Maura Healey, Governor
Kimberley Driscoll, Lieutenant Governor
Monica Tibbits-Nutt, Secretary & CEO
Jonathan L. Gulliver, Highway Administrator

massDOT
Massachusetts Department of Transportation
Highway Division

April 17, 2024

608857-125514

ADDENDUM NO. 1

To Prospective Bidders' and Others on:

CHESHIRE

Federal Aid Project Number STP(BR-OFF)-003S(725)X
Bridge Replacement, C-10-002, Sand Mill Road over Dry Brook

THIS PROPOSAL TO BE OPENED AND READ: TUESDAY, APRIL 23, 2024, at 2:00 P.M.

Transmitting revisions to the Contract Documents as follows:

QUESTIONS AND RESPONSES:	1 page.
DOCUMENT 00010:	Revised pages 2 and 3.
DOCUMENT 00104:	Revised pages 1 and 3.
DOCUMENT 00861:	Revised pages 3 through 40.
DOCUMENT 00880:	Deleted document in its entirety and inserted new document (28 pages).
DOCUMENT A00803:	Added new document (78 pages).
DOCUMENT A00804:	Added new document (146 pages).
DOCUMENT A00805:	Added new document (12 pages).
PLANS:	Existing plans (5 Sheets).

Note:
Response to question 3 alters sheet 24 of 32.
Official plan changes will be made at a later date.

Take note of the above, substitute the revised pages for the originals, delete document indicated, insert new document in proper order, and acknowledge Addendum No. 1 in your Expedite Proposal file before submitting your bid.

Very truly yours,

Eric M. Cardone Digitally signed by Eric M. Cardone
Date: 2024.04.17 08:44:10 -04'00'

Eric M. Cardone, P.E.
Construction Contracts Engineer

CD
c: Caitlin Marshall, Project Manager

Ten Park Plaza, Suite 4160, Boston, MA 02116
Tel: 857-368-4636, TTY: 857-368-0655
mass.gov/massdot

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CHESHIRE

Federal Aid Project Number STP(BR-OFF)-003S(725)X
Bridge Replacement, C-10-002, Sand Mill Road over Dry Brook

(608857-125514)

QUESTIONS AND RESPONSES

Addendum No. 1, April 17, 2024

Kinetic Demolition & Engineering, LLC, email dated April 9, 2024

Question 1)	Are there any: • existing plans? • inspection reports? • or rating reports available for the existing bridge?
Response 1)	See below: • See attached available existing plans. Bridge C-10-2 is a municipal owned structure. You will need to contact the town for any existing plans. • See new Document A00805. • See new Document A00804.

E.T.& L. Corp., email dated April 16, 2024

Question 2)	Can the plans for the existing bridge structure be provided?
Response 2)	See Response 1).
Question 3)	Sheet 2 of the Bridge Plans calls for the deck slab to be 5,000 psi ¾” 685 HP Cement Concrete. Sheet 12 of the Bridge Plans calls for the deck slab to be 5,000 psi ¾” 685 HP Cement Concrete. Sheet 12 of the Bridge Plans calls for the deck slab to be 4,000 psi ¾” 585 HP Concrete. Please confirm the concrete mix intended for use for the deck slab.
Response 3)	Note 4 on Sheet 12 of 16 of the Bridge Plans (24 of 32) shall be read, "Concrete Deck Slab shall be 5000 PSI, 3/4", 585 HP." Official plan changes will be made at a later date.

① Addendum No. 1, April 17, 2024

TABLE OF CONTENTS (Continued)

Addendum No. 1, April 17, 2024

TABLE OF CONTENTS (Continued)

*** END OF DOCUMENT ***

① Addendum No. 1, April 16, 2024

DOCUMENT 00104

NOTICE TO CONTRACTORS

Electronic proposals for the following project will be received through the internet using Bid Express until the date and time stated below and will be posted on www.bidx.com forthwith after the bid submission deadline. No paper copies of bids will be accepted. All Bidders must have a valid vendor code issued by MassDOT in order to bid on projects. Bidders need to apply for a Digital ID at least 14 days prior to a scheduled bid opening date with Bid Express.

① **TUESDAY, APRIL 23, 2024 at 2:00 P.M. ****
CHESHIRE
Federal Aid Project No. STP(BR-OFF)-003S(725)X
Bridge Replacement, C-10-002, Sand Mill Road over Dry Brook
(608857)

****Date Subject to Change**

PROJECT VALUE = $3,141,000.00

Bidders must be pre-qualified by the Department in the BRIDGE-CONSTRUCTION category to bid on the above project. An award will not be made to a Contractor who is not pre-qualified by the Department prior to the opening of Proposals.

All prospective Bidders who intend to bid on this project must obtain “Request Proposal Form (R109)”. The blank “Request Proposal Form (R109)” can be obtained at:
https://www.mass.gov/prequalification-of-horizontal-construction-firms.

All prospective Bidders must complete and e-mail an electronic copy of “Request Proposal Form (R109)” to the MassDOT Director of Prequalification for approval:
prequal.r109@dot.state.ma.us.

Proposal documents for official bidders are posted on www.bidx.com. Other interested parties may receive informational Contract Documents containing the Plans and Special Provisions, free of charge.

Bids will be considered, and the contract awarded in accordance with statutes governing such contracts in accordance with Massachusetts General Laws Chapter 30 § 39M.

The Project Bids File Attachments folder for proposals at www.bidx.com shall be used for submitting at the time of bid required information such as the Bid Bond required document, and other documents that may be requested in the proposal.

① Addendum No. 1, April 16, 2024

NOTICE TO CONTRACTORS (Continued)

PRICE ADJUSTMENTS

① This Contract contains price adjustments for hot mix asphalt and Portland cement mixtures, diesel fuel, and gasoline. For reference the base prices are as follows: liquid asphalt $637.50 per ton, Portland cement $425.53 per ton, diesel fuel $3.155 per gallon, and gasoline $2.695 per gallon, and Steel Base Price Index 436.7. MassDOT posts the **Price Adjustments** on their Highway Division's website at:
https://www.mass.gov/massdot-contract-price-adjustments

This Contract contains Price Adjustments for steel. See Document 00813 - PRICE ADJUSTMENT FOR STRUCTURAL STEEL AND REINFORCING STEEL for their application and base prices.

MassDOT projects are subject to the rules and regulations of the Architectural Access Board (521 CMR 1.00 et seq.)

Prospective bidders and interested parties can access this information and more via the internet at WWW.COMMBUYS.COM.

BY: Monica G. Tibbits-Nutt, Secretary and CEO, MassDOT
Jonathan L. Gulliver, Administrator, MassDOT Highway Division
SATURDAY, MARCH 16, 2024

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF LABOR AND WORKFORCE DEVELOPMENT
DEPARTMENT OF LABOR STANDARDS

Prevailing Wage Rates

As determined by the Director under the provisions of the Massachusetts General Laws, Chapter 149, Sections 26 to 27H

MAURA HEALEY
Governor

KIM DRISCOLL
Lt. Governor

LAUREN JONES
Secretary

MICHAEL FLANAGAN
Director

Awarding Authority: MassDOT Highway

Contract Number: 125514 **City/Town:** CHESHIRE

Description of Work: CHESHIRE: FAP No. STP(BR-OFF)-003S(725)X Bridge Replacement, C-10-002, Sand Mill Road over Dry Brook

Job Location: Sand Mill Road over Dry Brook

Information about Prevailing Wage Schedules for Awarding Authorities and Contractors

- **The wage rates will remain in effect for the duration of the project, except in the case of multi-year public construction projects. For construction projects lasting longer than one year, awarding authorities must request an updated wage schedule no later than two weeks before the anniversary of the date the contract was executed by the awarding authority and the general contractor.** For multi-year CM AT RISK projects, the awarding authority must request an annual update no later than two weeks before the anniversary date, determined as the earlier of: (a) the execution date of the GMP Amendment, or (b) the execution date of the first amendment to permit procurement of construction services. The annual update requirement is not applicable to 27F “rental of equipment” contracts. **The updated wage schedule must be provided to all contractors, including general and sub-contractors, working on the construction project.**
- This wage schedule applies only to the specific project referenced at the top of this page and uniquely identified by the “Wage Request Number” on all pages of this schedule.
- An Awarding Authority must request an updated wage schedule if it has not opened bids or selected a contractor within 90 days of the date of issuance of the wage schedule. For CM AT RISK projects (bid pursuant to G.L. c.149A), the earlier of: (a) the execution date of the GMP Amendment, or (b) the bid for the first construction scope of work must be within 90-days of the wage schedule issuance date.
- The wage schedule shall be incorporated in any advertisement or call for bids for the project as required by M.G.L. c. 149, § 27. The wage schedule shall be made a part of the contract awarded for the project. The wage schedule must be posted in a conspicuous place at the work site for the life of the project in accordance with M.G.L. c. 149 § 27. The wages listed on the wage schedule must be paid to employees performing construction work on the project whether they are employed by the prime contractor, a filed sub-bidder, or a sub-contractor.
- Apprentices working on the project are required to be registered with the Massachusetts Division of Apprentice Standards (DAS). Apprentices must keep their apprentice identification card on their persons during all work hours on the project. An apprentice registered with DAS may be paid the lower apprentice wage rate at the applicable step as provided on the prevailing wage schedule. **Any apprentice not registered with DAS regardless of whether they are registered with another federal, state, local, or private agency must be paid the journeyworker's rate.**
- Every contractor or subcontractor working on the construction project must submit weekly payroll reports and a Statement of Compliance directly to the awarding authority by mail or email and keep them on file for three years. Each weekly payroll report must contain: the employee’s name, address, occupational classification, hours worked, and wages paid. Do not submit weekly payroll reports to DLS. For a sample payroll reporting form go to http://www.mass.gov/dols/pw.
- Contractors with questions about the wage rates or classifications included on the wage schedule have an affirmative obligation to inquire with DLS at (617) 626-6953.
- Contractors must obtain the wage schedules from awarding authorities. Failure of a contractor or subcontractor to pay the prevailing wage rates listed on the wage schedule to all employees who perform construction work on the project is a violation of the law and subjects the contractor or subcontractor to civil and criminal penalties.
- Employees not receiving the prevailing wage rate set forth on the wage schedule may file a complaint with the Fair Labor Division of the office of the Attorney General at (617) 727-3465.

Issue Date: 03/19/2024 **Wage Request Number:** 20240319-022

Classification **Construction**	**Effective Date**	**Base Wage**	**Health**	**Pension**	**Supplemental Unemployment**	**Total Rate**
(2 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	01/01/2024	$38.95	$15.07	$18.67	$0.00	$72.69
	06/01/2024	$39.95	$15.07	$18.67	$0.00	$73.69
	12/01/2024	$39.95	$15.07	$20.17	$0.00	$75.19
	01/01/2025	$39.95	$15.57	$20.17	$0.00	$75.69
	06/01/2025	$40.95	$15.57	$20.17	$0.00	$76.69
	12/01/2025	$40.95	$15.57	$21.78	$0.00	$78.30
	01/01/2026	$40.95	$16.17	$21.78	$0.00	$78.90
	06/01/2026	$41.95	$16.17	$21.78	$0.00	$79.90
	12/01/2026	$41.95	$16.17	$23.52	$0.00	$81.64
	01/01/2027	$41.95	$16.77	$23.52	$0.00	$82.24
(3 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	01/01/2024	$39.02	$15.07	$18.67	$0.00	$72.76
	06/01/2024	$40.02	$15.07	$18.67	$0.00	$73.76
	12/01/2024	$40.02	$15.07	$20.17	$0.00	$75.26
	01/01/2025	$40.02	$15.57	$20.17	$0.00	$75.76
	06/01/2025	$41.02	$15.57	$20.17	$0.00	$76.76
	12/01/2025	$41.02	$15.57	$21.78	$0.00	$78.37
	01/01/2026	$41.02	$16.17	$21.78	$0.00	$78.97
	06/01/2026	$42.02	$16.17	$21.78	$0.00	$79.97
	12/01/2026	$42.02	$16.17	$23.52	$0.00	$81.71
	01/01/2027	$42.02	$16.77	$23.52	$0.00	$82.31
(4 & 5 AXLE) DRIVER - EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	01/01/2024	$39.14	$15.07	$18.67	$0.00	$72.88
	06/01/2024	$40.14	$15.07	$18.67	$0.00	$73.88
	12/01/2024	$40.14	$15.07	$20.17	$0.00	$75.38
	01/01/2025	$40.14	$15.57	$20.17	$0.00	$75.88
	06/01/2025	$41.14	$15.57	$20.17	$0.00	$76.88
	12/01/2025	$41.14	$15.57	$21.78	$0.00	$78.49
	01/01/2026	$41.14	$16.17	$21.78	$0.00	$79.09
	06/01/2026	$42.14	$16.17	$21.78	$0.00	$80.09
	12/01/2026	$42.14	$16.17	$23.52	$0.00	$81.83
	01/01/2027	$42.14	$16.77	$23.52	$0.00	$82.43
ADS/SUBMERSIBLE PILOT *PILE DRIVER LOCAL 56 (ZONE 3)*	08/01/2020	$103.05	$9.40	$23.12	$0.00	$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
AIR TRACK OPERATOR *LABORERS - ZONE 4 (BUILDING & SITE)*	12/01/2023	$31.16	$9.65	$14.53	$0.00	$55.34
	06/01/2024	$31.98	$9.65	$14.53	$0.00	$56.16
	12/01/2024	$32.79	$9.65	$14.53	$0.00	$56.97
For apprentice rates see "Apprentice- LABORER"						
AIR TRACK OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 4 (HEAVY & HIGHWAY)*	12/01/2023	$32.87	$9.65	$15.60	$0.00	$58.12
	06/01/2024	$34.06	$9.65	$15.60	$0.00	$59.31
	12/01/2024	$35.24	$9.65	$15.60	$0.00	$60.49
	06/01/2025	$36.48	$9.65	$15.60	$0.00	$61.73
	12/01/2025	$37.71	$9.65	$15.60	$0.00	$62.96
	06/01/2026	$39.75	$9.65	$15.60	$0.00	$65.00
	12/01/2026	$41.04	$9.65	$15.60	$0.00	$66.29
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						

