}}{25.00\,\frac{Dollars}{ft^2}}]$$

Out[59]=

$128.\,ft^2$

853.21 TEMPORARY CONCRETE BARRIER REMOVED & RESET (LF) - Quantity x Unit Price = Total Item Cost

In[60]:=

$$TC_{853.21} = N[(32\,ft) \times 2 \times 33.00\,\frac{Dollars}{ft}]$$

Out[60]=

2112. Dollars

In[61]:=

$$Q_{853.21} = N[\frac{TC_{853.21}}{33.00\,\frac{Dollars}{ft}}]$$

Out[61]=

64. ft

859 REFLECTORIZED DRUM (UD) - Quantity x Unit Price = Total Item Cost

In[62]:=

$$TC_{859} = N[(800\,UD) \times 0.50\,\frac{Dollars}{UD}]$$

Out[62]=

400. Dollars

In[63]:=

$$Q_{859} = N[\frac{TC_{859}}{0.50\,\frac{Dollars}{UD}}]$$

Out[63]=

800. UD

- 904.0 4000 PSI, 3/4 IN., 610 CEMENT CONCRETE - WALL FOOTINGS (CY) - Quantity x Unit Price = Total Item Cost

In[64]:=

$$TC_{904.0} = N[2\,(((35\,ft) \times (5\,ft)\,(\frac{24\,in}{12\,\frac{in}{ft}}))) \times (\frac{cy^3}{27\,ft^3}) \times (900.00\,\frac{Dollars}{cy^3})\,]$$

Out[64]=

23 333.3 Dollars

In[65]:=

$$Q_{904.0} = N[\frac{TC_{904.0}}{900.00\,\frac{Dollars}{cy^3}}]$$

Out[65]=

$25.9259\ cy^3$

- *904.01 STEEL REINFORCED 4000 PSI, 3/4 IN., 610 CEMENT CONCRETE - PEDESTRIAN BRIDGE DECK SLAB (CY) - Quantity x Unit Price = Total Item Cost

In[66]:=

$$TC_{904.01} = N[(((70\,ft) \times (9\,ft)\,(\frac{10\,in}{12\,\frac{in}{ft}}))) \times (\frac{cy^3}{27\,ft^3}) \times (1600.00\,\frac{Dollars}{cy^3})\,]$$

Out[66]=

31 111.1 Dollars

In[67]:=

$$Q_{904.01} = N[\frac{TC_{904.01}}{1600.00\,\frac{Dollars}{cy^3}}]$$

Out[67]=

$19.4444\ cy^3$

- *960.111 STEEL ORNAMENTAL PEDESTRIAN BRIDGE HANDRAIL (LF) - Quantity x Unit Price = Total Item Cost

In[68]:=

$$TC_{960.111} = N[(2\,(70\,lf))\,(350.00\,\frac{Dollars}{lf})\,]$$

Out[68]=

49 000. Dollars

In[69]:=

$$Q_{960.111} = N[\frac{TC_{960.111}}{350.00\,\frac{Dollars}{lf}}]$$

Out[69]=

$140.\ lf$

- *991.1 CONTROL OF WATER-STRUCTURE NO. S-26-022 (LS) - Quantity x Unit Price = Total Item Cost

In[70]:=

$$TC_{991.1} = N[(1\ ls)\ 12\,000.00\ \frac{Dollars}{ls}]$$

Out[70]=

12 000. Dollars

In[71]:=

$$Q_{991.1} = N[\frac{TC_{991.1}}{12\,000.00\ \frac{Dollars}{ls}}]$$

Out[71]=

1. ls

- *992.001 STRUCTURAL & GEOTECHNICAL ENGINEERING BRIDGE DESIGN, SHOP DRAWING AND TESTING REVIEWS & CONSTRUCTION INSPECTION (LS) - Quantity x Unit Price = Total Item Cost

In[72]:=

$$TC_{992.001} = N[(0.085\ ls)\ 500\,000\ \frac{Dollars}{ls}]$$

Out[72]=

42 500. Dollars

In[73]:=

$$Q_{992.001} = N[\frac{TC_{992.001}}{42\,500\ \frac{Dollars}{ls}}]$$

Out[73]=

1. ls

- *992.002 CIVIL ENGINEERING, SURVEYING, PERMITING & CONSTRUCTION INSPECTION (LS) - Quantity x Unit Price = Total Item Cost

In[74]:=

$$TC_{992.002} = N[(0.3\ ls)\ 500\,000\ \frac{Dollars}{ls}]$$

Out[74]=

150 000. Dollars

In[75]:=

$$Q_{992.002} = N[\frac{TC_{992.002}}{150\,000\ \frac{Dollars}{ls}}]$$

Out[75]=

1. ls

- *992.004 ADDITIONAL 15% CONTINGENCY CONSTRUCTION COST 15% (LS) - Quantity x Unit Price = Total Item Cost

In[76]:=

$$TC_{992.004} = (TC_{101.0} + TC_{103.0} + TC_{114.1} + TC_{129.6} + TC_{151.2} + TC_{690.0} + TC_{751.0} + TC_{765.0} + TC_{851.1} + TC_{852} + TC_{853.21} + TC_{859} + TC_{904.0} + TC_{904.01} + TC_{960.111} + TC_{991.1})\, 0.15$$

Out[76]=

40 214.1 Dollars

In[77]:=

$$Q_{992.004} = N\left[\frac{TC_{992.004}}{40\,214.125864707676\ \frac{\text{Dollars}}{\text{ls}}}\right]$$

Out[77]=

1. ls

TOTAL CONSTRUCTION COST ESTIMATE FOR - OPTION 2- Bridge No. S-26-002 (A4Q)

In[78]:=

$$\text{TotalCost} = \text{AccountingForm}[TC_{101.0} + TC_{103.0} + TC_{114.1} + TC_{129.6} + TC_{151.2} + TC_{690.0} + TC_{751.0} + TC_{765.0} + TC_{851.1} + TC_{852} + TC_{853.21} + TC_{859} + TC_{904.0} + TC_{904.01} + TC_{960.111} + TC_{991.1} + TC_{992.001} + TC_{992.002} + TC_{992.004}, 12]$$

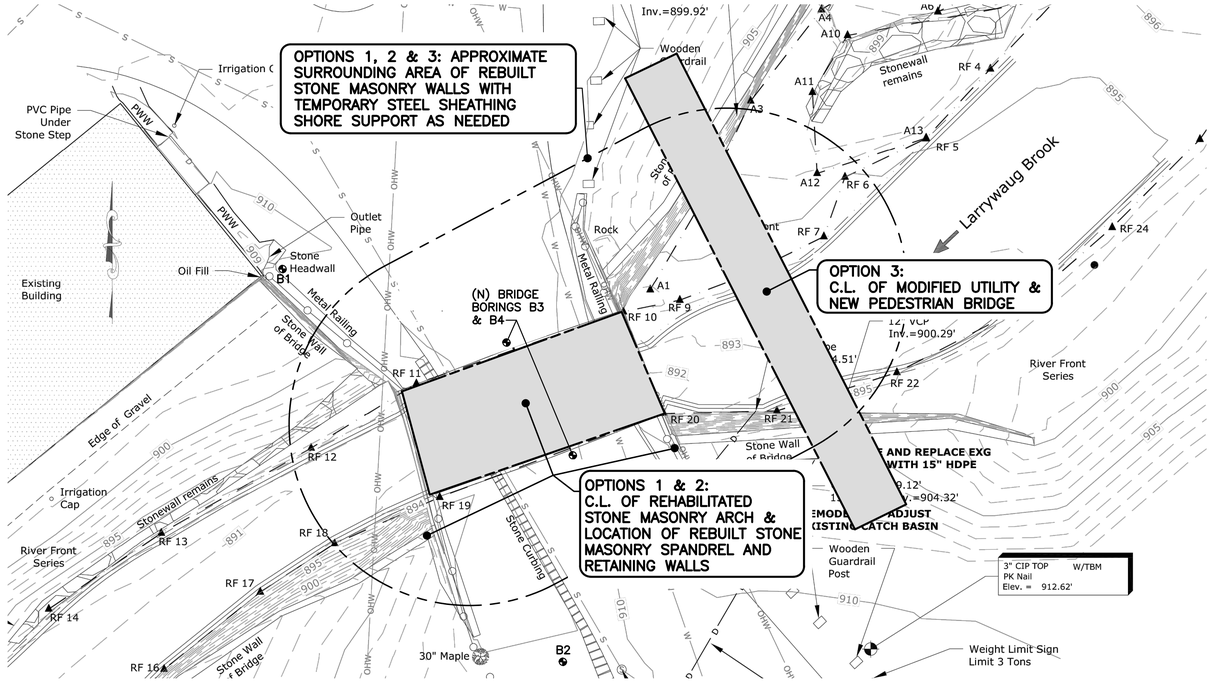
Out[78]//AccountingForm=

500808.298296 Dollars

E STRUCTURAL ENGINEERING COMPUTATIONS (PROVIDED UPON REQUEST)

OPTIONS I, II & III

PRELIMINARY SK DRAWINGS NOT FOR CONSTRUCTION 04.08.24

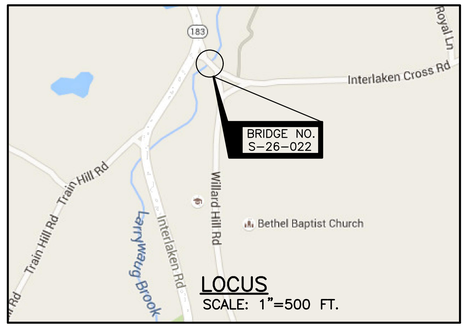


PLAN
SCALE: 1"=10'

INDEX OF SHEETS

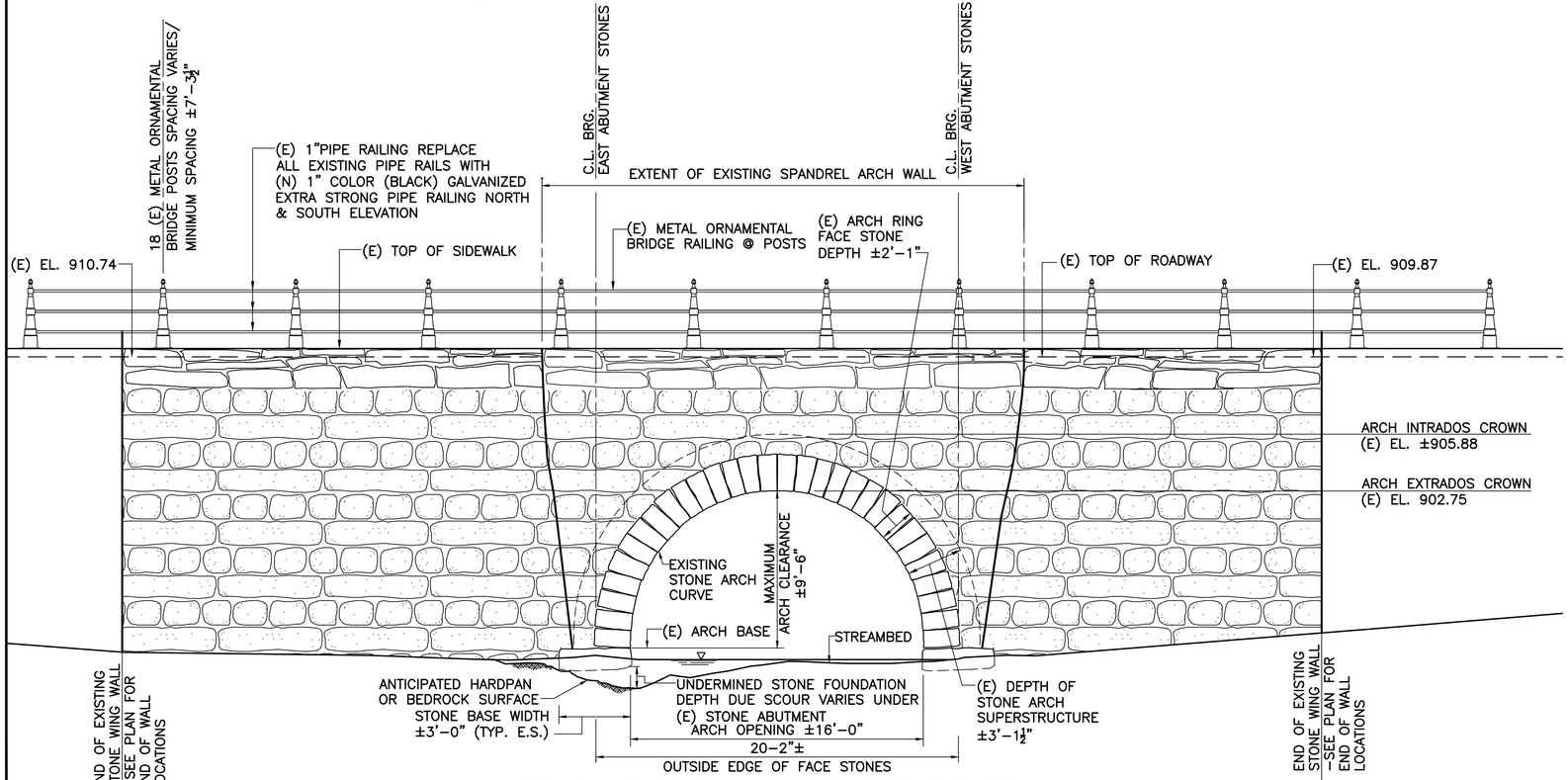
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.			
PROJECT FILE NO.			

OPTIONS 1, 2 & 3
INDEX, KEY PLAN, EXISTING ELEVATIONS & LOCUS

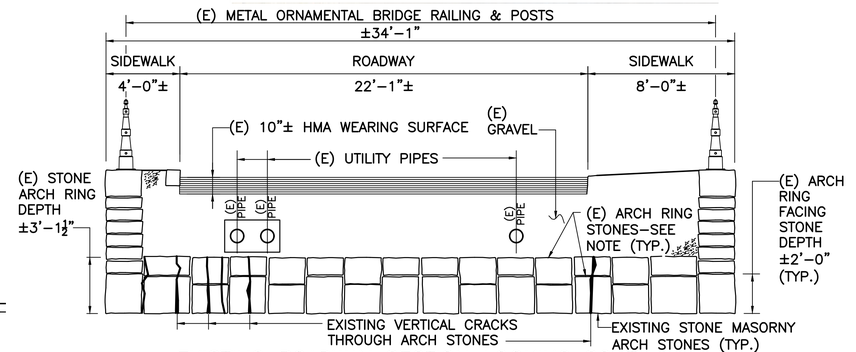


LOCUS
SCALE: 1"=500 FT.

PHOTO PANORAMA EXISTING WEST ELEVATION
SCALE: ¼"=1'–0"



SQUARE LONGITUDINAL SECTION–EAST ELEVATION
EXISTING & PROPOSED NEW REHABILITATED CIRCULAR STONE ARCH BRIDGE
(WEST ELEVATION SIMILAR)
SCALE: ¼"=1'–0"



EXISTING ROADWAY SECTION LOOKING SOUTH
SCALE: ¼"=1'–0"

NOTES:
1. (E) DENOTES EXISTING CONSTRUCTION USED THROUGHOUT SHEETS 1–4.
2. ALL EXISTING ARCH RINGS STONES VARY IN SIZE. SIZE VARIABILITY OF ALL EXISTING ARCH RING STONES ARE: 23"±4" WIDE x 12"±2" x 23"±4" DEEP.