Classification	**Effective Date**	**Base Wage**	**Health**	**Pension**	**Supplemental Unemployment**	**Total Rate**
ASBESTOS WORKER (PIPES & TANKS) *HEAT & FROST INSULATORS LOCAL 6 (SPRINGFIELD)*	12/01/2023	$36.72	$14.50	$10.55	$0.00	$61.77
	06/01/2024	$37.62	$14.50	$10.55	$0.00	$62.67
	12/01/2024	$38.52	$14.50	$10.55	$0.00	$63.57
	06/01/2025	$39.42	$14.50	$10.55	$0.00	$64.47
	12/01/2025	$40.32	$14.50	$10.55	$0.00	$65.37
ASPHALT RAKER *LABORERS - ZONE 4 (BUILDING & SITE)*	12/01/2023	$30.66	$9.65	$14.53	$0.00	$54.84
	06/01/2024	$31.48	$9.65	$14.53	$0.00	$55.66
	12/01/2024	$32.29	$9.65	$14.53	$0.00	$56.47
For apprentice rates see "Apprentice- LABORER"						
ASPHALT RAKER (HEAVY & HIGHWAY) *LABORERS - ZONE 4 (HEAVY & HIGHWAY)*	12/01/2023	$32.37	$9.65	$15.60	$0.00	$57.62
	06/01/2024	$33.56	$9.65	$15.60	$0.00	$58.81
	12/01/2024	$34.74	$9.65	$15.60	$0.00	$59.99
	06/01/2025	$35.98	$9.65	$15.60	$0.00	$61.23
	12/01/2025	$37.21	$9.65	$15.60	$0.00	$62.46
	06/01/2026	$39.25	$9.65	$15.60	$0.00	$64.50
	12/01/2026	$40.54	$9.65	$15.60	$0.00	$65.79
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
AUTOMATIC GRADER-EXCAVATOR (RECLAIMER) *OPERATING ENGINEERS LOCAL 98*	12/01/2023	$39.56	$13.78	$15.15	$0.00	$68.49
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BACKHOE/FRONT-END LOADER OPERATOR *OPERATING ENGINEERS LOCAL 98*	12/01/2023	$39.56	$13.78	$15.15	$0.00	$68.49
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BARCO-TYPE JUMPING TAMPER *LABORERS - ZONE 4 (BUILDING & SITE)*	12/01/2023	$30.66	$9.65	$14.53	$0.00	$54.84
	06/01/2024	$31.48	$9.65	$14.53	$0.00	$55.66
	12/01/2024	$32.29	$9.65	$14.53	$0.00	$56.47
For apprentice rates see "Apprentice- LABORER"						
BATCH/CEMENT PLANT - ON SITE *OPERATING ENGINEERS LOCAL 98*	12/01/2023	$39.03	$13.38	$15.15	$0.00	$67.56
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BLOCK PAVER, RAMMER / CURB SETTER *LABORERS - ZONE 4 (BUILDING & SITE)*	12/01/2023	$31.16	$9.65	$14.53	$0.00	$55.34
	06/01/2024	$31.98	$9.65	$14.53	$0.00	$56.16
	12/01/2024	$32.79	$9.65	$14.53	$0.00	$56.97
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER (HEAVY & HIGHWAY) *LABORERS - ZONE 4 (HEAVY & HIGHWAY)*	12/01/2023	$32.87	$9.65	$15.60	$0.00	$58.12
	06/01/2024	$34.06	$9.65	$15.60	$0.00	$59.31
	12/01/2024	$35.24	$9.65	$15.60	$0.00	$60.49
	06/01/2025	$36.48	$9.65	$15.60	$0.00	$61.73
	12/01/2025	$37.71	$9.65	$15.60	$0.00	$62.96
	06/01/2026	$39.75	$9.65	$15.60	$0.00	$65.00
	12/01/2026	$41.04	$9.65	$15.60	$0.00	$66.29
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
BOILER MAKER *BOILERMAKERS LOCAL 29*	01/01/2024	$48.12	$7.07	$20.60	$0.00	$75.79

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *BOILERMAKER - Local 29*

Effective Date - 01/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	$31.28	$7.07	$13.22	$0.00	$51.57
2	65	$31.28	$7.07	$13.22	$0.00	$51.57
3	70	$33.68	$7.07	$14.23	$0.00	$54.98
4	75	$36.09	$7.07	$15.24	$0.00	$58.40
5	80	$38.50	$7.07	$16.25	$0.00	$61.82
6	85	$40.90	$7.07	$17.28	$0.00	$65.25
7	90	$43.31	$7.07	$18.28	$0.00	$68.66
8	95	$45.71	$7.07	$19.32	$0.00	$72.10

Notes:

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING) *BRICKLAYERS LOCAL 3 (SPRINGFIELD/PITTSFIELD)*	02/01/2024	$50.81	$11.49	$21.46	$0.00	$83.76
	08/01/2024	$52.06	$11.49	$21.46	$0.00	$85.01
	02/01/2025	$53.36	$11.49	$21.46	$0.00	$86.31
	08/01/2025	$55.51	$11.49	$21.46	$0.00	$88.46
	02/01/2026	$56.86	$11.49	$21.46	$0.00	$89.81
	08/01/2026	$59.06	$11.49	$21.46	$0.00	$92.01
	02/01/2027	$60.46	$11.49	$21.46	$0.00	$93.41

Apprentice - *BRICK/PLASTER/CEMENT MASON - Local 3 Springfield/Pittsfield*

Effective Date - 02/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$25.41	$11.49	$21.46	$0.00	$58.36
2	60	$30.49	$11.49	$21.46	$0.00	$63.44
3	70	$35.57	$11.49	$21.46	$0.00	$68.52
4	80	$40.65	$11.49	$21.46	$0.00	$73.60
5	90	$45.73	$11.49	$21.46	$0.00	$78.68

Effective Date - 08/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$26.03	$11.49	$21.46	$0.00	$58.98
2	60	$31.24	$11.49	$21.46	$0.00	$64.19
3	70	$36.44	$11.49	$21.46	$0.00	$69.39
4	80	$41.65	$11.49	$21.46	$0.00	$74.60
5	90	$46.85	$11.49	$21.46	$0.00	$79.80

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	**Effective Date**	**Base Wage**	**Health**	**Pension**	**Supplemental Unemployment**	**Total Rate**
BULLDOZER/POWER SHOVEL/TREE SHREDDER /CLAM SHELL *OPERATING ENGINEERS LOCAL 98*	12/01/2023	$39.56	$13.78	$15.15	$0.00	$68.49
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
CAISSON & UNDERPINNING BOTTOM MAN *LABORERS - FOUNDATION AND MARINE*	12/01/2023	$45.48	$9.65	$18.22	$0.00	$73.35
	06/01/2024	$46.96	$9.65	$18.22	$0.00	$74.83
	12/01/2024	$48.43	$9.65	$18.22	$0.00	$76.30
	06/01/2025	$49.93	$9.65	$18.22	$0.00	$77.80
	12/01/2025	$51.43	$9.65	$18.22	$0.00	$79.30
	06/01/2026	$52.98	$9.65	$18.22	$0.00	$80.85
	12/01/2026	$54.48	$9.65	$18.22	$0.00	$82.35
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING LABORER *LABORERS - FOUNDATION AND MARINE*	12/01/2023	$44.33	$9.65	$18.22	$0.00	$72.20
	06/01/2024	$45.81	$9.65	$18.22	$0.00	$73.68
	12/01/2024	$47.28	$9.65	$18.22	$0.00	$75.15
	06/01/2025	$48.78	$9.65	$18.22	$0.00	$76.65
	12/01/2025	$50.28	$9.65	$18.22	$0.00	$78.15
	06/01/2026	$51.83	$9.65	$18.22	$0.00	$79.70
	12/01/2026	$53.33	$9.65	$18.22	$0.00	$81.20
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CAISSON & UNDERPINNING TOP MAN *LABORERS - FOUNDATION AND MARINE*	12/01/2023	$44.33	$9.65	$18.22	$0.00	$72.20
	06/01/2024	$45.81	$9.65	$18.22	$0.00	$73.68
	12/01/2024	$47.28	$9.65	$18.22	$0.00	$75.15
	06/01/2025	$48.78	$9.65	$18.22	$0.00	$76.65
	12/01/2025	$50.28	$9.65	$18.22	$0.00	$78.15
	06/01/2026	$51.83	$9.65	$18.22	$0.00	$79.70
	12/01/2026	$53.33	$9.65	$18.22	$0.00	$81.20
For apprentice rates see "Apprentice- LABORER"						
CARBIDE CORE DRILL OPERATOR *LABORERS - ZONE 4 (BUILDING & SITE)*	12/01/2023	$30.66	$9.65	$14.53	$0.00	$54.84
	06/01/2024	$31.48	$9.65	$14.53	$0.00	$55.66
	12/01/2024	$32.29	$9.65	$14.53	$0.00	$56.47
For apprentice rates see "Apprentice- LABORER"						
CARPENTER *CARPENTERS LOCAL 336 - BERKSHIRE COUNTY*	03/01/2024	$41.41	$7.91	$18.15	$0.00	$67.47
	09/01/2024	$42.36	$7.91	$18.15	$0.00	$68.42
	03/01/2025	$43.26	$7.91	$18.15	$0.00	$69.32
	09/01/2025	$44.21	$7.91	$18.15	$0.00	$70.27
	03/01/2026	$45.11	$7.91	$18.15	$0.00	$71.17
	09/01/2026	$46.06	$7.91	$18.15	$0.00	$72.12
	03/01/2027	$46.96	$7.91	$18.15	$0.00	$73.02

Classification	**Effective Date**	**Base Wage**	**Health**	**Pension**	**Supplemental Unemployment**	**Total Rate**

Apprentice - *CARPENTER - Local 336 Berkshire*

Effective Date - 03/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$18.63	$7.91	$1.40	$0.00	$27.94
2	45	$18.63	$7.91	$1.40	$0.00	$27.94
3	55	$22.78	$7.91	$2.76	$0.00	$33.45
4	55	$22.78	$7.91	$2.76	$0.00	$33.45
5	70	$28.99	$7.91	$15.39	$0.00	$52.29
6	70	$28.99	$7.91	$15.39	$0.00	$52.29
7	80	$33.13	$7.91	$16.77	$0.00	$57.81
8	80	$33.13	$7.91	$16.77	$0.00	$57.81

Effective Date - 09/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$19.06	$7.91	$1.40	$0.00	$28.37
2	45	$19.06	$7.91	$1.40	$0.00	$28.37
3	55	$23.30	$7.91	$2.76	$0.00	$33.97
4	55	$23.30	$7.91	$2.76	$0.00	$33.97
5	70	$29.65	$7.91	$15.39	$0.00	$52.95
6	70	$29.65	$7.91	$15.39	$0.00	$52.95
7	80	$33.89	$7.91	$16.77	$0.00	$58.57
8	80	$33.89	$7.91	$16.77	$0.00	$58.57

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CARPENTER WOOD FRAME *CARPENTERS-ZONE 3 (Wood Frame)*	10/01/2023	$25.55	$7.02	$4.80	$0.00	$37.37
	10/01/2024	$26.65	$7.02	$4.80	$0.00	$38.47
	10/01/2025	$27.75	$7.02	$4.80	$0.00	$39.57
	10/01/2026	$28.85	$7.02	$4.80	$0.00	$40.67

All Aspects of New Wood Frame Work

Apprentice - *CARPENTER (Wood Frame) - Zone 3*

Effective Date - 10/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$15.33	$7.02	$0.00	$0.00	$22.35
2	60	$15.33	$7.02	$0.00	$0.00	$22.35
3	65	$16.61	$7.02	$1.00	$0.00	$24.63
4	70	$17.89	$7.02	$1.00	$0.00	$25.91
5	75	$19.16	$7.02	$4.80	$0.00	$30.98
6	80	$20.44	$7.02	$4.80	$0.00	$32.26
7	85	$21.72	$7.02	$4.80	$0.00	$33.54
8	90	$23.00	$7.02	$4.80	$0.00	$34.82

Effective Date - 10/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$15.99	$7.02	$0.00	$0.00	$23.01
2	60	$15.99	$7.02	$0.00	$0.00	$23.01
3	65	$17.32	$7.02	$1.00	$0.00	$25.34
4	70	$18.66	$7.02	$1.00	$0.00	$26.68
5	75	$19.99	$7.02	$4.80	$0.00	$31.81
6	80	$21.32	$7.02	$4.80	$0.00	$33.14
7	85	$22.65	$7.02	$4.80	$0.00	$34.47
8	90	$23.99	$7.02	$4.80	$0.00	$35.81

Notes:

% Indentured After 10/1/17; 45/45/55/55/70/70/80/80

Step 1&2 $18.52/ 3&4 $21.07/ 5&6 $28.70/ 7&8 $31.26

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CEMENT MASONRY/PLASTERING *BRICKLAYERS LOCAL 3 (SPRINGFIELD/PITTSFIELD)*	01/01/2024	$44.68	$12.90	$18.66	$1.25	$77.49

Apprentice - *CEMENT MASONRY/PLASTERING - Springfield/Pittsfield*

Effective Date - 01/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.34	$12.90	$15.86	$0.00	$51.10
2	60	$26.81	$12.90	$18.66	$1.25	$59.62
3	65	$29.04	$12.90	$18.66	$1.25	$61.85
4	70	$31.28	$12.90	$18.66	$1.25	$64.09
5	75	$33.51	$12.90	$18.66	$1.25	$66.32
6	80	$35.74	$12.90	$18.66	$1.25	$68.55
7	90	$40.21	$12.90	$18.66	$1.25	$73.02

Notes:

Steps 3,4 are 500 hrs. All other steps are 1,000 hrs.