COMMONWEALTH OF MASSACHUSETTS
JOSEPH D. BIANCHI
STRUCTURAL
No. 40197
REGISTERED PROFESSIONAL ENGINEER
04.08.24

JDB Consulting Engineers Inc.
835 Samoset Rd., Eastham, MA 02642

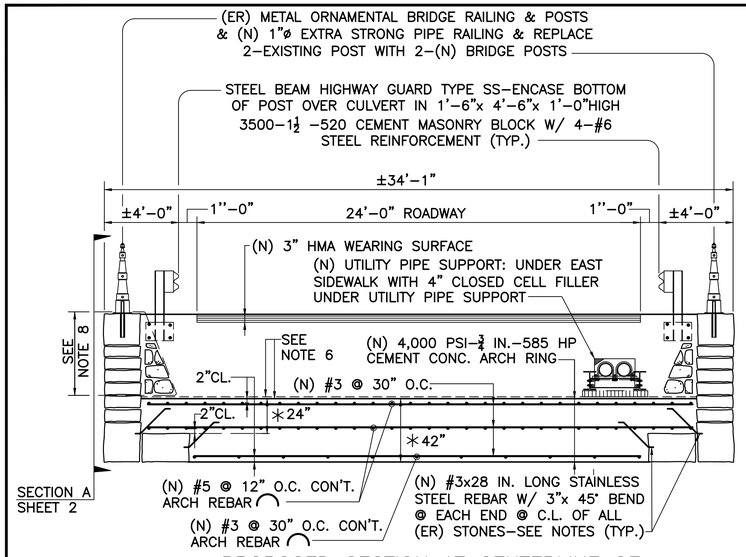
PRELIMINARY | ACCEPTED FOR CONSTRUCTION

PROPOSED BRIDGE EVALUATION STUDY

STOCKBRIDGE
INTERLAKEN CROSS RD.
OVER LARRYWAUG BROOK

TOWN OF STOCKBRIDGE
50 MAIN STREET
STOCKBRIDGE, MA 01262

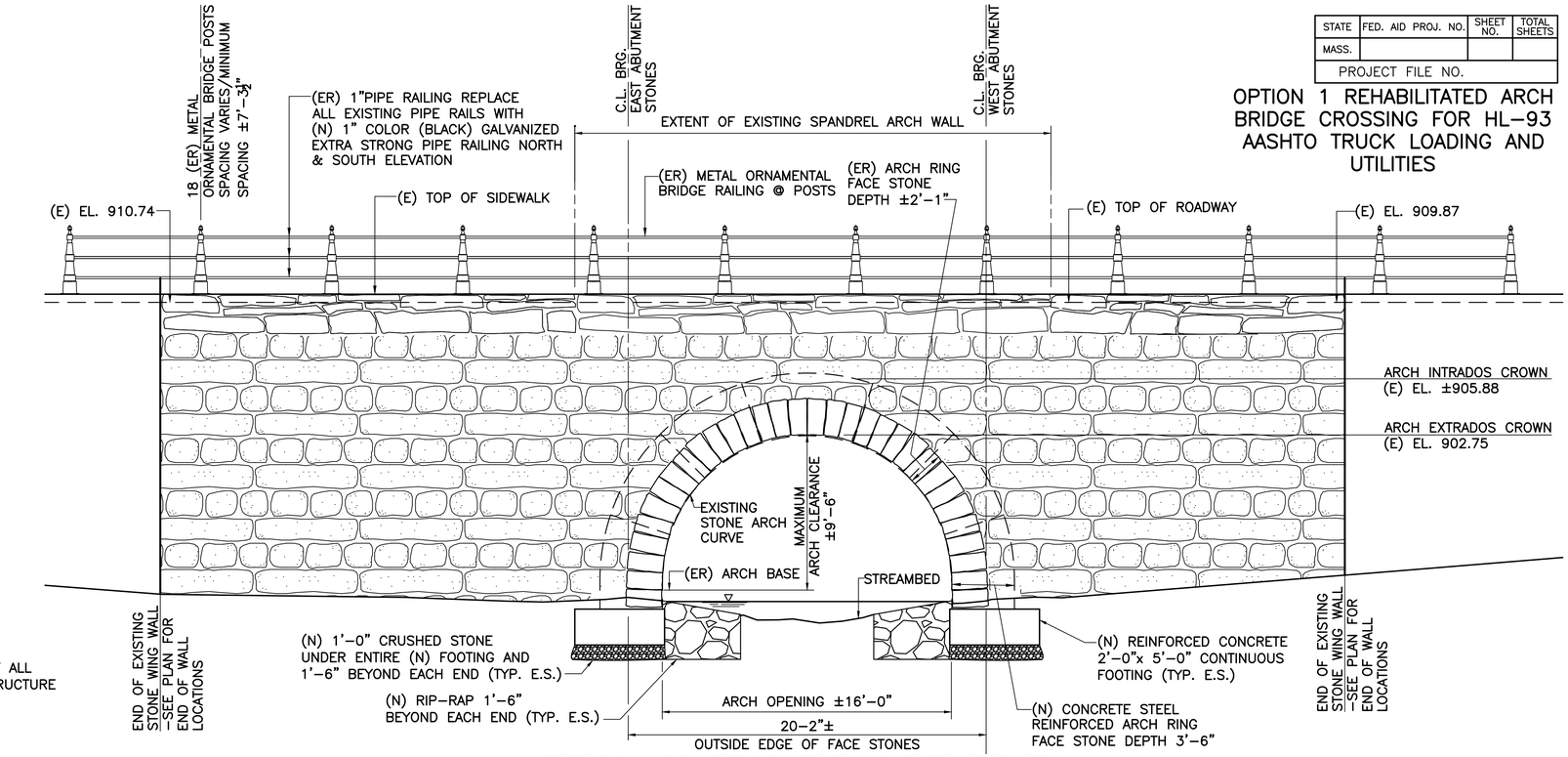
PRELIMINARY SK DRAWINGS NOT FOR CONSTRUCTION 04.08.24



PROPOSED SECTION AT CENTERLINE OF CROWN LOOKING SOUTH

SCALE: ¼"=1'–0"

NOTES:
1. INSTALL ONE #3 STAINLESS STEEL REBAR PER ARCH STONE AT THE CENTERLINE OF EACH STONE.
2. 3" LONG – 90° HOOK END SHALL BE IMBEDDED IN A WET CORED DRILLED HOLE–SEE NOTE 3.
3. WET CORE DRILL ½"øx 3" DEEP HOLE IN STONE: FILLED SOLID WITH ADHESIVE SIKA ANCHORFIX–1 MANUF. BY SIKA AS PER MANUF. SPECIFICATIONS.
4. ALL STEEL REINFORCEMENT SHALL BE EPOXY COATED.
5. FILL ALL (ER) VERTICAL ARCH STONES JOINTS TO A DEPTH OF 6" FROM THE INNER INTRADOS FACE OF ALL (ER) ARCH STONES SOLID ADJACENT TO THE (N) UPPER CONCRETE STEEL REINFORCED ARCH SUPERSTRUCTURE WITH SIKAGROUT 328 AT MORTAR CONSISTENCY MANUF. BY SIKA AS PER MANUF. SPECIFICATIONS.
6. POWER ROTOR WASH AT 1,450 PSI TOP SURFACE OF (N) CONCRETE STEEL REINFORCED ARCH SUPERSTRUCTURE 30 DAYS AFTER INSTALLATION AND WHEN DRY APPLY 30 MIL. HAND ROLLED COAT OF SIKADUR 32 HI–MOD EPOXY MEMBRANE MANUF. BY SIKA AS PER MANUF. SPECIFICATIONS.
7. ∗ DENOTES UNIFORM (N) STEEL REINFORCED CONCRETE ARCH DEPTH FROM BASE TO CROWN.
8. PARTIALLY CEMENTED STONE MASONRY ON SOUTH AND NORTH RING ARCHWAY RING ABUTMENT TO TOP SIDE OF ROADWAY SIMILAR ALL FOUR WING WALLS ALONG EACH APPROACH.



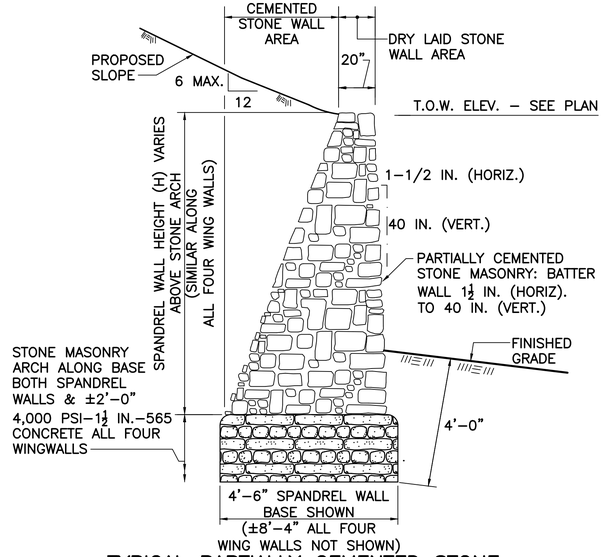
SECTION A SQUARE LONGITUDINAL EAST ELEVATION PROPOSED NEW REHABILITATED CIRCULAR STONE ARCH BRIDGE (WEST ELEVATION SIMILAR)

SCALE: ¼"=1'–0"

NOTES:
1.0 (ER) AND (N) DENOTES EXISTING REUSED AND NEWLY PROPOSED CONSTRUCTION RESPECTIVELY.
2.0 (E) DENOTES EXISTING CONDITION.

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.			
PROJECT FILE NO.			

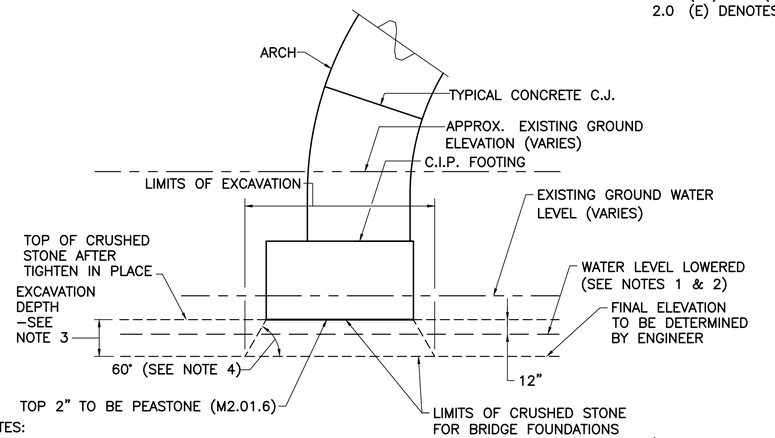
OPTION 1 REHABILITATED ARCH BRIDGE CROSSING FOR HL–93 AASHTO TRUCK LOADING AND UTILITIES



TYPICAL PARTIALLY CEMENTED STONE MASONRY WALL SPANDREL & WINGWALL SECTION (SIMILAR FOR NEARBY REBUILT STONE MASONRY WALLS WITH TEMPORARY STEEL SHEATHING SHORE SUPPORT NOT SHOWN)

NO SCALE

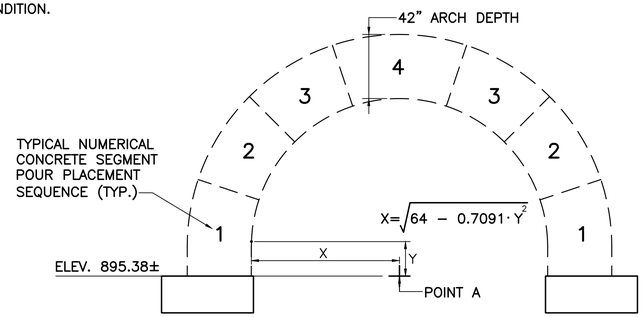
NOTES:
1. COMPACT NATIVE INORGANIC SOIL OR GRAVEL BORROW FOR BRIDGE FOUNDATIONS (MHD 1.51.1) UNDER FOOTING AS PER MHD SECTION 150.66.
2. ALL UNSUITABLE MATERIAL SHALL BE REMOVED WITHIN THE LIMITS OF THE FOUNDATION OF THE OF THE STRUCTURE, AS DIRECTED BY THE ENGINEER.



NOTES:
1.0 LOWER WATER LEVEL AS MUCH AS POSSIBLE WITHOUT DISTURBING THE GRANULAR SOIL (SIDES AND BOTTOM) AND TIGHTEN THE CRUSHED STONE IN PLACE BY USING A PNEUMATIC–TIRED EARTH ROLLER HAVING 4 WHEELS ABREAST AND LOADED TO 35 TONS OR BY OTHER MEANS APPROVED BY THE ENGINEER PRIOR TO THE INSTALLATION OF ALL C.I.P. FOOTINGS. WATER LEVEL MAY BE RAISED AFTER ALL C.I.P. FOOTINGS ARE INSTALLED.
2.0 WATER CONTROL REQUIREMENTS:
   1. SUBMIT WATER CONTROL PLAN FOR CHANNEL PRIOR TO REMOVAL OF EXISTING BRIDGE AND WINGWALLS FOR FINAL APPROVAL AND PRIOR TO THE INSTALLATION OF EACH FOOTING AND UPPER ARCH FRAME.
   2. EXCAVATED FOOTING AREA SHALL CONTINUE TO BE DEWATERED UNTIL FORMS ARE REMOVED.
   3. RIPRAP SHALL BE PLACED IN THE DRY AFTER DEWATERING ALL AREAS–SEE KEY PLAN.
3.0 MINIMUM DEPTH 1'–6"
4.0 45°, IF DEPTH IS 5'–0" OR LESS.

CRUSHED STONE FOR BRIDGE FOUNDATIONS UNDER ALL C.I.P. FOOTINGS

NO SCALE



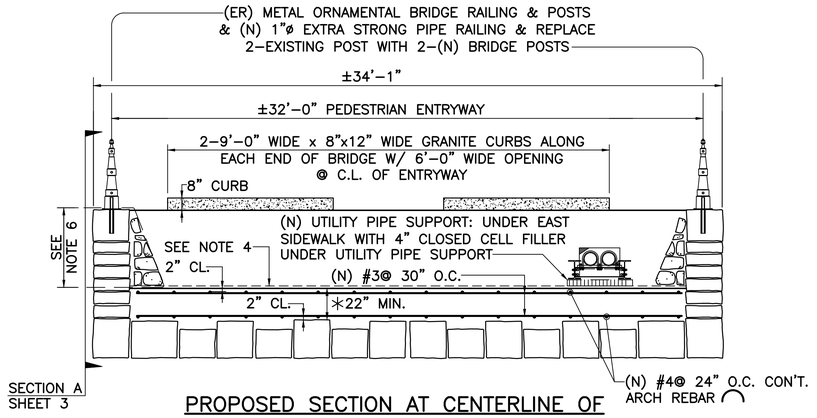
TYPICAL REINFORCED ARCH RING CONCRETE PLACEMENT SEQUENCE

SCALE: ¼"=1'–0"

CONSTRUCTION NOTES:
1.0 CONTRACTOR SHALL SUBMIT CONSTRUCTION SEQUENCE OF WHICH SHALL INCLUDE THE RECONSTRUCTION OF THE ARCH, SPANDREL WALLS, WING WALLS, EXISTING BACK FILL REMOVAL AND REPLACEMENT.
2.0 CONTRACTOR SHALL UNDERPIN AND SUPPORT THE ENTIRE NEW ARCH RING SHOWN ABOVE WITH TEMPORARY SUPPORT SHORING FORM SYSTEM DESIGNED BY PROFESSIONAL ENGINEER LICENSED IN MASSACHUSETTS–SEE NOTES 3, 4, 5 & 6.
3.0 ALL CONCRETE PLACEMENT SHALL BE INSTALLED IN ONE CONTINUOUS SEQUENCE FROM THE WESTERN INTERIOR SPANDREL WALL FACE TO THE EASTERN INTERIOR SPANDREL WALL FACE AND SHALL BE FULLY CONSOLIDATED WITH A FLEXIBLE CONCRETE VIBRATOR THROUGHOUT THE CONTINUOUS PLACEMENT OF EACH ARCH SEGMENT DURING THE CONCRETE PLACEMENT STAGE.
4.0 CONTRACTOR SHALL PROVIDE A STRUCTURAL FORM SUPPORT DESIGN FOR ALL TEMPORARY ARCH TOP EXTRADOS, BOTTOM INTRADOS AND THE SPANDREL WALL SIDES FORM SIDES FOR ALL C.I.P. CONCRETE AND STONES AS DETAILED AND SHOWN ON THE PLANS TO THE ENGINEER PRIOR TO CONSTRUCTION.
5.0 IN ONE CONTINUOUS CONCRETE PLACEMENT SEQUENCE ALL CEMENT CONCRETE MASONRY SHALL BE PLACED IN THE 1 TO 4 ORDER SHOWN ABOVE WITH RESPECT THE FOUR SEQUENCES SHOWN.
6.0 INTERIOR COORDINATES X & Y AS SHOWN ABOVE ARE OF THE EXISTING INTERIOR ARCH CURVE FACE SHOWN IN FEET AS SHOWN IN THE EQUATION ABOVE.

DATE	DESCRIPTION
APR. 8, 2024	ACCEPTED FOR CONSTRUCTION
USE ONLY PRINTS OF LATEST DATE	

PRELIMINARY SK DRAWINGS NOT FOR CONSTRUCTION 04.08.24

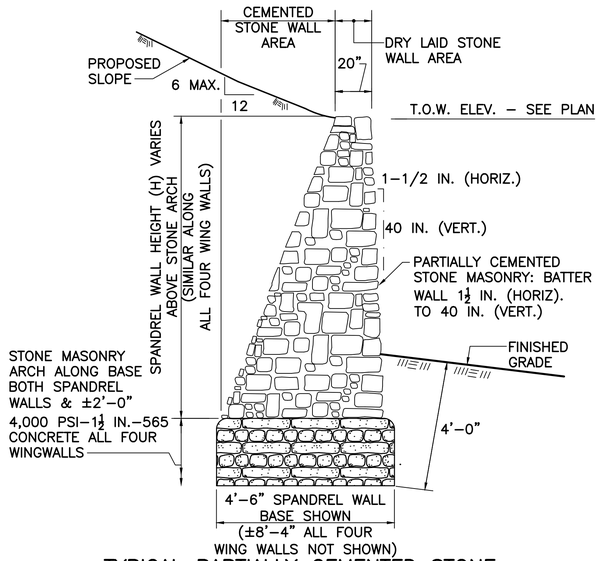


PROPOSED SECTION AT CENTERLINE OF CROWN LOOKING SOUTH

SCALE: ¼"=1'-0"

NOTES:

1. ALL STEEL REINFORCEMENT SHALL BE EPOXY COATED.
2. CAULK ALL (ER) ARCH STONES JOINTS TO A DEPTH OF ½" FROM THE INNER INTRADOS FACE OF ALL ARCH STONES SOLID ADJACENT TO THE (N) UPPER CONCRETE STEEL REINFORCED ARCH SUPERSTRUCTURE WITH SIKAGROUT 328 OR APPROVED EQUAL AS A MORTAR CONSISTENCY MANUF. BY SIKA AS PER MANUF. SPECIFICATIONS.
3. ALL (ER) ARCH STONES SHALL BE EPOXY BONDED TO THE (N) CONCRETE STEEL ARCH SLAB BY THE APPLICATION OF SIKADUR 32 HI-MOD EPOXY MANUF. BY SIKA TO ALL DRY LAID MASONRY STONES AS PER MANUF. SPECIFICATIONS.
4. POWER ROTOR WASH AT 1,450 PSI TOP SURFACE OF (N) CONCRETE STEEL REINFORCED ARCH SUPERSTRUCTURE 30 DAYS AFTER INSTALLATION WHEN DRY APPLY 30 MIL. COAT HAND ROLLED COAT OF SIKADUR 32 HI-MOD EPOXY MEMBRANE MANUF. BY SIKA AS PER MANUF. SPECIFICATIONS.
5. * DENOTES UNIFORM (N) STEEL REINFORCED CONCRETE ARCH DEPTH FROM BASE TO CROWN.
6. PARTIALLY CEMENTED STONE MASONRY ON SOUTH AND NORTH RING ARCHWAY RING ABUTMENT TO TOP SIDE OF ROADWAY SIMILAR ALL FOUR WING WALLS ALONG EACH APPROACH.