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CHAIN SAW OPERATOR *LABORERS - ZONE 4 (BUILDING & SITE)*	12/01/2023	$30.66	$9.65	$14.53	$0.00	$54.84
	06/01/2024	$31.48	$9.65	$14.53	$0.00	$55.66
	12/01/2024	$32.29	$9.65	$14.53	$0.00	$56.47

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
COMPRESSOR OPERATOR *OPERATING ENGINEERS LOCAL 98*	12/01/2023	$39.03	$13.38	$15.15	$0.00	$67.56

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CRANE OPERATOR *OPERATING ENGINEERS LOCAL 98*	12/01/2023	$43.06	$13.78	$15.15	$0.00	$71.99

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DELEADER (BRIDGE) *PAINTERS LOCAL 35 - ZONE 3*	01/01/2024	$56.06	$9.95	$23.95	$0.00	$89.96
	07/01/2024	$57.26	$9.95	$23.95	$0.00	$91.16
	01/01/2025	$58.46	$9.95	$23.95	$0.00	$92.36

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 01/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.03	$9.95	$0.00	$0.00	$37.98
2	55	$30.83	$9.95	$6.66	$0.00	$47.44
3	60	$33.64	$9.95	$7.26	$0.00	$50.85
4	65	$36.44	$9.95	$7.87	$0.00	$54.26
5	70	$39.24	$9.95	$20.32	$0.00	$69.51
6	75	$42.05	$9.95	$20.93	$0.00	$72.93
7	80	$44.85	$9.95	$21.53	$0.00	$76.33
8	90	$50.45	$9.95	$22.74	$0.00	$83.14

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.63	$9.95	$0.00	$0.00	$38.58
2	55	$31.49	$9.95	$6.66	$0.00	$48.10
3	60	$34.36	$9.95	$7.26	$0.00	$51.57
4	65	$37.22	$9.95	$7.87	$0.00	$55.04
5	70	$40.08	$9.95	$20.32	$0.00	$70.35
6	75	$42.95	$9.95	$20.93	$0.00	$73.83
7	80	$45.81	$9.95	$21.53	$0.00	$77.29
8	90	$51.53	$9.95	$22.74	$0.00	$84.22

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DEMO: ADZEMAN *LABORERS - ZONE 4 (BUILDING & SITE)*	12/01/2023	$44.48	$9.65	$18.07	$0.00	$72.20

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DEMO: BACKHOE/LOADER/HAMMER OPERATOR *LABORERS - ZONE 4 (BUILDING & SITE)*	12/01/2023	$45.48	$9.65	$18.07	$0.00	$73.20

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DEMO: BURNERS *LABORERS - ZONE 4 (BUILDING & SITE)* For apprentice rates see "Apprentice- LABORER"	12/01/2023	$45.23	$9.65	$18.07	$0.00	$72.95
DEMO: CONCRETE CUTTER/SAWYER *LABORERS - ZONE 4 (BUILDING & SITE)* For apprentice rates see "Apprentice- LABORER"	12/01/2023	$45.48	$9.65	$18.07	$0.00	$73.20
DEMO: JACKHAMMER OPERATOR *LABORERS - ZONE 4 (BUILDING & SITE)* For apprentice rates see "Apprentice- LABORER"	12/01/2023	$45.23	$9.65	$18.07	$0.00	$72.95
DEMO: WRECKING LABORER *LABORERS - ZONE 4 (BUILDING & SITE)* For apprentice rates see "Apprentice- LABORER"	12/01/2023	$44.48	$9.65	$18.07	$0.00	$72.20
DIVER *PILE DRIVER LOCAL 56 (ZONE 3)* For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2020	$68.70	$9.40	$23.12	$0.00	$101.22
DIVER TENDER *PILE DRIVER LOCAL 56 (ZONE 3)* For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2020	$49.07	$9.40	$23.12	$0.00	$81.59
DIVER TENDER (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 3)* For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2020	$73.60	$9.40	$23.12	$0.00	$106.12
DIVER/SLURRY (EFFLUENT) *PILE DRIVER LOCAL 56 (ZONE 3)* For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2020	$103.05	$9.40	$23.12	$0.00	$135.57
DRAWBRIDGE OPERATOR (Construction) *DRAWBRIDGE - SEIU LOCAL 888*	07/01/2020	$26.77	$6.67	$3.93	$0.16	$37.53
ELECTRICIAN (Including Core Drilling) *ELECTRICIANS LOCAL 7*	12/31/2023	$49.01	$12.75	$14.61	$0.00	$76.37
	06/30/2024	$50.01	$13.00	$14.86	$0.00	$77.87
	12/29/2024	$51.06	$13.25	$15.06	$0.00	$79.37
	06/29/2025	$52.16	$13.50	$15.21	$0.00	$80.87
	12/28/2025	$53.26	$13.75	$15.36	$0.00	$82.37
	06/28/2026	$54.41	$14.00	$15.46	$0.00	$83.87
	01/03/2027	$55.56	$14.25	$15.56	$0.00	$85.37

Apprentice - *ELECTRICIAN - Local 7*

Effective Date - 12/31/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$19.60	$7.65	$0.59	$0.00	$27.84
2	45	$22.05	$7.65	$0.66	$0.00	$30.36
3	50	$24.51	$12.75	$7.34	$0.00	$44.60
4	55	$26.96	$12.75	$7.41	$0.00	$47.12
5	65	$31.86	$12.75	$9.52	$0.00	$54.13
6	70	$34.31	$12.75	$10.90	$0.00	$57.96

Effective Date - 06/30/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$20.00	$7.80	$0.60	$0.00	$28.40
2	45	$22.50	$7.80	$0.68	$0.00	$30.98
3	50	$25.01	$13.00	$7.40	$0.00	$45.41
4	55	$27.51	$13.00	$7.48	$0.00	$47.99
5	65	$32.51	$13.00	$9.64	$0.00	$55.15
6	70	$35.01	$13.00	$11.06	$0.00	$59.07

Notes:

Steps 1-2 are 1000 hrs; Steps 3-6 are 1500 hrs.

Apprentice to Journeyworker Ratio:2:3****

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ELEVATOR CONSTRUCTOR *ELEVATOR CONSTRUCTORS LOCAL 41*	01/01/2024	$61.98	$16.18	$20.96	$0.00	$99.12
	01/01/2025	$62.83	$16.28	$21.36	$0.00	$100.47
	01/01/2026	$63.68	$16.38	$21.76	$0.00	$101.82
	01/01/2027	$64.53	$16.48	$22.16	$0.00	$103.17

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *ELEVATOR CONSTRUCTOR - Local 41*

Effective Date - 01/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$30.99	$16.18	$0.00	$0.00	$47.17
2	55	$34.09	$16.18	$20.96	$0.00	$71.23
3	65	$40.29	$16.18	$20.96	$0.00	$77.43
4	70	$43.39	$16.18	$20.96	$0.00	$80.53
5	80	$49.58	$16.18	$20.96	$0.00	$86.72

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$31.42	$16.28	$0.00	$0.00	$47.70
2	55	$34.56	$16.28	$21.36	$0.00	$72.20
3	65	$40.84	$16.28	$21.36	$0.00	$78.48
4	70	$43.98	$16.28	$21.36	$0.00	$81.62
5	80	$50.26	$16.28	$21.36	$0.00	$87.90

Notes:

Steps 1-2 are 6 mos.; Steps 3-5 are 1 year

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ELEVATOR CONSTRUCTOR HELPER *ELEVATOR CONSTRUCTORS LOCAL 41*	01/01/2024	$43.39	$16.18	$20.96	$0.00	$80.53
	01/01/2025	$43.98	$16.28	$21.36	$0.00	$81.62
	01/01/2026	$44.58	$16.38	$21.76	$0.00	$82.72
	01/01/2027	$45.17	$16.48	$22.16	$0.00	$83.81
For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"						
FENCE & BEAM RAIL ERECTOR *LABORERS - ZONE 4 (BUILDING & SITE)*	12/01/2023	$30.41	$9.65	$14.53	$0.00	$54.59
	06/01/2024	$31.23	$9.65	$14.53	$0.00	$55.41
	12/01/2024	$32.04	$9.65	$14.53	$0.00	$56.22
For apprentice rates see "Apprentice- LABORER"						
FENCE & GUARD RAIL ERECTOR (HEAVY & HIGHWAY) *LABORERS - ZONE 4 (HEAVY & HIGHWAY)*	12/01/2023	$32.37	$9.65	$15.60	$0.00	$57.62
	06/01/2024	$33.56	$9.65	$15.60	$0.00	$58.81
	12/01/2024	$34.74	$9.65	$15.60	$0.00	$59.99
	06/01/2025	$35.98	$9.65	$15.60	$0.00	$61.23
	12/01/2025	$37.21	$9.65	$15.60	$0.00	$62.46
	06/01/2026	$39.25	$9.65	$15.60	$0.00	$64.50
	12/01/2026	$40.54	$9.65	$15.60	$0.00	$65.79
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
FIELD ENG.INST/ROD-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 98*	06/01/1999	$18.84	$4.80	$4.10	$0.00	$27.74
FIELD ENG.PARTY CHIEF:BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 98*	06/01/1999	$21.33	$4.80	$4.10	$0.00	$30.23
FIELD ENG.SURVEY CHIEF-BLDG,SITE,HVY/HWY *OPERATING ENGINEERS LOCAL 98*	06/01/1999	$22.33	$4.80	$4.10	$0.00	$31.23

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FIRE ALARM INSTALLER *ELECTRICIANS LOCAL 7*	12/31/2023	$49.01	$12.75	$14.61	$0.00	$76.37
	06/30/2024	$50.01	$13.00	$14.86	$0.00	$77.87
	12/29/2024	$51.06	$13.25	$15.06	$0.00	$79.37
	06/29/2025	$52.16	$13.50	$15.21	$0.00	$80.87
	12/28/2025	$53.26	$13.75	$15.36	$0.00	$82.37
	06/28/2026	$54.41	$14.00	$15.46	$0.00	$83.87
	01/03/2027	$55.56	$14.25	$15.56	$0.00	$85.37

For apprentice rates see "Apprentice- ELECTRICIAN"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FIRE ALARM REPAIR / MAINTENANCE / COMMISSIONING *ELECTRICIANS LOCAL 7*	12/31/2023	$49.01	$12.75	$14.61	$0.00	$76.37
	06/30/2024	$50.01	$13.00	$14.86	$0.00	$77.87
	12/29/2024	$51.06	$13.25	$15.06	$0.00	$79.37
	06/29/2025	$52.16	$13.50	$15.21	$0.00	$80.87
	12/28/2025	$53.26	$13.75	$15.36	$0.00	$82.37
	06/28/2026	$54.41	$14.00	$15.46	$0.00	$83.87
	01/03/2027	$55.56	$14.25	$15.56	$0.00	$85.37

For apprentice rates see "Apprentice- TELECOMMUNICATIONS TECHNICIAN"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FIREMAN *OPERATING ENGINEERS LOCAL 98*	12/01/2023	$39.03	$13.38	$15.15	$0.00	$67.56

Apprentice - *OPERATING ENGINEERS - Local 98 Class 3*

Effective Date - 12/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$23.42	$13.38	$15.15	$0.00	$51.95
2	70	$27.32	$13.38	$15.15	$0.00	$55.85
3	80	$31.22	$13.38	$15.15	$0.00	$59.75
4	90	$35.13	$13.38	$15.15	$0.00	$63.66

Notes:

Steps 1-2 are 1000 hrs.; Steps 3-4 are 2000 hrs.