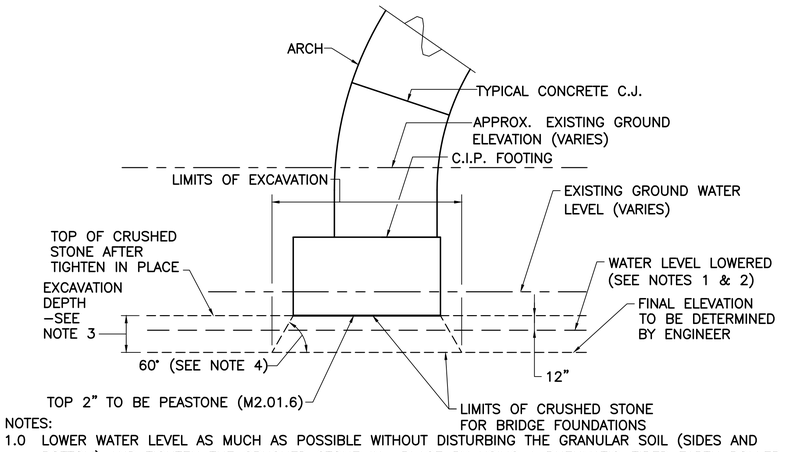


TYPICAL PARTIALLY CEMENTED STONE MASONRY WALL SPANDREL & WINGWALL SECTION (SIMILAR FOR NEARBY REBUILT STONE MASONRY WALLS WITH TEMPORARY STEEL SHEATHING SHORE SUPPORT NOT SHOWN)

NO SCALE

NOTES:

1. COMPACT NATIVE INORGANIC SOIL OR GRAVEL BORROW FOR BRIDGE FOUNDATIONS (MHD 1.51.1) UNDER FOOTING AS PER MHD SECTION 150.66.
2. ALL UNSUITABLE MATERIAL SHALL BE REMOVED WITHIN THE LIMITS OF THE FOUNDATION OF THE OF THE STRUCTURE, AS DIRECTED BY THE ENGINEER.



NOTES:

1.0 LOWER WATER LEVEL AS MUCH AS POSSIBLE WITHOUT DISTURBING THE GRANULAR SOIL (SIDES AND BOTTOM) AND TIGHTEN THE CRUSHED STONE IN PLACE BY USING A PNEUMATIC-TIRED EARTH ROLLER HAVING 4 WHEELS ABREAST AND LOADED TO 35 TONS OR BY OTHER MEANS APPROVED BY THE ENGINEER PRIOR TO THE INSTALLATION OF ALL C.I.P. FOOTINGS. WATER LEVEL MAY BE RAISED AFTER ALL C.I.P. FOOTINGS ARE INSTALLED.

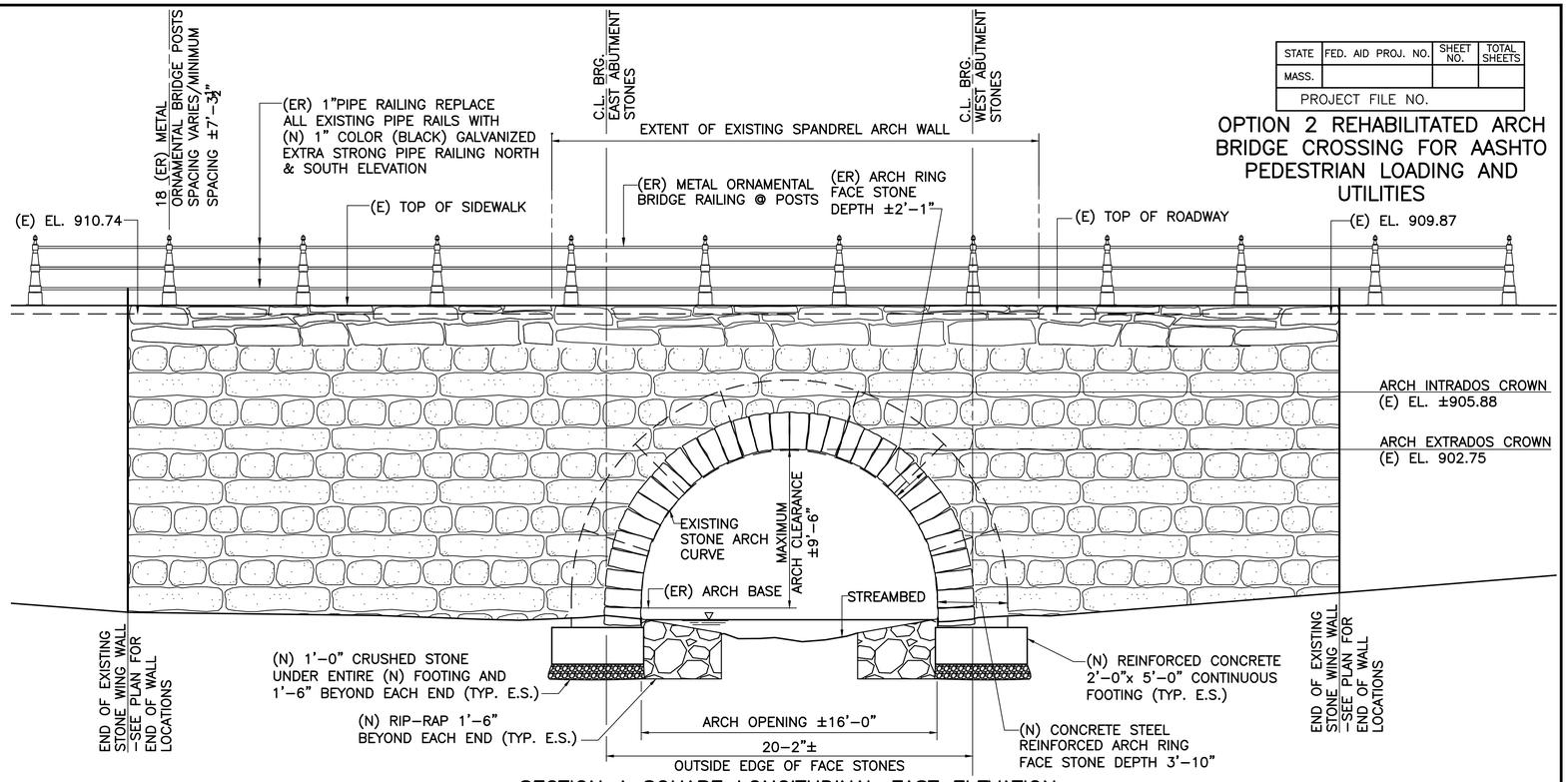
2.0 WATER CONTROL REQUIREMENTS:
   1. SUBMIT WATER CONTROL PLAN FOR CHANNEL PRIOR TO REMOVAL OF EXISTING BRIDGE AND WINGWALLS FOR FINAL APPROVAL AND PRIOR TO THE INSTALLATION OF EACH FOOTING AND UPPER ARCH FRAME.
   2. EXCAVATED FOOTING AREA SHALL CONTINUE TO BE DEWATERED UNTIL FORMS ARE REMOVED.
   3. RIPRAP SHALL BE PLACED IN THE DRY AFTER DEWATERING ALL AREAS-SEE KEY PLAN.

3.0 MINIMUM DEPTH 1'-6"

4.0 45°, IF DEPTH IS 5'-0" OR LESS.

CRUSHED STONE FOR BRIDGE FOUNDATIONS UNDER ALL C.I.P. FOOTINGS

NO SCALE



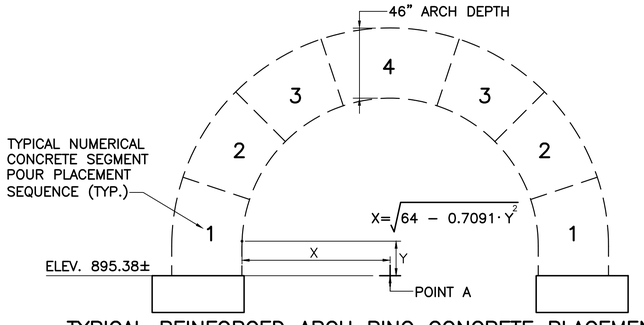
SECTION A SQUARE LONGITUDINAL EAST ELEVATION PROPOSED NEW REHABILITATED CIRCULAR STONE ARCH BRIDGE (WEST ELEVATION SIMILAR)

SCALE: ¼"=1'-0"

NOTES:

1.0 (ER) AND (N) DENOTES EXISTING REUSED AND NEWLY PROPOSED CONSTRUCTION RESPECTIVELY.

2.0 (E) DENOTES EXISTING CONDITION.



TYPICAL REINFORCED ARCH RING CONCRETE PLACEMENT SEQUENCE

SCALE: ¼"=1'-0"

CONSTRUCTION NOTES:

1.0 CONTRACTOR SHALL SUBMIT CONSTRUCTION SEQUENCE OF WHICH SHALL INCLUDE THE RECONSTRUCTION OF THE ARCH, SPANDREL WALLS, WING WALLS, EXISTING BACK FILL REMOVAL AND REPLACEMENT.

2.0 CONTRACTOR SHALL UNDERPIN AND SUPPORT THE ENTIRE NEW ARCH RING SHOWN ABOVE WITH TEMPORARY SUPPORT SHORING FORM SYSTEM DESIGNED BY PROFESSIONAL ENGINEER LICENSED IN MASSACHUSETTS-SEE NOTES 3, 4, 5 & 6.

3.0 ALL CONCRETE PLACEMENT SHALL BE INSTALLED IN ONE CONTINUOUS SEQUENCE FROM THE WESTERN INTERIOR SPANDREL WALL FACE TO THE EASTERN INTERIOR SPANDREL WALL FACE AND SHALL BE FULLY CONSOLIDATED WITH A FLEXIBLE CONCRETE VIBRATOR THROUGHOUT THE CONTINUOUS PLACEMENT OF EACH ARCH SEGMENT DURING THE CONCRETE PLACEMENT STAGE.

4.0 CONTRACTOR SHALL PROVIDE A STRUCTURAL FORM SUPPORT DESIGN FOR ALL TEMPORARY ARCH TOP EXTRADOS, BOTTOM INTRADOS AND THE SPANDREL WALL SIDES FORM SIDES FOR ALL C.I.P. CONCRETE AND STONES AS DETAILED AND SHOWN ON THE PLANS TO THE ENGINEER PRIOR TO CONSTRUCTION.

5.0 IN ONE CONTINUOUS CONCRETE PLACEMENT SEQUENCE ALL CEMENT CONCRETE MASONRY SHALL BE PLACED IN THE 1 TO 4 ORDER SHOWN ABOVE WITH RESPECT THE FOUR SEQUENCES SHOWN.

6.0 INTERIOR COORDINATES X & Y AS SHOWN ABOVE ARE OF THE EXISTING INTERIOR ARCH CURVE FACE SHOWN IN FEET AS SHOWN IN THE EQUATION ABOVE.

7.0 CRITICAL: CONTRACTOR SHALL INSTALL NEW CONCRETE C.I.P. CONCRETE ARCH SLAB SUPERSTRUCTURE SEGMENTS POURS IN 12" LIFTS OR LESS WHILE EPOXY BONDING COATING IS INSTALLED "WET" AS PER MAUNF. SPECIFICATIONS WHILE EACH CONCRETE LIFT IS POURED IN PLACE AND FORMED-REFER AND SEE "SECTION A" & NOTE 3 SHOWN ON "PROPOSED SECTION AT CENTERLINE OF CROWN LOOKING SOUTH" FOR ADDITIONAL INFORMATION.

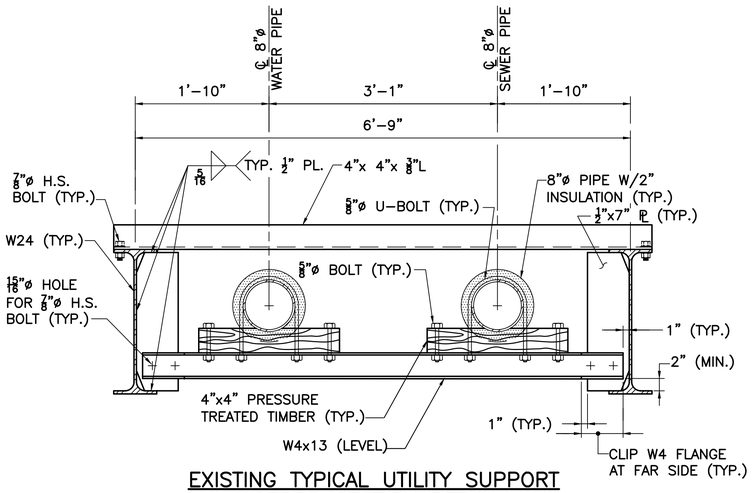
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.			
PROJECT FILE NO.			

OPTION 2 REHABILITATED ARCH BRIDGE CROSSING FOR AASHTO PEDESTRIAN LOADING AND UTILITIES

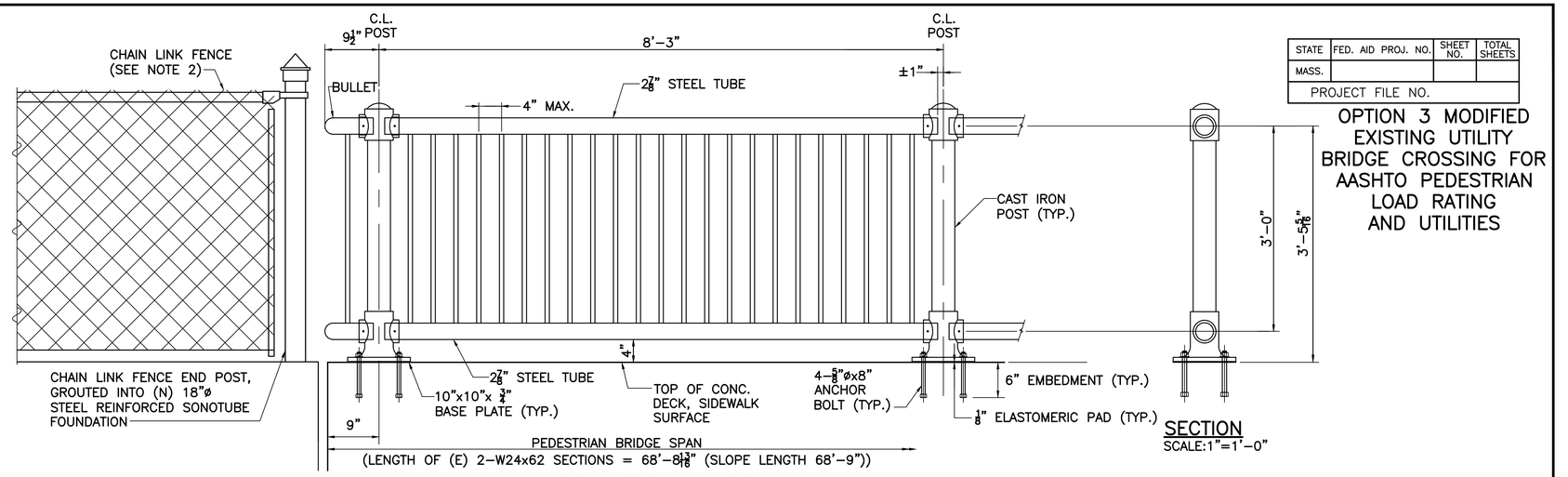
APR. 8, 2024	ACCEPTED FOR CONSTRUCTION
DATE	DESCRIPTION
USE ONLY PRINTS OF LATEST DATE	

SHEET 3 OF 4 SHEETS BRIDGE NO. S-26-022 (XXX)

PRELIMINARY SK DRAWINGS NOT FOR CONSTRUCTION 04.08.24



EXISTING TYPICAL UTILITY SUPPORT CROSS SECTION DETAIL
SCALE:1"=1'–0"



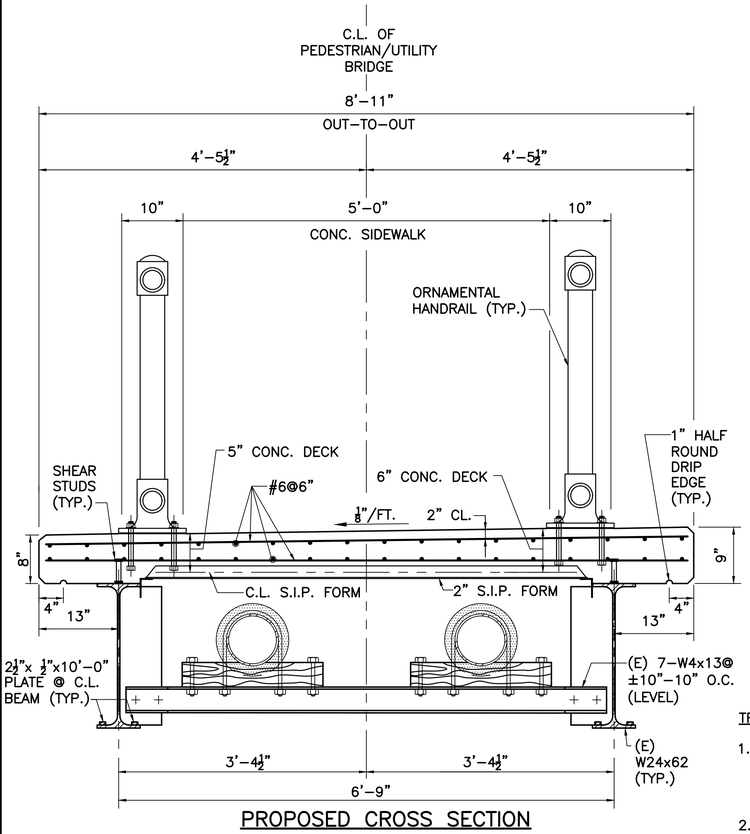
ORNAMENTAL HANDRAIL ON CONCRETE SIDEWALK DECK DETAIL
SCALE:1"=1'–0"

SECTION
SCALE:1"=1'–0"

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MASS.			
PROJECT FILE NO.			