Apprentice to Journeyworker Ratio:1:6

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FLAGGER & SIGNALER (HEAVY & HIGHWAY) *LABORERS - ZONE 4 (HEAVY & HIGHWAY)*	12/01/2023	$25.48	$9.65	$15.60	$0.00	$50.73
	06/01/2024	$26.51	$9.65	$15.60	$0.00	$51.76
	12/01/2024	$26.51	$9.65	$15.60	$0.00	$51.76
	06/01/2025	$27.59	$9.65	$15.60	$0.00	$52.84
	12/01/2025	$27.59	$9.65	$15.60	$0.00	$52.84
	06/01/2026	$28.71	$9.65	$15.60	$0.00	$53.96
	12/01/2026	$28.71	$9.65	$15.60	$0.00	$53.96

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FLOORCOVERER *FLOORCOVERERS LOCAL 2168 ZONE III*	03/01/2024	$41.41	$7.91	$18.15	$0.00	$67.47
	09/01/2024	$42.36	$7.91	$18.15	$0.00	$68.42
	03/01/2025	$43.26	$7.91	$18.15	$0.00	$69.32
	09/01/2025	$44.21	$7.91	$18.15	$0.00	$70.27
	03/01/2026	$45.11	$7.91	$18.15	$0.00	$71.17
	09/01/2026	$46.06	$7.91	$18.15	$0.00	$72.12
	03/01/2027	$46.96	$7.91	$18.15	$0.00	$73.02

Apprentice - *FLOORCOVERER - Local 2168 Zone III*

Effective Date - 03/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.71	$7.31	$1.38	$0.00	$29.40
2	55	$22.78	$7.31	$1.38	$0.00	$31.47
3	60	$24.85	$7.31	$2.76	$0.00	$34.92
4	65	$26.92	$7.31	$2.76	$0.00	$36.99
5	70	$28.99	$7.31	$15.39	$0.00	$51.69
6	75	$31.06	$7.31	$15.39	$0.00	$53.76
7	80	$33.13	$7.31	$16.77	$0.00	$57.21
8	85	$35.20	$7.31	$16.77	$0.00	$59.28

Effective Date - 09/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.18	$7.31	$1.38	$0.00	$29.87
2	55	$23.30	$7.31	$1.38	$0.00	$31.99
3	60	$25.42	$7.31	$2.76	$0.00	$35.49
4	65	$27.53	$7.31	$2.76	$0.00	$37.60
5	70	$29.65	$7.31	$15.39	$0.00	$52.35
6	75	$31.77	$7.31	$15.39	$0.00	$54.47
7	80	$33.89	$7.31	$16.77	$0.00	$57.97
8	85	$36.01	$7.31	$16.77	$0.00	$60.09

Notes: Steps are 750 hrs.
% After 10/1/17; 45/45/55/55/70/70/80/80 (1500hr Steps)
Step 1&2 $26.72.24/ 3&4 $32.11/ 5&6 $50.75/ 7&8 $56.14

Apprentice to Journeyworker Ratio:1:1

Classification	**Effective Date**	**Base Wage**	**Health**	**Pension**	**Supplemental Unemployment**	**Total Rate**
FORK LIFT *OPERATING ENGINEERS LOCAL 98* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2023	$39.25	$13.78	$15.15	$0.00	$68.18
GENERATORS/LIGHTING PLANTS *OPERATING ENGINEERS LOCAL 98* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2023	$35.80	$13.78	$15.15	$0.00	$64.73
GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) *GLAZIERS LOCAL 1333*	06/01/2020	$39.18	$10.80	$10.45	$0.00	$60.43

Apprentice - *GLAZIER - Local 1333*

Effective Date - 06/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$19.59	$10.80	$1.80	$0.00	$32.19
2	56	$22.04	$10.80	$1.80	$0.00	$34.64
3	63	$24.49	$10.80	$2.45	$0.00	$37.74
4	69	$26.94	$10.80	$2.45	$0.00	$40.19
5	75	$29.39	$10.80	$3.15	$0.00	$43.34
6	81	$31.83	$10.80	$3.15	$0.00	$45.78
7	88	$34.28	$10.80	$10.45	$0.00	$55.53
8	94	$36.73	$10.80	$10.45	$0.00	$57.98

Notes:

Apprentice to Journeyworker Ratio:1:3

Classification	**Effective Date**	**Base Wage**	**Health**	**Pension**	**Supplemental Unemployment**	**Total Rate**
GRADER/TRENCHING MACHINE/DERRICK *OPERATING ENGINEERS LOCAL 98*	12/01/2023	$39.56	$13.78	$15.15	$0.00	$68.49
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
HVAC (DUCTWORK) *SHEETMETAL WORKERS LOCAL 63*	01/01/2024	$43.80	$10.64	$17.54	$2.05	$74.03
	07/01/2024	$45.05	$10.64	$17.54	$2.05	$75.28
	01/01/2025	$46.30	$10.64	$17.54	$2.05	$76.53
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (ELECTRICAL CONTROLS) *ELECTRICIANS LOCAL 7*	12/31/2023	$49.01	$12.75	$14.61	$0.00	$76.37
	06/30/2024	$50.01	$13.00	$14.86	$0.00	$77.87
	12/29/2024	$51.06	$13.25	$15.06	$0.00	$79.37
	06/29/2025	$52.16	$13.50	$15.21	$0.00	$80.87
	12/28/2025	$53.26	$13.75	$15.36	$0.00	$82.37
	06/28/2026	$54.41	$14.00	$15.46	$0.00	$83.87
	01/03/2027	$55.56	$14.25	$15.56	$0.00	$85.37
For apprentice rates see "Apprentice- ELECTRICIAN"						
HVAC (TESTING AND BALANCING - AIR) *SHEETMETAL WORKERS LOCAL 63*	01/01/2024	$43.80	$10.64	$17.54	$2.05	$74.03
	07/01/2024	$45.05	$10.64	$17.54	$2.05	$75.28
	01/01/2025	$46.30	$10.64	$17.54	$2.05	$76.53
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (TESTING AND BALANCING -WATER) *PLUMBERS & PIPEFITTERS LOCAL 104 WESTERN DIVISION*	03/17/2024	$49.21	$9.55	$17.10	$0.00	$75.86
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HVAC MECHANIC *PLUMBERS & PIPEFITTERS LOCAL 104 WESTERN DIVISION*	03/17/2024	$49.21	$9.55	$17.10	$0.00	$75.86
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HYDRAULIC DRILLS (HEAVY & HIGHWAY) *LABORERS - ZONE 4 (HEAVY & HIGHWAY)*	12/01/2023	$32.87	$9.65	$15.60	$0.00	$58.12
	06/01/2024	$34.06	$9.65	$15.60	$0.00	$59.31
	12/01/2024	$35.24	$9.65	$15.60	$0.00	$60.49
	06/01/2025	$36.48	$9.65	$15.60	$0.00	$61.73
	12/01/2025	$37.71	$9.65	$15.60	$0.00	$62.96
	06/01/2026	$39.75	$9.65	$15.60	$0.00	$65.00
	12/01/2026	$41.04	$9.65	$15.60	$0.00	$66.29

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
INSULATOR (PIPES & TANKS) *HEAT & FROST INSULATORS LOCAL 6 (SPRINGFIELD)*	09/01/2023	$42.80	$14.75	$19.61	$0.00	$77.16
	09/01/2024	$45.54	$14.75	$19.61	$0.00	$79.90
	09/01/2025	$48.27	$14.75	$19.61	$0.00	$82.63
	09/01/2026	$51.01	$14.75	$19.61	$0.00	$85.37

Apprentice - *ASBESTOS INSULATOR (Pipes & Tanks) - Local 6 Springfield*

Effective Date - 09/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.40	$14.75	$14.32	$0.00	$50.47
2	60	$25.68	$14.75	$15.37	$0.00	$55.80
3	70	$29.96	$14.75	$16.43	$0.00	$61.14
4	80	$34.24	$14.75	$17.49	$0.00	$66.48

Effective Date - 09/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$22.77	$14.75	$14.32	$0.00	$51.84
2	60	$27.32	$14.75	$15.37	$0.00	$57.44
3	70	$31.88	$14.75	$16.43	$0.00	$63.06
4	80	$36.43	$14.75	$17.49	$0.00	$68.67

Notes:

Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
IRONWORKER/WELDER *IRONWORKERS LOCAL 12*	07/01/2019	$31.55	$6.75	$19.66	$0.00	$57.96

Apprentice - *IRONWORKER - Local 12*

Effective Date - 07/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$18.93	$6.75	$3.50	$0.00	$29.18
2	70	$22.09	$6.75	$14.64	$0.00	$43.48
3	80	$25.24	$6.75	$16.22	$0.00	$48.21
4	90	$28.40	$6.75	$17.82	$0.00	$52.97

Notes:

Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
JACKHAMMER & PAVING BREAKER OPERATOR *LABORERS - ZONE 4 (BUILDING & SITE)*	12/01/2023	$30.66	$9.65	$14.53	$0.00	$54.84
	06/01/2024	$31.48	$9.65	$14.53	$0.00	$55.66
	12/01/2024	$32.29	$9.65	$14.53	$0.00	$56.47
For apprentice rates see "Apprentice- LABORER"						
LABORER *LABORERS - ZONE 4 (BUILDING & SITE)*	12/01/2023	$30.41	$9.65	$14.53	$0.00	$54.59
	06/01/2024	$31.23	$9.65	$14.53	$0.00	$55.41
	12/01/2024	$32.04	$9.65	$14.53	$0.00	$56.22

Apprentice - *LABORER - Zone 4 Building and Site*

Effective Date - 12/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$18.25	$9.65	$14.53	$0.00	$42.43
2	70	$21.29	$9.65	$14.53	$0.00	$45.47
3	80	$24.33	$9.65	$14.53	$0.00	$48.51
4	90	$27.37	$9.65	$14.53	$0.00	$51.55

Effective Date - 06/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$18.74	$9.65	$14.53	$0.00	$42.92
2	70	$21.86	$9.65	$14.53	$0.00	$46.04
3	80	$24.98	$9.65	$14.53	$0.00	$49.16
4	90	$28.11	$9.65	$14.53	$0.00	$52.29

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER (HEAVY & HIGHWAY) *LABORERS - ZONE 4 (HEAVY & HIGHWAY)*	12/01/2023	$32.12	$9.65	$15.60	$0.00	$57.37
	06/01/2024	$33.31	$9.65	$15.60	$0.00	$58.56
	12/01/2024	$34.49	$9.65	$15.60	$0.00	$59.74
	06/01/2025	$35.73	$9.65	$15.60	$0.00	$60.98
	12/01/2025	$36.96	$9.65	$15.60	$0.00	$62.21
	06/01/2026	$39.00	$9.65	$15.60	$0.00	$64.25
	12/01/2026	$40.29	$9.65	$15.60	$0.00	$65.54

Apprentice - *LABORER (Heavy and Highway) - Zone 4*

Effective Date - 12/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$19.27	$9.65	$15.60	$0.00	$44.52
2	70	$22.48	$9.65	$15.60	$0.00	$47.73
3	80	$25.70	$9.65	$15.60	$0.00	$50.95
4	90	$28.91	$9.65	$15.60	$0.00	$54.16

Effective Date - 06/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$19.99	$9.65	$15.60	$0.00	$45.24
2	70	$23.32	$9.65	$15.60	$0.00	$48.57
3	80	$26.65	$9.65	$15.60	$0.00	$51.90
4	90	$29.98	$9.65	$15.60	$0.00	$55.23

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: CARPENTER TENDER *LABORERS - ZONE 4 (BUILDING & SITE)*	12/01/2023	$30.41	$9.65	$14.53	$0.00	$54.59
	06/01/2024	$31.23	$9.65	$14.53	$0.00	$55.41
	12/01/2024	$32.04	$9.65	$14.53	$0.00	$56.22
For apprentice rates see "Apprentice- LABORER"						
LABORER: CEMENT FINISHER TENDER *LABORERS - ZONE 4 (BUILDING & SITE)*	12/01/2023	$30.41	$9.65	$14.53	$0.00	$54.59
	06/01/2024	$31.23	$9.65	$14.53	$0.00	$55.41
	12/01/2024	$32.04	$9.65	$14.53	$0.00	$56.22
For apprentice rates see "Apprentice- LABORER"						
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER *LABORERS - ZONE 4 (BUILDING & SITE)*	12/01/2023	$30.89	$9.65	$14.41	$0.00	$54.95
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER *LABORERS - ZONE 4 (BUILDING & SITE)*	12/01/2023	$32.41	$9.65	$14.53	$0.00	$56.59
	06/01/2024	$33.23	$9.65	$14.53	$0.00	$57.41
	12/01/2024	$34.04	$9.65	$14.53	$0.00	$58.22
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: MASON TENDER (HEAVY & HIGHWAY) *LABORERS - ZONE 4 (HEAVY & HIGHWAY)*	12/01/2023	$32.37	$9.65	$15.60	$0.00	$57.62
	06/01/2024	$33.56	$9.65	$15.60	$0.00	$58.81
	12/01/2024	$34.74	$9.65	$15.60	$0.00	$59.99
	06/01/2025	$35.98	$9.65	$15.60	$0.00	$61.23
	12/01/2025	$37.21	$9.65	$15.60	$0.00	$62.46
	06/01/2026	$39.25	$9.65	$15.60	$0.00	$64.50
	12/01/2026	$40.54	$9.65	$15.60	$0.00	$65.79
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
LABORER: MULTI-TRADE TENDER *LABORERS - ZONE 4 (BUILDING & SITE)*	12/01/2023	$30.41	$9.65	$14.53	$0.00	$54.59
	06/01/2024	$31.23	$9.65	$14.53	$0.00	$55.41
	12/01/2024	$32.04	$9.65	$14.53	$0.00	$56.22
For apprentice rates see "Apprentice- LABORER"						
LABORER: TREE REMOVER *LABORERS - ZONE 4 (BUILDING & SITE)*	12/01/2023	$30.41	$9.65	$14.53	$0.00	$54.59
	06/01/2024	$31.23	$9.65	$14.53	$0.00	$55.41
	12/01/2024	$32.04	$9.65	$14.53	$0.00	$56.22
This classification applies to the removal of standing trees, and the trimming and removal of branches and limbs when related to public works construction or site clearance incidental to construction . For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR *LABORERS - ZONE 4 (BUILDING & SITE)*	12/01/2023	$30.66	$9.65	$14.53	$0.00	$54.84
	06/01/2024	$31.48	$9.65	$14.53	$0.00	$55.66
	12/01/2024	$32.29	$9.65	$14.53	$0.00	$56.47
For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 4 (HEAVY & HIGHWAY)*	12/01/2023	$32.37	$9.65	$15.60	$0.00	$57.62
	06/01/2024	$33.56	$9.65	$15.60	$0.00	$58.81
	12/01/2024	$34.74	$9.65	$15.60	$0.00	$59.99
	06/01/2025	$35.98	$9.65	$15.60	$0.00	$61.23
	12/01/2025	$37.21	$9.65	$15.60	$0.00	$62.46
	06/01/2026	$39.25	$9.65	$15.60	$0.00	$64.50
	12/01/2026	$40.54	$9.65	$15.60	$0.00	$65.79
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
MARBLE & TILE FINISHERS *BRICKLAYERS LOCAL 3 (SPR/PITT) - MARBLE & TILE*	02/01/2024	$41.37	$11.49	$20.53	$0.00	$73.39
	08/01/2024	$43.05	$11.49	$20.53	$0.00	$75.07
	02/01/2025	$44.90	$11.49	$20.53	$0.00	$76.92
	08/01/2025	$45.81	$11.49	$20.53	$0.00	$77.83
	02/01/2026	$46.89	$11.49	$20.53	$0.00	$78.91
	08/01/2026	$48.65	$11.49	$20.53	$0.00	$80.67
	02/01/2027	$49.77	$11.49	$20.53	$0.00	$81.79

Apprentice - *MARBLE-TILE FINISHER-Local 3 Marble/Tile (Spr/Pitt)*

Effective Date - 02/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.69	$11.49	$20.53	$0.00	$52.71
2	60	$24.82	$11.49	$20.53	$0.00	$56.84
3	70	$28.96	$11.49	$20.53	$0.00	$60.98
4	80	$33.10	$11.49	$20.53	$0.00	$65.12
5	90	$37.23	$11.49	$20.53	$0.00	$69.25

Effective Date - 08/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$21.53	$11.49	$20.53	$0.00	$53.55
2	60	$25.83	$11.49	$20.53	$0.00	$57.85
3	70	$30.14	$11.49	$20.53	$0.00	$62.16
4	80	$34.44	$11.49	$20.53	$0.00	$66.46
5	90	$38.75	$11.49	$20.53	$0.00	$70.77

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MARBLE MASON/TILE LAYER(SP/PT)SeeBrick *BRICKLAYERS LOCAL 3 (SPR/PITT) - MARBLE & TILE* See "BRICK/STONE/ARTIFICIAL MASONRY(INCL.MASONRY WATERPROOFING)						
MECH. SWEEPER OPERATOR (ON CONST. SITES) *OPERATING ENGINEERS LOCAL 98* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2023	$39.56	$13.78	$15.15	$0.00	$68.49
MECHANIC/WELDER/BOOM TRUCK *OPERATING ENGINEERS LOCAL 98* For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2023	$39.03	$13.38	$15.15	$0.00	$67.56
MILLWRIGHT (Zone 3) *MILLWRIGHTS LOCAL 1121 - Zone 3*	01/01/2024	$41.20	$10.08	$21.22	$0.00	$72.50
	01/06/2025	$43.48	$10.08	$21.22	$0.00	$74.78
	01/05/2026	$45.76	$10.08	$21.22	$0.00	$77.06

Apprentice - *MILLWRIGHT - Local 1121 Zone 3*

Effective Date - 01/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$22.66	$10.08	$5.36	$0.00	$38.10
2	65	$26.78	$10.08	$6.34	$0.00	$43.20
3	75	$30.90	$10.08	$18.78	$0.00	$59.76
4	85	$35.02	$10.08	$19.76	$0.00	$64.86

Effective Date - 01/06/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	$23.91	$10.08	$5.36	$0.00	$39.35
2	65	$28.26	$10.08	$6.34	$0.00	$44.68
3	75	$32.61	$10.08	$18.78	$0.00	$61.47
4	85	$36.96	$10.08	$19.76	$0.00	$66.80

Notes: Step 1&2 Appr. indentured after 1/6/2020 receive no pension,
but do receive annuity. (Step 1 $5.72, Step 2 $6.66)
Steps are 2,000 hours

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MORTAR MIXER *LABORERS - ZONE 4 (BUILDING & SITE)*	12/01/2023	$30.66	$9.65	$14.53	$0.00	$54.84
	06/01/2024	$31.48	$9.65	$14.53	$0.00	$55.66
	12/01/2024	$32.29	$9.65	$14.53	$0.00	$56.47
For apprentice rates see "Apprentice- LABORER"						
OILER *OPERATING ENGINEERS LOCAL 98*	12/01/2023	$35.02	$13.78	$15.15	$0.00	$63.95
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OTHER POWER DRIVEN EQUIPMENT - CLASS VI *OPERATING ENGINEERS LOCAL 98*	12/01/2023	$32.74	$13.78	$15.15	$0.00	$61.67
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PAINTER (BRIDGES/TANKS) *PAINTERS LOCAL 35 - ZONE 3*	01/01/2024	$56.06	$9.95	$23.95	$0.00	$89.96
	07/01/2024	$57.26	$9.95	$23.95	$0.00	$91.16
	01/01/2025	$58.46	$9.95	$23.95	$0.00	$92.36

Classification	**Effective Date**	**Base Wage**	**Health**	**Pension**	**Supplemental Unemployment**	**Total Rate**

Apprentice - *PAINTER Local 35 - BRIDGES/TANKS*

Effective Date - 01/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.03	$9.95	$0.00	$0.00	$37.98
2	55	$30.83	$9.95	$6.66	$0.00	$47.44
3	60	$33.64	$9.95	$7.26	$0.00	$50.85
4	65	$36.44	$9.95	$7.87	$0.00	$54.26
5	70	$39.24	$9.95	$20.32	$0.00	$69.51
6	75	$42.05	$9.95	$20.93	$0.00	$72.93
7	80	$44.85	$9.95	$21.53	$0.00	$76.33
8	90	$50.45	$9.95	$22.74	$0.00	$83.14

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$28.63	$9.95	$0.00	$0.00	$38.58
2	55	$31.49	$9.95	$6.66	$0.00	$48.10
3	60	$34.36	$9.95	$7.26	$0.00	$51.57
4	65	$37.22	$9.95	$7.87	$0.00	$55.04
5	70	$40.08	$9.95	$20.32	$0.00	$70.35
6	75	$42.95	$9.95	$20.93	$0.00	$73.83
7	80	$45.81	$9.95	$21.53	$0.00	$77.29
8	90	$51.53	$9.95	$22.74	$0.00	$84.22

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PAINTER (SPRAY OR SANDBLAST, NEW) * * If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 3*	01/01/2024	$38.83	$9.65	$19.90	$0.00	$68.38
	07/01/2024	$40.03	$9.65	$19.90	$0.00	$69.58
	01/01/2025	$41.23	$9.65	$19.90	$0.00	$70.78

Apprentice - *PAINTER Local 35 Zone 3 - Spray/Sandblast - New*

Effective Date - 01/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$19.42	$9.95	$0.00	$0.00	$29.37
2	55	$21.36	$9.95	$4.43	$0.00	$35.74
3	60	$23.30	$9.95	$4.83	$0.00	$38.08
4	65	$25.24	$9.95	$5.23	$0.00	$40.42
5	70	$27.18	$9.95	$17.49	$0.00	$54.62
6	75	$29.12	$9.95	$17.89	$0.00	$56.96
7	80	$31.06	$9.95	$18.29	$0.00	$59.30
8	90	$34.95	$9.95	$19.10	$0.00	$64.00

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$20.02	$9.95	$0.00	$0.00	$29.97
2	55	$22.02	$9.95	$4.43	$0.00	$36.40
3	60	$24.02	$9.95	$4.83	$0.00	$38.80
4	65	$26.02	$9.95	$5.23	$0.00	$41.20
5	70	$28.02	$9.95	$17.49	$0.00	$55.46
6	75	$30.02	$9.95	$17.89	$0.00	$57.86
7	80	$32.02	$9.95	$18.29	$0.00	$60.26
8	90	$36.03	$9.95	$19.10	$0.00	$65.08

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PAINTER (SPRAY OR SANDBLAST, REPAINT) *PAINTERS LOCAL 35 - ZONE 3*	01/01/2024	$36.15	$9.95	$19.90	$0.00	$66.00
	07/01/2024	$37.35	$9.95	$19.90	$0.00	$67.20
	01/01/2025	$38.55	$9.95	$19.90	$0.00	$68.40

Classification	**Effective Date**	**Base Wage**	**Health**	**Pension**	**Supplemental Unemployment**	**Total Rate**

Apprentice - *PAINTER Local 35 Zone 3 - Spray/Sandblast - Repaint*

Effective Date - 01/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$18.08	$9.95	$0.00	$0.00	$28.03
2	55	$19.88	$9.95	$4.43	$0.00	$34.26
3	60	$21.69	$9.95	$4.83	$0.00	$36.47
4	65	$23.50	$9.95	$5.23	$0.00	$38.68
5	70	$25.31	$9.95	$17.49	$0.00	$52.75
6	75	$27.11	$9.95	$17.89	$0.00	$54.95
7	80	$28.92	$9.95	$18.29	$0.00	$57.16
8	90	$32.54	$9.95	$19.10	$0.00	$61.59

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$18.68	$9.95	$0.00	$0.00	$28.63
2	55	$20.54	$9.95	$4.43	$0.00	$34.92
3	60	$22.41	$9.95	$4.83	$0.00	$37.19
4	65	$24.28	$9.95	$5.23	$0.00	$39.46
5	70	$26.15	$9.95	$17.49	$0.00	$53.59
6	75	$28.01	$9.95	$17.89	$0.00	$55.85
7	80	$29.88	$9.95	$18.29	$0.00	$58.12
8	90	$33.62	$9.95	$19.10	$0.00	$62.67

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PAINTER / TAPER (BRUSH, NEW) * * If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used.*PAINTERS LOCAL 35 - ZONE 3*	01/01/2024	$37.43	$9.95	$19.90	$0.00	$67.28
	07/01/2024	$38.63	$9.95	$19.90	$0.00	$68.48
	01/01/2025	$39.83	$9.95	$19.90	$0.00	$69.68

Classification	**Effective Date**	**Base Wage**	**Health**	**Pension**	**Supplemental Unemployment**	**Total Rate**

Apprentice - *PAINTER - Local 35 Zone 3 - BRUSH NEW*

Effective Date - 01/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$18.72	$9.95	$0.00	$0.00	$28.67
2	55	$20.59	$9.95	$4.43	$0.00	$34.97
3	60	$22.46	$9.95	$4.83	$0.00	$37.24
4	65	$24.33	$9.95	$5.23	$0.00	$39.51
5	70	$26.20	$9.95	$17.49	$0.00	$53.64
6	75	$28.07	$9.95	$17.89	$0.00	$55.91
7	80	$29.94	$9.95	$18.29	$0.00	$58.18
8	90	$33.69	$9.95	$19.10	$0.00	$62.74

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$19.32	$9.95	$0.00	$0.00	$29.27
2	55	$21.25	$9.95	$4.43	$0.00	$35.63
3	60	$23.18	$9.95	$4.83	$0.00	$37.96
4	65	$25.11	$9.95	$5.23	$0.00	$40.29
5	70	$27.04	$9.95	$17.49	$0.00	$54.48
6	75	$28.97	$9.95	$17.89	$0.00	$56.81
7	80	$30.90	$9.95	$18.29	$0.00	$59.14
8	90	$34.77	$9.95	$19.10	$0.00	$63.82

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PAINTER / TAPER (BRUSH, REPAINT) *PAINTERS LOCAL 35 - ZONE 3*	01/01/2024	$34.75	$9.95	$19.90	$0.00	$64.60
	07/01/2024	$35.95	$9.95	$19.90	$0.00	$65.80
	01/01/2025	$37.15	$9.95	$19.90	$0.00	$67.00

Apprentice - *PAINTER Local 35 Zone 3 - BRUSH REPAINT*

Effective Date - 01/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$17.38	$9.95	$0.00	$0.00	$27.33
2	55	$19.11	$9.95	$4.43	$0.00	$33.49
3	60	$20.85	$9.95	$4.83	$0.00	$35.63
4	65	$22.59	$9.95	$5.23	$0.00	$37.77
5	70	$24.33	$9.95	$17.49	$0.00	$51.77
6	75	$26.06	$9.95	$17.89	$0.00	$53.90
7	80	$27.80	$9.95	$18.29	$0.00	$56.04
8	90	$31.28	$9.95	$19.10	$0.00	$60.33

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$17.98	$9.95	$0.00	$0.00	$27.93
2	55	$19.77	$9.95	$4.43	$0.00	$34.15
3	60	$21.57	$9.95	$4.83	$0.00	$36.35
4	65	$23.37	$9.95	$5.23	$0.00	$38.55
5	70	$25.17	$9.95	$17.49	$0.00	$52.61
6	75	$26.96	$9.95	$17.89	$0.00	$54.80
7	80	$28.76	$9.95	$18.29	$0.00	$57.00
8	90	$32.36	$9.95	$19.10	$0.00	$61.41

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PAINTER TRAFFIC MARKINGS (HEAVY/HIGHWAY) *LABORERS - ZONE 4 (HEAVY & HIGHWAY)*	12/01/2023	$32.12	$9.65	$15.60	$0.00	$57.37
	06/01/2024	$33.31	$9.65	$15.60	$0.00	$58.56
	12/01/2024	$34.49	$9.65	$15.60	$0.00	$59.74
	06/01/2025	$35.73	$9.65	$15.60	$0.00	$60.98
	12/01/2025	$36.96	$9.65	$15.60	$0.00	$62.21
	06/01/2026	$39.00	$9.65	$15.60	$0.00	$64.25
	12/01/2026	$40.29	$9.65	$15.60	$0.00	$65.54