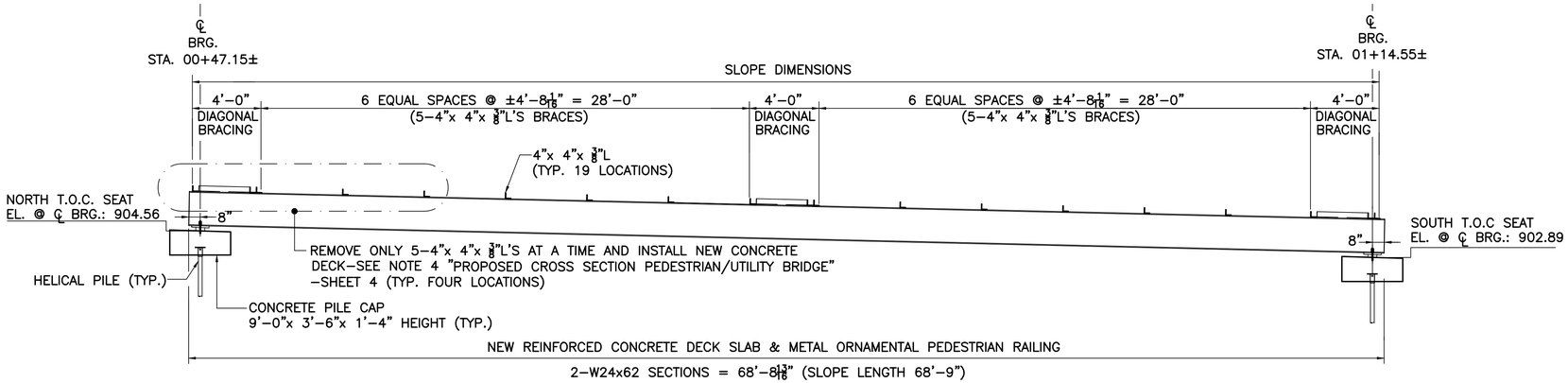
OPTION 3 MODIFIED EXISTING UTILITY BRIDGE CROSSING FOR AASHTO PEDESTRIAN LOAD RATING AND UTILITIES

NOTES:
1. STEEL SHAPES SHALL CONFORM TO ASTM A–36.
2. PIPE SHALL CONFORM TO ASTM A–53 GR. B, A500, OR A501.
3. POSTS SHALL BE GREY IRON CASTINGS CONFORMING TO ASTM A–48, CLASS # 30. PAINTED ONLY.
4. WORKMANSHIP SHALL BE SMOOTH AND BURR–FREE.
5. RAILS TO BE GALVANIZED TO ASTM A123 THEN PAINTED FED STD 595B BLACK #17038 (COLORGALV).
6. ANCHOR BOLTS SHALL BE SET WITH TEMPLATES.
7. THE NUT SECURING THE POST BASE PLATE TO THE CONCRETE DECK SLAB SHALL BE TIGHTENED A SNUG FIT, AND THEN GIVEN AN ADDITIONAL ⅛ TURN AFTER THE STEEL IS IN PLACE.
8. BOTTOM OF THE POST BASE PLATE TO BE SET ON A ⅛" MOLDED FABRIC BEARING PAD (M9.16.2). THE THICKNESS OF THE PAD SHALL BE IGNORED BY THE DETAILER.
9. POSTS SHALL BE SET PLUMB. RAILS SHALL BE PARALLEL TO THE PROFILE GRADE LINE.
10. MAXIMUM POST POST SPACING 8'–0"
11. HORIZONTAL RAILING COMPONENTS ARE TO HAVE FIXED CONNECTIONS AT ONE POST AND SLIDING AT THE OTHER. EACH POST AND SLIDING CONNECTIONS ON ONE SIDE AND HAVE FIXED CONNECTIONS ON THE OTHER.
12. ENDS OF TUBES SECTIONS SHALL BE SAWED. GRIND SMOOTH EXPOSED EDGES. ALL CUT ENDS SHALL BE PLUMB AND SMOOTH.
13. ALL STEEL FOR THE ORNAMENTAL RAILINGS SHALL BE GALVANIZED AND PAINTED BLACK. ALL STEEL, INCLUDING HEADS OF EXPOSED BOLTS, SHALL HAVE A FINISH COAT COLOR BLACK, FEDERAL COLOR ID #17038.
14. PROPOSED CHAIN LINK FENCE SHALL HAVE A BLACK VINYL FINISH COATING.



PROPOSED CROSS SECTION PEDESTRIAN/UTILITY BRIDGE
SCALE:1"=1'–0"

NOTES:
1. ALL STEEL REINFORCEMENT SHALL BE EPOXY COATED.
2. CONCRETE DECK SLAB SHALL 4,000 PSI, ⅜ IN., 120 LIGHTWEIGHT CEMENT CONCRETE.
3. BRIDGE DECK SHALL BE BROOM FINISHED, TRANSVERSELY.
4. CONCRETE DECK SLAB SHALL BE INSTALLED IN FOUR SEPARATE POURS–SEE "TRANSVERSE CONSTRUCTION JOINT DETAIL IN DECK SLAB" FOR ADDITIONAL INFORMATION.
   ONLY FIVE CONSECUTIVE 4"x 4"x ⅜"L TOP CHORD BRACING MEMBERS SHALL BE REMOVED AT A TIME FOR EACH OF THE FOUR SEPARATE DECK SLAB POURS
5. REFER TO "EXISTING TYPICAL UTILITY SUPPORT CROSS SECTION DETAIL" THIS SHEET FOR ADDITIONAL INFORMATION.

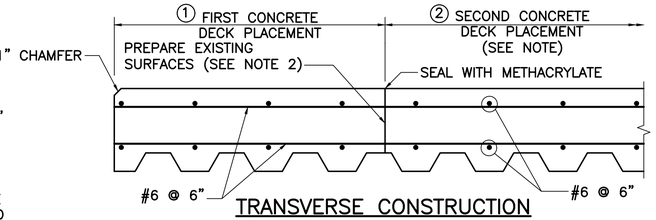


EXISTING UTILITY BRIDGE WEST ELEVATION
SCALE: ½"=1'–0"

NOTE:
NEW REINFORCED CONCRETE DECK SLAB & METAL ORNAMENTAL PEDESTRIAN RAILING NOT SHOWN FOR CLARITY.

TRANSVERSE PEDESTRIAN CONCRETE DECK JOINT NOTES:

1. BRIDGE DECK SLAB SHALL BE PLACED IN ACCORDANCE WITH THE PLACEMENT SEQUENCE SHOWN ON THE PLANS. EACH SEQUENTIAL DECK SLAB POUR SHALL NOT BE INSTALLED UNTIL 3 DAYS HAVE PAST AFTER THE PRECEDING DECK SLAB POUR.
2. THE SURFACE OF THE PREVIOUSLY CAST CONCRETE SHALL BE BLAST CLEANED, ROUGHENED, WETTED WITH CLEAN WATER, AND THEN FLUSHED WITH A MORTAR COMPOSED OF EQUAL PARTS OF THE CEMENT AND SAND SPECIFIED FOR THE NEW CONCRETE, BEFORE NEW CONCRETE IS PLACED ADJACENT THERETO.
3. IN LIEU OF THE MORTAR, AN EPOXY ADHESIVE SUITABLE FOR BONDING FRESH CONCRETE TO HARDENED CONCRETE FOR LOAD BEARING APPLICATIONS MAY BE USED. THE EPOXY ADHESIVE SHALL CONFORM TO AASHTO M 235 TYPE V AND SHALL BE APPLIED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
4. DOWEL BAR SPLICERS SHALL BE USED WHERE USE OF LAP SPLICES IS NOT FEASIBLE.



TRANSVERSE CONSTRUCTION JOINT DETAIL IN DECK SLAB
NOT TO SCALE

NOTE:
SIMILAR FOR CONCRETE DECK SLAB PLACEMENT POURS 1 THROUGH 5

DATE	DESCRIPTION
APR. 8, 2024	ACCEPTED FOR CONSTRUCTION
USE ONLY PRINTS OF LATEST DATE	

JDB Consulting Engineers, Inc.
835 Samoset Rd., Eastham, MA 02642
Telephone 508.255.1422

April 12, 2024

Invoice submitted to:
Town of Stockbridge
P.O. Box 417
50 Main St.
Stockbridge MA 02162

In reference to:
Project No. 02311-061-02
Curtisville Bridge-Bridge Rehabilitation Study
Stockbridge, MA

Description of services

Complete structural engineering design services pertaining for the evaluation of three relative bridge replacements options (superstructure and substructure) along the present bridge span site location. Complete bridge sketch design plans, written report study and construction estimates with respect a existing referenced bridge crossing including the existing nearby town utility bridge along the referenced crossing and site.

Bridge Engineer:
03.10.24 through 03.16.24 - 3 hrs.,
03.17.24 through 03.23.24 - 3 hrs.,
03.24.24 through 03.30.24 - 2 hrs.,
03.31.24 through 04.06.24 - 1 hrs.,
04.07.24 through 04.13.24 - 1 hrs.,

Design Engineer:
03.10.24 through 03.16.24 - 15 hrs.,
03.17.24 through 03.23.24 - 25 hrs.,
03.24.24 through 03.30.24 - 35 hrs.,
03.31.24 through 04.06.24 - 2 hrs.,
04.07.24 through 04.13.24 - 2 hrs.,

LABOR

Bridge Engineer	10	hours	@ 160.00/hour	=	$1,600.00
Design Engineer	79	hours	@ $90.00/hour	=	$7,110.00
			Subtotal:		$8,710.00

EXPENSES

No expenses incurred

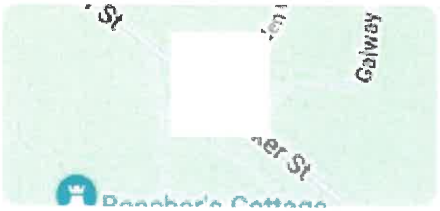
Previous balance

Balance due $8,710.00

Invoice balances remaining unpaid for thirty (30) calendar days after invoice date is subject to additional interest charges from invoice date of 1.5 percent per month.