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PANEL & PICKUP TRUCKS DRIVER *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	01/01/2024	$38.78	$15.07	$18.67	$0.00	$72.52
	06/01/2024	$39.78	$15.07	$18.67	$0.00	$73.52
	12/01/2024	$39.78	$15.07	$20.17	$0.00	$75.02
	01/01/2025	$39.78	$15.57	$20.17	$0.00	$75.52
	06/01/2025	$40.78	$15.57	$20.17	$0.00	$76.52
	12/01/2025	$40.78	$15.57	$21.78	$0.00	$78.13
	01/01/2026	$40.78	$16.17	$21.78	$0.00	$78.73
	06/01/2026	$41.78	$16.17	$21.78	$0.00	$79.73
	12/01/2026	$41.78	$16.17	$23.52	$0.00	$81.47
	01/01/2027	$41.78	$16.77	$23.52	$0.00	$82.07

Classification	**Effective Date**	**Base Wage**	**Health**	**Pension**	**Supplemental Unemployment**	**Total Rate**
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) *PILE DRIVER LOCAL 56 (ZONE 3)* For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2020	$43.53	$9.40	$23.12	$0.00	$76.05
PILE DRIVER *PILE DRIVER LOCAL 56 (ZONE 3)*	08/01/2020	$43.53	$9.40	$23.12	$0.00	$76.05

Apprentice - *PILE DRIVER - Local 56 Zone 3*

Effective Date - 08/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	0	$0.00	$0.00	$0.00	$0.00	$0.00

Notes: Apprentice wages shall be no less than the following Steps;
(Same as set in Zone 1)
1$57.06/2$61.96/3$66.87/4$69.32/5$71.78/6$71.78/7$76.68/8$76.68

Apprentice to Journeyworker Ratio:1:5

Classification	**Effective Date**	**Base Wage**	**Health**	**Pension**	**Supplemental Unemployment**	**Total Rate**
PIPELAYER *LABORERS - ZONE 4 (BUILDING & SITE)*	12/01/2023	$30.66	$9.65	$14.53	$0.00	$54.84
	06/01/2024	$31.48	$9.65	$14.53	$0.00	$55.66
	12/01/2024	$32.29	$9.65	$14.53	$0.00	$56.47
For apprentice rates see "Apprentice- LABORER"						
PIPELAYER (HEAVY & HIGHWAY) *LABORERS - ZONE 4 (HEAVY & HIGHWAY)*	12/01/2023	$32.37	$9.65	$15.60	$0.00	$57.62
	06/01/2024	$33.56	$9.65	$15.60	$0.00	$58.81
	12/01/2024	$34.74	$9.65	$15.60	$0.00	$59.99
	06/01/2025	$35.98	$9.65	$15.60	$0.00	$61.23
	12/01/2025	$37.21	$9.65	$15.60	$0.00	$62.46
	06/01/2026	$39.25	$9.65	$15.60	$0.00	$64.50
	12/01/2026	$40.54	$9.65	$15.60	$0.00	$65.79
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
PLUMBER & PIPEFITTER *PLUMBERS & PIPEFITTERS LOCAL 104 WESTERN DIVISION*	03/17/2024	$49.21	$9.55	$17.10	$0.00	$75.86

Apprentice - *PLUMBER/PIPEFITTER - Local 104 Western*

Effective Date - 03/17/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$22.14	$9.55	$10.10	$0.00	$41.79
2	50	$24.61	$9.55	$10.10	$0.00	$44.26
3	55	$27.07	$9.55	$10.10	$0.00	$46.72
4	60	$29.53	$9.55	$10.10	$0.00	$49.18
5	65	$31.99	$9.55	$10.10	$0.00	$51.64
6	70	$34.45	$9.55	$10.10	$0.00	$54.10
7	75	$36.91	$9.55	$10.10	$0.00	$56.56
8	80	$39.37	$9.55	$10.10	$0.00	$59.02
9	80	$39.37	$9.55	$17.10	$0.00	$66.02
10	80	$39.37	$9.55	$17.10	$0.00	$66.02

Notes: **1:1,2:5,3:9,4:12

Apprentice to Journeyworker Ratio:**

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PNEUMATIC CONTROLS (TEMP.) *PLUMBERS & PIPEFITTERS LOCAL 104 WESTERN DIVISION*	03/17/2024	$49.21	$9.55	$17.10	$0.00	$75.86
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
PNEUMATIC DRILL/TOOL OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 4 (HEAVY & HIGHWAY)*	12/01/2023	$32.37	$9.65	$15.60	$0.00	$57.62
	06/01/2024	$33.56	$9.65	$15.60	$0.00	$58.81
	12/01/2024	$34.74	$9.65	$15.60	$0.00	$59.99
	06/01/2025	$35.98	$9.65	$15.60	$0.00	$61.23
	12/01/2025	$37.21	$9.65	$15.60	$0.00	$62.46
	06/01/2026	$39.25	$9.65	$15.60	$0.00	$64.50
	12/01/2026	$40.54	$9.65	$15.60	$0.00	$65.79
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
POWDERMAN & BLASTER *LABORERS - ZONE 4 (BUILDING & SITE)*	12/01/2023	$31.41	$9.65	$14.53	$0.00	$55.59
	06/01/2024	$32.23	$9.65	$14.53	$0.00	$56.41
	12/01/2024	$33.04	$9.65	$14.53	$0.00	$57.22
For apprentice rates see "Apprentice- LABORER"						
POWDERMAN & BLASTER (HEAVY & HIGHWAY) *LABORERS - ZONE 4 (HEAVY & HIGHWAY)*	12/01/2023	$33.53	$9.65	$15.19	$0.00	$58.37
	06/01/2024	$34.72	$9.65	$15.19	$0.00	$59.56
	12/01/2024	$35.90	$9.65	$15.19	$0.00	$60.74
	06/01/2025	$37.14	$9.65	$15.19	$0.00	$61.98
	12/01/2025	$38.37	$9.65	$15.19	$0.00	$63.21
	06/01/2026	$40.41	$9.65	$15.19	$0.00	$65.25
	12/01/2026	$41.70	$9.65	$15.19	$0.00	$66.54
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
PUMP OPERATOR (CONCRETE) *OPERATING ENGINEERS LOCAL 98*	12/01/2023	$39.56	$13.78	$15.15	$0.00	$68.49
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (DEWATERING, OTHER) *OPERATING ENGINEERS LOCAL 98*	12/01/2023	$39.03	$13.38	$15.15	$0.00	$67.56

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
READY-MIX CONCRETE DRIVER *TEAMSTERS 404 - Construction Service (Northampton)*	05/01/2023	$25.24	$11.57	$7.00	$0.00	$43.81
	05/01/2024	$26.14	$11.82	$7.25	$0.00	$45.21
RIDE-ON MOTORIZED BUGGY OPERATOR *LABORERS - ZONE 4 (BUILDING & SITE)*	12/01/2023	$30.66	$9.65	$14.53	$0.00	$54.84
	06/01/2024	$31.48	$9.65	$14.53	$0.00	$55.66
	12/01/2024	$32.29	$9.65	$14.53	$0.00	$56.47
For apprentice rates see "Apprentice- LABORER"						
ROLLER OPERATOR *OPERATING ENGINEERS LOCAL 98*	12/01/2023	$38.42	$13.78	$15.15	$0.00	$67.35
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
ROOFER (Coal tar pitch) *ROOFERS LOCAL 248*	07/16/2023	$38.91	$10.35	$18.00	$0.00	$67.26
For apprentice rates see "Apprentice- ROOFER"						
ROOFER (Inc.Roofer Waterproofng &Roofer Damproofg) *ROOFERS LOCAL 248*	07/16/2023	$38.41	$10.35	$18.00	$0.00	$66.76

Apprentice - *ROOFER - Local 248*

Effective Date - 07/16/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$23.05	$10.35	$0.00	$0.00	$33.40
2	65	$24.97	$10.35	$18.00	$0.00	$53.32
3	70	$26.89	$10.35	$18.00	$0.00	$55.24
4	75	$28.81	$10.35	$18.00	$0.00	$57.16
5	80	$30.73	$10.35	$18.00	$0.00	$59.08
6	85	$32.65	$10.35	$18.00	$0.00	$61.00
7	90	$34.57	$10.35	$18.00	$0.00	$62.92
8	95	$36.49	$10.35	$18.00	$0.00	$64.84

Notes:

Steps are 750 hrs.Roofer(Tear Off)1:1; Same as above

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
ROOFER SLATE / TILE / PRECAST CONCRETE *ROOFERS LOCAL 248*	07/16/2023	$38.91	$10.35	$18.00	$0.00	$67.26
For apprentice rates see "Apprentice- ROOFER"						
SCRAPER *OPERATING ENGINEERS LOCAL 98*	12/01/2023	$39.03	$13.38	$15.15	$0.00	$67.56
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
SELF-POWERED ROLLERS AND COMPACTORS (TAMPERS) *OPERATING ENGINEERS LOCAL 98*	12/01/2023	$38.42	$13.78	$15.15	$0.00	$67.35
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
SELF-PROPELLED POWER BROOM *OPERATING ENGINEERS LOCAL 98*	12/01/2023	$35.80	$13.78	$15.15	$0.00	$64.73
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
SHEETMETAL WORKER *SHEETMETAL WORKERS LOCAL 63*	01/01/2024	$43.80	$10.64	$17.54	$2.05	$74.03
	07/01/2024	$45.05	$10.64	$17.54	$2.05	$75.28
	01/01/2025	$46.30	$10.64	$17.54	$2.05	$76.53

Apprentice - *SHEET METAL WORKER - Local 63*

Effective Date - 01/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$19.71	$4.79	$4.76	$0.92	$30.18
2	50	$21.90	$5.32	$5.29	$1.03	$33.54
3	55	$24.09	$5.85	$5.82	$1.13	$36.89
4	60	$26.28	$6.38	$6.35	$1.23	$40.24
5	65	$28.47	$6.92	$6.88	$1.33	$43.60
6	70	$30.66	$7.45	$7.41	$1.44	$46.96
7	75	$32.85	$7.98	$7.94	$1.54	$50.31
8	80	$35.04	$8.51	$15.42	$1.64	$60.61
9	85	$37.23	$9.04	$15.95	$1.74	$63.96
10	90	$39.42	$9.58	$16.48	$1.85	$67.33

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$20.27	$4.79	$4.76	$0.92	$30.74
2	50	$22.53	$5.32	$5.29	$1.03	$34.17
3	55	$24.78	$5.85	$5.82	$1.13	$37.58
4	60	$27.03	$6.38	$6.35	$1.23	$40.99
5	65	$29.28	$6.92	$6.88	$1.33	$44.41
6	70	$31.54	$7.45	$7.41	$1.44	$47.84
7	75	$33.79	$7.98	$7.94	$1.54	$51.25
8	80	$36.04	$8.51	$15.42	$1.64	$61.61
9	85	$38.29	$9.04	$15.95	$1.74	$65.02
10	90	$40.55	$9.58	$16.48	$1.85	$68.46

Notes:

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
SPECIALIZED EARTH MOVING EQUIP < 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	01/01/2024	$39.24	$15.07	$18.67	$0.00	$72.98
	06/01/2024	$40.24	$15.07	$18.67	$0.00	$73.98
	12/01/2024	$40.24	$15.07	$20.17	$0.00	$75.48
	01/01/2025	$40.24	$15.57	$20.17	$0.00	$75.98
	06/01/2025	$41.24	$15.57	$20.17	$0.00	$76.98
	12/01/2025	$41.24	$15.57	$21.78	$0.00	$78.59
	01/01/2026	$41.24	$16.17	$21.78	$0.00	$79.19
	06/01/2026	$42.24	$16.17	$21.78	$0.00	$80.19
	12/01/2026	$42.24	$16.17	$23.52	$0.00	$81.93
	01/01/2027	$42.24	$16.77	$23.52	$0.00	$82.53

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
SPECIALIZED EARTH MOVING EQUIP > 35 TONS *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	01/01/2024	$39.53	$15.07	$18.67	$0.00	$73.27
	06/01/2024	$40.53	$15.07	$18.67	$0.00	$74.27
	12/01/2024	$40.53	$15.07	$20.17	$0.00	$75.77
	01/01/2025	$40.53	$15.57	$20.17	$0.00	$76.27
	06/01/2025	$41.53	$15.57	$20.17	$0.00	$77.27
	12/01/2025	$41.53	$15.57	$21.78	$0.00	$78.88
	01/01/2026	$41.53	$16.17	$21.78	$0.00	$79.48
	06/01/2026	$42.53	$16.17	$21.78	$0.00	$80.48
	12/01/2026	$42.53	$16.17	$23.52	$0.00	$82.22
	01/01/2027	$42.53	$16.77	$23.52	$0.00	$82.82
SPRINKLER FITTER *SPRINKLER FITTERS LOCAL 669*	04/01/2023	$47.43	$11.45	$16.61	$0.00	$75.49

Apprentice - *SPRINKLER FITTER - Local 669*

Effective Date - 04/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	$21.34	$8.22	$0.00	$0.00	$29.56
2	50	$23.72	$8.22	$0.00	$0.00	$31.94
3	55	$26.09	$11.45	$7.20	$0.00	$44.74
4	60	$28.46	$11.45	$8.35	$0.00	$48.26
5	65	$30.83	$11.45	$8.35	$0.00	$50.63
6	70	$33.20	$11.45	$8.60	$0.00	$53.25
7	75	$35.57	$11.45	$8.60	$0.00	$55.62
8	80	$37.94	$11.45	$8.60	$0.00	$57.99
9	85	$40.32	$11.45	$8.60	$0.00	$60.37
10	90	$42.69	$11.45	$8.60	$0.00	$62.74

Notes:

Apprentice to Journeyworker Ratio:1:1

TELECOMMUNICATION TECHNICIAN *ELECTRICIANS LOCAL 7*	12/31/2023	$49.01	$12.75	$14.61	$0.00	$76.37
	06/30/2024	$50.01	$13.00	$14.86	$0.00	$77.87
	12/29/2024	$51.06	$13.25	$15.06	$0.00	$79.37
	06/29/2025	$52.16	$13.50	$15.21	$0.00	$80.87
	12/28/2025	$53.26	$13.75	$15.36	$0.00	$82.37
	06/28/2026	$54.41	$14.00	$15.46	$0.00	$83.87
	01/03/2027	$55.56	$14.25	$15.56	$0.00	$85.37

Apprentice - *TELECOMMUNICATION TECHNICIAN - Local 7*

Effective Date - 12/31/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$19.60	$7.05	$0.59	$0.00	$27.24
2	45	$22.05	$7.05	$0.66	$0.00	$29.76
3	50	$24.51	$12.75	$7.34	$0.00	$44.60
4	55	$26.96	$12.75	$7.41	$0.00	$47.12
5	65	$31.86	$12.75	$9.52	$0.00	$54.13
6	70	$34.31	$12.75	$10.90	$0.00	$57.96

Effective Date - 06/30/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	$20.00	$7.20	$0.60	$0.00	$27.80
2	45	$22.50	$7.20	$0.68	$0.00	$30.38
3	50	$25.01	$13.00	$7.40	$0.00	$45.41
4	55	$27.51	$13.00	$7.48	$0.00	$47.99
5	65	$32.51	$13.00	$9.64	$0.00	$55.15
6	70	$35.01	$13.00	$11.06	$0.00	$59.07

Notes:

Steps are 800 hours

Apprentice to Journeyworker Ratio:1:1

TERRAZZO FINISHERS *BRICKLAYERS LOCAL 3 (SPR/PITT) - MARBLE & TILE*	02/01/2024	$61.34	$11.49	$23.59	$0.00	$96.42
	08/01/2024	$63.44	$11.49	$23.59	$0.00	$98.52
	02/01/2025	$64.74	$11.49	$23.59	$0.00	$99.82
	08/01/2025	$66.89	$11.49	$23.59	$0.00	$101.97
	02/10/2026	$68.24	$11.49	$23.59	$0.00	$103.32
	08/01/2026	$70.44	$11.49	$23.59	$0.00	$105.52
	02/01/2027	$71.84	$11.49	$23.59	$0.00	$106.92

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - *TERRAZZO FINISHER-Local 3 Marble/Tile (Spr/Ptt)*

Effective Date - 02/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$30.67	$11.49	$23.59	$0.00	$65.75
2	60	$36.80	$11.49	$23.59	$0.00	$71.88
3	70	$42.94	$11.49	$23.59	$0.00	$78.02
4	80	$49.07	$11.49	$23.59	$0.00	$84.15
5	90	$55.21	$11.49	$23.59	$0.00	$90.29

Effective Date - 08/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$31.72	$11.49	$23.59	$0.00	$66.80
2	60	$38.06	$11.49	$23.59	$0.00	$73.14
3	70	$44.41	$11.49	$23.59	$0.00	$79.49
4	80	$50.75	$11.49	$23.59	$0.00	$85.83
5	90	$57.10	$11.49	$23.59	$0.00	$92.18

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TERRAZZO MECHANIC *BRICKLAYERS LOCAL 3 (SPR/PITT) - MARBLE & TILE*	02/01/2024	$62.42	$11.49	$23.56	$0.00	$97.47
	08/01/2024	$64.52	$11.49	$23.56	$0.00	$99.57
	02/01/2025	$65.82	$11.49	$23.56	$0.00	$100.87
	08/01/2025	$67.97	$11.49	$23.56	$0.00	$103.02
	02/01/2026	$69.32	$11.49	$23.56	$0.00	$104.37
	08/01/2026	$71.52	$11.49	$23.56	$0.00	$106.57
	02/01/2027	$72.92	$11.49	$23.56	$0.00	$107.97

Apprentice - *TERRAZZO MECH - Local 3 Marble/Tile (Spr/Pitt)*

Effective Date - 02/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$31.21	$11.49	$23.56	$0.00	$66.26
2	60	$37.45	$11.49	$23.56	$0.00	$72.50
3	70	$43.69	$11.49	$23.56	$0.00	$78.74
4	80	$49.94	$11.49	$23.56	$0.00	$84.99
5	90	$56.18	$11.49	$23.56	$0.00	$91.23

Effective Date - 08/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	$32.26	$11.49	$23.56	$0.00	$67.31
2	60	$38.71	$11.49	$23.56	$0.00	$73.76
3	70	$45.16	$11.49	$23.56	$0.00	$80.21
4	80	$51.62	$11.49	$23.56	$0.00	$86.67
5	90	$58.07	$11.49	$23.56	$0.00	$93.12

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TEST BORING DRILLER *LABORERS - FOUNDATION AND MARINE*	12/01/2023	$48.33	$9.65	$18.22	$0.00	$76.20
	06/01/2024	$49.81	$9.65	$18.22	$0.00	$77.68
	12/01/2024	$51.28	$9.65	$18.22	$0.00	$79.15
	06/01/2025	$52.78	$9.65	$18.22	$0.00	$80.65
	12/01/2025	$54.28	$9.65	$18.22	$0.00	$82.15
	06/01/2026	$55.83	$9.65	$18.22	$0.00	$83.70
	12/01/2026	$57.33	$9.65	$18.22	$0.00	$85.20

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TEST BORING DRILLER HELPER *LABORERS - FOUNDATION AND MARINE*	12/01/2023	$44.45	$9.65	$18.22	$0.00	$72.32
	06/01/2024	$45.93	$9.65	$18.22	$0.00	$73.80
	12/01/2024	$47.40	$9.65	$18.22	$0.00	$75.27
	06/01/2025	$48.90	$9.65	$18.22	$0.00	$76.77
	12/01/2025	$50.40	$9.65	$18.22	$0.00	$78.27
	06/01/2026	$51.95	$9.65	$18.22	$0.00	$79.82
	12/01/2026	$53.45	$9.65	$18.22	$0.00	$81.32

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TEST BORING LABORER *LABORERS - FOUNDATION AND MARINE*	12/01/2023	$44.33	$9.65	$18.22	$0.00	$72.20
	06/01/2024	$45.81	$9.65	$18.22	$0.00	$73.68
	12/01/2024	$47.28	$9.65	$18.22	$0.00	$75.15
	06/01/2025	$48.78	$9.65	$18.22	$0.00	$76.65
	12/01/2025	$50.28	$9.65	$18.22	$0.00	$78.15
	06/01/2026	$51.83	$9.65	$18.22	$0.00	$79.70
	12/01/2026	$53.33	$9.65	$18.22	$0.00	$81.20

For apprentice rates see "Apprentice- LABORER"

Classification	**Effective Date**	**Base Wage**	**Health**	**Pension**	**Supplemental Unemployment**	**Total Rate**
TRACTORS *OPERATING ENGINEERS LOCAL 98*	12/01/2023	$38.42	$13.78	$15.15	$0.00	$67.35
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TRAILERS FOR EARTH MOVING EQUIPMENT *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	01/01/2024	$39.82	$15.07	$18.67	$0.00	$73.56
	06/01/2024	$40.82	$15.07	$18.67	$0.00	$74.56
	12/01/2024	$40.82	$15.07	$20.17	$0.00	$76.06
	01/01/2025	$40.82	$15.57	$20.17	$0.00	$76.56
	06/01/2025	$41.82	$15.57	$20.17	$0.00	$77.56
	12/01/2025	$41.82	$15.57	$21.78	$0.00	$79.17
	01/01/2026	$41.82	$16.17	$21.78	$0.00	$79.77
	06/01/2026	$42.82	$16.17	$21.78	$0.00	$80.77
	12/01/2026	$42.82	$16.17	$23.52	$0.00	$82.51
	01/01/2027	$42.82	$16.77	$23.52	$0.00	$83.11
TUNNEL WORK - COMPRESSED AIR *LABORERS (COMPRESSED AIR)*	12/01/2023	$56.56	$9.65	$18.67	$0.00	$84.88
	06/01/2024	$58.04	$9.65	$18.67	$0.00	$86.36
	12/01/2024	$59.51	$9.65	$18.67	$0.00	$87.83
	06/01/2025	$61.01	$9.65	$18.67	$0.00	$89.33
	12/01/2025	$62.51	$9.65	$18.67	$0.00	$90.83
	06/01/2026	$64.06	$9.65	$18.67	$0.00	$92.38
	12/01/2026	$65.56	$9.65	$18.67	$0.00	$93.88
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) *LABORERS (COMPRESSED AIR)*	12/01/2023	$58.56	$9.65	$18.67	$0.00	$86.88
	06/01/2024	$60.04	$9.65	$18.67	$0.00	$88.36
	12/01/2024	$61.51	$9.65	$18.67	$0.00	$89.83
	06/01/2025	$63.01	$9.65	$18.67	$0.00	$91.33
	12/01/2025	$64.51	$9.65	$18.67	$0.00	$92.83
	06/01/2026	$66.06	$9.65	$18.67	$0.00	$94.38
	12/01/2026	$67.56	$9.65	$18.67	$0.00	$95.88
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR *LABORERS (FREE AIR TUNNEL)*	12/01/2023	$48.63	$9.65	$18.67	$0.00	$76.95
	06/01/2024	$50.11	$9.65	$18.67	$0.00	$78.43
	12/01/2024	$51.58	$9.65	$18.67	$0.00	$79.90
	06/01/2025	$53.08	$9.65	$18.67	$0.00	$81.40
	12/01/2025	$54.58	$9.65	$18.67	$0.00	$82.90
	06/01/2026	$56.13	$9.65	$18.67	$0.00	$84.45
	12/01/2026	$57.63	$9.65	$18.67	$0.00	$85.95
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR (HAZ. WASTE) *LABORERS (FREE AIR TUNNEL)*	12/01/2023	$50.63	$9.65	$18.67	$0.00	$78.95
	06/01/2024	$52.11	$9.65	$18.67	$0.00	$80.43
	12/01/2024	$53.58	$9.65	$18.67	$0.00	$81.90
	06/01/2025	$55.08	$9.65	$18.67	$0.00	$83.40
	12/01/2025	$56.58	$9.65	$18.67	$0.00	$84.90
	06/01/2026	$58.13	$9.65	$18.67	$0.00	$86.45
	12/01/2026	$59.63	$9.65	$18.67	$0.00	$87.95
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
VAC-HAUL *TEAMSTERS JOINT COUNCIL NO. 10 ZONE B*	01/01/2024	$39.24	$15.07	$18.67	$0.00	$72.98
	06/01/2024	$40.24	$15.07	$18.67	$0.00	$73.98
	12/01/2024	$40.24	$15.07	$20.17	$0.00	$75.48
	01/01/2025	$40.24	$15.57	$20.17	$0.00	$75.98
	06/01/2025	$41.24	$15.57	$20.17	$0.00	$76.98
	12/01/2025	$41.24	$15.57	$21.78	$0.00	$78.59
	01/01/2026	$41.24	$16.17	$21.78	$0.00	$79.19
	06/01/2026	$42.24	$16.17	$21.78	$0.00	$80.19
	12/01/2026	$42.24	$16.17	$23.52	$0.00	$81.93
	01/01/2027	$42.24	$16.77	$23.52	$0.00	$82.53
WAGON DRILL OPERATOR (HEAVY & HIGHWAY) *LABORERS - ZONE 4 (HEAVY & HIGHWAY)*	12/01/2023	$32.37	$9.65	$15.60	$0.00	$57.62
	06/01/2024	$33.56	$9.65	$15.60	$0.00	$58.81
	12/01/2024	$34.74	$9.65	$15.60	$0.00	$59.99
	06/01/2025	$35.98	$9.65	$15.60	$0.00	$61.23
	12/01/2025	$37.21	$9.65	$15.60	$0.00	$62.46
	06/01/2026	$39.25	$9.65	$15.60	$0.00	$64.50
	12/01/2026	$40.54	$9.65	$15.60	$0.00	$65.79
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
WATER METER INSTALLER *PLUMBERS & PIPEFITTERS LOCAL 104 WESTERN DIVISION*	03/17/2024	$49.21	$9.55	$17.10	$0.00	$75.86
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"						
Marine Drilling						
BLASTER *MARINE DRILLING*	01/01/2018	$41.82	$7.63	$3.60	$0.00	$53.05
BOAT CAPTAIN *MARINE DRILLING*	01/01/2018	$33.87	$7.63	$3.30	$0.00	$44.80
BOAT CAPTAIN / Over 1,000 hp *MARINE DRILLING*	01/01/2018	$38.06	$7.63	$3.60	$0.00	$49.29
CORE DRILLER *MARINE DRILLING*	01/01/2018	$31.43	$7.63	$2.90	$0.00	$41.96
CORE DRILLER HELPER *MARINE DRILLING*	01/01/2018	$28.47	$7.63	$3.00	$0.00	$39.10
DRILLER *MARINE DRILLING*	01/01/2018	$39.70	$7.63	$3.60	$0.00	$50.93
ENGINEER *MARINE DRILLING*	01/01/2018	$39.69	$7.63	$3.50	$0.00	$50.82
HELPER *MARINE DRILLING*	01/01/2018	$34.24	$7.63	$3.00	$0.00	$44.87
MACHINIST *MARINE DRILLING*	01/01/2018	$38.88	$7.63	$3.30	$0.00	$49.81
OILER - MARINE DRILLING *MARINE DRILLING*	01/01/2018	$34.24	$7.63	$3.00	$0.00	$44.87
TUG DECKHAND *MARINE DRILLING*	01/01/2018	$27.61	$7.63	$3.00	$0.00	$38.24
WELDER *MARINE DRILLING*	01/01/2018	$38.88	$7.63	$3.30	$0.00	$49.81
Op Eng Marine (Dredging Work)						
BOAT OPERATOR *OPERATING ENGINEERS - MARINE DIVISION*	10/01/2017	$29.26	$7.63	$3.30	$0.00	$40.19