Google Maps 263 Walker St

Image capture: Jul 2023 © 2024 Google



STOCKBRIDGE
EAST STOCKBRIDGE LEE ROAD/ROUTE 102

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	N/A	#	#
PROJECT FILE NO. 612637, 118827			

CONSTRUCTION PLANS

CONTINUED ON SHEET NO. 2

0 40 100 160

SCALE: 1" = 40'

STOCKBRIDGERT102_SIDEWALKPROJECTFINAL1.DWG Plotted on 26-Mar-2024 12:37 PM

STOCKBRIDGE
EAST STOCKBRIDGE LEE ROAD/ROUTE 102

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	N/A	#	#
PROJECT FILE NO. 612637, 118827			

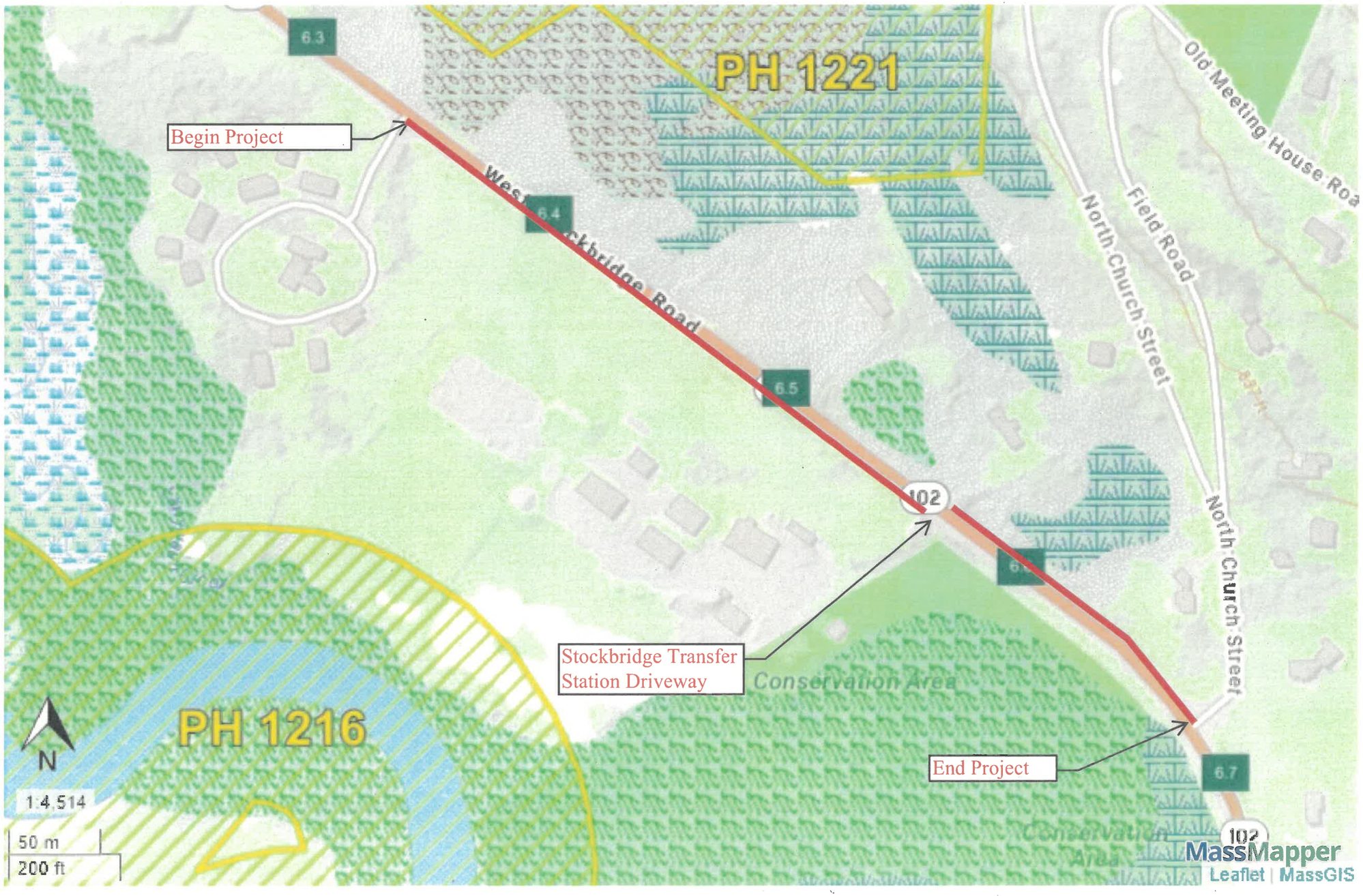
CONSTRUCTION PLANS

0 40 100 160

SCALE: 1" = 40'

STOCKBRIDGERT102_SIDEWALKPROJECTFINAL1.DWG Plotted on 26-Mar-2024 12:37 PM

Stockbridge-Sidewalk Construction Route 102



NHESP Priority Habitats of Rare Species

NHESP Estimated Habitats of Rare Wildlife

DEP Wetlands Detailed

- Barrier Beach System
- Barrier Beach-Deep Marsh
- Barrier Beach-Wooded Swamp Mixed Trees
- Barrier Beach-Coastal Beach
- Barrier Beach-Coastal Dune
- Barrier Beach-Marsh
- Barrier Beach-Salt Marsh
- Barrier Beach-Shrub Swamp
- Barrier Beach-Wooded Swamp Coniferous
- Barrier Beach-Wooded Swamp Deciduous
- Bog
- Coastal Bank Bluff or Sea Cliff
- Coastal Beach
- Coastal Dune
- Cranberry Bog
- Deep Marsh
- Barrier Beach-Open Water
- Open Water
- Rocky Intertidal Shore
- Salt Marsh
- Shallow Marsh Meadow or Fen
- Shrub Swamp
- Tidal Flat
- Wooded Swamp Coniferous
- Wooded Swamp Deciduous
- Wooded Swamp Mixed Trees

Highway Mile Markers

Town of Stockbridge
50 MAIN STREET, P.O. BOX 417
STOCKBRIDGE, MASSACHUSETTS 01262-0417
TELEPHONE 413-298-4170
FAX 41.3-298-4344

State Bridge Engineer
Alexander Bardow, P.E.
MassDOT Highway Division
10 Park Plaza, Room 7110
Boston, MA 02116

May 2, 2024

Re: Town of Stockbridge
Hydraulic Bridge Wavier
Glendale Middle Road over the Housactonic River
MassDOT Bridge No. S-26-002

Dear Mr. Bardow:

Town of Stockbridge Board of Selectmen wish to make a formal approval request for a hydraulic opening waiver with respect this town's upcoming replacement / rehabilitation bridge project. This waiver request is critical and necessary for this bridge project after our Chapter 85 Section 35 of the General Laws of Massachusetts review is fully completed and accepted.

The Board of Selectmen is strongly committed to the replacement of the referenced important bridge for the regional transportation needs along this location as noted by our current MassWorks Infrastructure grant and our recent commitment of town funding of this project.

To increase and raise the hydraulic opening for this bridge, in order to meet and provide a new 2 ft. clearance above the 25-year storm design flood stage height would not change the flooding along the local surrounding area. The existing roadway historically floods along the easterly bridge approach. This flooding would not change even if a new, conforming, hydraulic opening was to be installed. The surrounding properties would not flood to a lesser degree if this new bridge height were to be increased to meet this 25-year flood stage height plus 2 ft. clearance as suggested for this crossing.

The easterly flood plain area in question is dramatical large during and when 25-year flood events occur and also contains roughly a 100-acre private golf course which also floods. If such an area was to be partially filled to accommodate current 25-year design flood parameters such an area is would be problematic with respect to roadway safety, costly and impractical due to the interests of local residents and land owners who seek to maintain the present vertical footprint along this bridge crossing so as not to infringe on the heights of future floods.

Additionally, if the vertical highway profile of a new bridge replacement were to be raised with a new truss bridge type of minimal vertical structural depth the easterly and westerly roadway

approach grades would need to raised approximately 3.6 ft. to accommodate the 25-yr. design flood with a 2 ft. draft clearance of which introduces local traffic safety problems.

This would introduce a major highway safety concern along the westerly roadway approach. Since this area contains a municipal roadway intersection located approximately 40 ft. from the existing and proposed westerly bridge abutment along this crossing.

Therefore, the design of such a new bridge replacement for the 25-year storm becomes impractical and costly and will greatly delay this project due to land easements and costs associated with such land easements especially when new public highway safety issues are introduced into such hydraulic design criteria.

Therefore, a waiver with respect to such a hydraulic bridge opening requirement is being requested for this important bridge within our community.

The towns newly selected and proposed bridge option improves by maintaining the past hydraulic opening requirement but does not meet the 2 ft. separation draft clearance during future 25-year storm events.

The existing bridge superstructure with precisely the same hydraulic opening of the new bridge replacement being proposed and incorporated into the new bridge design has been in use and place for over the past 150 years with no negative flooding impacts within our community.

The Board of Selectmen would appreciate an early and favorable review of the enclosed aforementioned hydraulic bridge opening wavier so construction for our preferred replacement option may proceed as soon as our Chapter 85 Section 35 review and approval is completed and granted.

Should you require additional information, please contact Mr. Joseph D. Bianchi, P.E. at his office in JDB Consulting Engineers, Inc., Eastham, Massachusetts.

Thank you for your kind consideration in this matter.

TOWN OF STOCKBRIDGE
BOARD OF SELECTMEN

_____
Ernest J. Cardillo, Chair

_____
Jamie M. Minacci

_____
Patrick White,