Classification	**Effective Date**	**Base Wage**	**Health**	**Pension**	**Supplemental Unemployment**	**Total Rate**
CERTIFIED WELDER *OPERATING ENGINEERS - MARINE DIVISION*	10/01/2017	$31.09	$7.63	$3.60	$0.00	$42.32
CHIEF WELDER/ CHIEF MATE *OPERATING ENGINEERS - MARINE DIVISION*	10/01/2017	$33.02	$7.63	$3.60	$0.00	$44.25
DERRICK / SPIDER / SPILLBARGE OPERATOR *OPERATING ENGINEERS - MARINE DIVISION*	10/01/2017	$33.02	$7.63	$3.60	$0.00	$44.25
DRAG BARGE OPERATOR / WELDER / MATE *OPERATING ENGINEERS - MARINE DIVISION*	10/01/2017	$30.24	$7.63	$3.30	$0.00	$41.17
ENGINEER / ELECTRICIAN *OPERATING ENGINEERS - MARINE DIVISION*	10/01/2017	$33.02	$7.63	$3.60	$0.00	$44.25
LICENSED BOAT OPERATOR *OPERATING ENGINEERS - MARINE DIVISION*	10/01/2017	$33.02	$7.63	$3.60	$0.00	$44.25
LICENSED TUG OPERATOR OVER 1000HP *OPERATING ENGINEERS - MARINE DIVISION*	10/01/2017	$38.18	$7.63	$3.60	$0.00	$49.41
MAINTENANCE ENGINEER *OPERATING ENGINEERS - MARINE DIVISION*	10/01/2017	$33.03	$7.63	$3.60	$0.00	$44.26
OILER - MARINE DIVISION *OPERATING ENGINEERS - MARINE DIVISION*	10/01/2017	$24.30	$7.63	$3.00	$0.00	$34.93
OPERATOR / LEVERMAN *OPERATING ENGINEERS - MARINE DIVISION*	10/01/2017	$38.18	$7.63	$3.60	$0.00	$49.41
RODMAN / SCOWMAN *OPERATING ENGINEERS - MARINE DIVISION*	10/01/2017	$24.30	$7.63	$3.00	$0.00	$34.93
SHOREMAN / DECKHAND *OPERATING ENGINEERS - MARINE DIVISION*	10/01/2017	$24.30	$7.63	$3.00	$0.00	$34.93
Outside Electrical - West						
EQUIPMENT OPERATOR *OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42* For apprentice rates see "Apprentice- LINEMAN"	09/01/2019	$44.67	$8.00	$12.55	$0.00	$65.22
GROUNDMAN *OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42* For apprentice rates see "Apprentice- LINEMAN"	09/01/2019	$30.58	$8.00	$5.48	$0.00	$44.06
GROUNDMAN / TRUCK DRIVER *OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42* For apprentice rates see "Apprentice- LINEMAN"	09/01/2019	$39.97	$8.00	$10.96	$0.00	$58.93
HEAVY EQUIPMENT OPERATOR *OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42* For apprentice rates see "Apprentice- LINEMAN"	09/01/2019	$47.01	$8.00	$13.22	$0.00	$68.23
JOURNEYMAN LINEMAN *OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42*	09/01/2019	$51.71	$8.00	$15.55	$0.00	$75.26

Classification	**Effective Date**	**Base Wage**	**Health**	**Pension**	**Supplemental Unemployment**	**Total Rate**

Apprentice - *LINEMAN (Outside Electrical) - West Local 42*
Effective Date - 09/01/2019

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	$31.03	$8.00	$3.43	$0.00	$42.46
2	65	$33.61	$8.00	$3.51	$0.00	$45.12
3	70	$36.20	$8.00	$3.59	$0.00	$47.79
4	75	$38.78	$8.00	$5.16	$0.00	$51.94
5	80	$41.37	$8.00	$5.24	$0.00	$54.61
6	85	$43.95	$8.00	$5.32	$0.00	$57.27
7	90	$46.54	$8.00	$7.40	$0.00	$61.94

Notes:

Apprentice to Journeyworker Ratio:1:2

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TELEDATA CABLE SPLICER *OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42*	02/04/2019	$30.73	$4.70	$3.17	$0.00	$38.60
TELEDATA LINEMAN/EQUIPMENT OPERATOR *OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42*	02/04/2019	$28.93	$4.70	$3.14	$0.00	$36.77
TELEDATA WIREMAN/INSTALLER/TECHNICIAN *OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42*	02/04/2019	$28.93	$4.70	$3.14	$0.00	$36.77
TRACTOR-TRAILER DRIVER *OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42*	09/01/2019	$44.67	$8.00	$12.55	$0.00	$65.22

Additional Apprentice Information:

Minimum wage rates for apprentices employed on public works projects are listed above as a percentage of the pre-determined hourly wage rate established by the Commissioner under the provisions of the M.G.L. c. 149, ss. 26-27D. Apprentice ratios are established by the Division of Apprenticeship Training pursuant to M.G.L. c. 23, ss. 11E-11L.

All apprentices must be registered with the Division of Apprenticeship Training in accordance with M.G.L. c. 23, ss. 11E-11L.

All steps are six months (1000 hours.)
Ratios are expressed in allowable number of apprentices to journeymen or fraction thereof, unless otherwise specified.

** Multiple ratios are listed in the comment field.
*** APP to JM; 1:1, 2:2, 2:3, 3:4, 4:4, 4:5, 4:6, 5:7, 6:7, 6:8, 6:9, 7:10, 8:10, 8:11, 8:12, 9:13, 10:13, 10:14, etc.
**** APP to JM; 1:1, 1:2, 2:3, 2:4, 3:5, 4:6, 4:7, 5:8, 6:9, 6:10, 7:11, 8:12, 8:13, 9:14, 10:15, 10:16, etc.

DOCUMENT 00880

Revised January 12, 2022

DEPARTMENT OF LABOR

Employment Standards Administration

MINIMUM WAGES FOR FEDERAL AND FEDERALLY ASSISTED CONTRACTS

"General Decision Number: MA20240016 03/01/2024

Superseded General Decision Number: MA20230016

State: Massachusetts

Construction Type: Highway

County: Berkshire County in Massachusetts.

HIGHWAY CONSTRUCTION PROJECTS

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(1).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	. Executive Order 14026 generally applies to the contract. . The contractor must pay all covered workers at least $17.20 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2024.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least $12.90 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2024.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the

Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at http://www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/05/2024
1	01/19/2024
2	03/01/2024

ENGI0004-019 12/01/2023

	Rates	Fringes
POWER EQUIPMENT OPERATOR		
Group 1	$ 48.73	29.25+A
GROUP 1	$ 55.03	32.45
Group 2	$ 48.23	29.25+A
GROUP 2	$ 54.43	32.45

FOOTNOTE FOR POWER EQUIPMENT OPERATORS:

A. PAID HOLIDAYS: New Year's Day, Washington's Birthday, Labor Day, Memorial Day, Independence Day, Patriot's Day, Columbus Day, Veteran's Day, Thanksgiving Day, Christmas Day

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

Group 1: Broom/Sweeper; Crane; Gradall; Post Driver (Guardrail/Fences)

Group 2: Bulldozer; Grader/Blade

ENGI0098-010 12/01/2016

	Rates	Fringes
POWER EQUIPMENT OPERATOR		
Group 1	$ 33.68	23.96+A
Group 2	$ 33.37	23.96+A
Group 4	$ 32.54	23.96+A

Footnote:

A. Paid Holidays: New year's Day, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Columbus Day, Veterans Day, Thanksgiving Day and Christmas Day

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POWER EQUIPMENT OPERATORS CLASSIFICATIONS
  Group 1: Backhoe/Excavator/Trackhoe; Bobcat/Skid Steer/Skid
  Loader; Loader
  Group 2: Milling Machine; Paver (Asphalt, Aggregate, and
  Concrete)
Group 4: Roller

----------------------------------------------------------------
 IRON0007-027 09/16/2023

                                  Rates          Fringes

IRONWORKER (ORNAMENTAL AND
STRUCTURAL)......................$ 39.05            32.42
----------------------------------------------------------------
* LABO0473-007 12/01/2023

                                  Rates          Fringes

LABORER (Common or General)......$ 30.41            24.98
TRAFFIC CONTROL (Flagger)........$ 25.46            24.98
----------------------------------------------------------------
 LABO0596-005 12/01/2021

                                  Rates          Fringes

LABORER (Form Work Only).........$ 32.50            23.96
----------------------------------------------------------------
 PAIN0035-023 07/01/2023

                                  Rates          Fringes

PAINTER (Steel)..................$ 55.51            35.10
----------------------------------------------------------------
  SUMA2014-006 01/11/2017

                                  Rates          Fringes

CARPENTER........................$ 44.11            21.41

CEMENT MASON/CONCRETE FINISHER...$ 52.13            20.89

ELECTRICIAN......................$ 47.13            13.41

IRONWORKER, REINFORCING..........$ 46.21            21.27

LABORER:  Asphalt, Includes
Raker, Shoveler, Spreader and
Distributor......................$ 33.10            18.09
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LABORER: Concrete Saw (Hand Held/Walk Behind)	$ 44.43	14.18
LABORER: Landscape	$ 36.62	16.00
OPERATOR: Forklift	$ 51.63	0.00
OPERATOR: Mechanic	$ 48.14	17.02
OPERATOR: Piledriver	$ 43.87	18.04
PAINTER: Spray (Linestriping)	$ 38.30	17.43
TRAFFIC CONTROL: Laborer-Cones/ Barricades/Barrels - Setter/Mover/Sweeper	$ 43.73	15.06
TRUCK DRIVER: Concrete Truck	$ 33.69	15.79
TRUCK DRIVER: Dump Truck	$ 38.94	12.00
TRUCK DRIVER: Flatbed Truck	$ 48.53	0.00

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at https://www.dol.gov/agencies/whd/government-contracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION"

"General Decision Number: MA20240006 01/05/2024

Superseded General Decision Number: MA20230006

State: Massachusetts

Construction Type: Heavy Dredging

Counties: Massachusetts Statewide.
STATEWIDE

Massacusetts All Dredging, except self-propelled hopper dredges, on the Atlantic Coast & tributary waters emptying into the Atlantic Ocean.

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(1).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	. Executive Order 14026 generally applies to the contract. . The contractor must pay all covered workers at least $17.20 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2024.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least $12.90 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2024.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at http://www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/05/2024

ENGI0025-001 10/01/2023

STATEWIDE

	Rates	Fringes
Dredging:		
CLASS A1....................	$ 45.26	15.17+a+b
CLASS A2....................	$ 40.33	14.82+a+b
CLASS B1....................	$ 39.14	14.74+a+b
CLASS B2....................	$ 36.84	14.58+a+b
CLASS C1....................	$ 35.83	14.26+a+b
CLASS C2....................	$ 34.68	14.18+a+b
CLASS D.....................	$ 28.81	13.77+a+b

CLASSIFICATIONS:
CLASS A1: Deck Captain; Mechanical Dredge Operator, Leverman, Licensed Tug Operator over 1000 HP.
CLASS A2: Crane Operator (360 swing).
CLASS B1: Derrick Operator (180 swing), Spider/Spill Barge Operator, Engineer, Electrician, Chief Welder, Chief Mate, Fill Placer, Operator II, Maintenance Engineer, Licensed Boat Operator, Licensed Crew Boat Operator.
CLASS B2: Certified Welder.
CLASS C1: Mate, Drag Barge Operator, Assistant Fill Placer, Welder, Steward.
CLASS C2: Boat Operator.
CLASS D: Oiler, Deckhand, Shoreman, Rodman, Scowman, Cook, Messman, Porter/Janitor.

INCENTIVE PAY: (Add to Hourly Rate)
Operator (NCCCO License/Certification) $1.80 Licensed Tug Operator over 1000 HP (Assigned as Master) (USCG licensed Master of Towing Vessels (MOTV) $1.80; Licensed Boat

Operator (Assigned as lead boat captain) USCG licensed boat operator $1.30; Engineer (QMED and Tankerman endorsement or licensed engineer (USCG) $1.80 Oiler (QMED and Tankerman endorsement (USCG) $1.80; All classifications (Tankerman endorsement only) USCG $1.55; Deckhand or Mate (AB with Lifeboatman endorsement (USCG) $1.80; All classifications (lifeboatman endorsement only (USCG) $1.55; Welder (ABS certification) $1.55

FOOTNOTES APPLICABLE TO ABOVE CRAFTS:

a. PAID HOLIDAYS: New Year's Day, Martin Luther King, Jr.'s Birthday, Memorial Day, Good Friday, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day and Christmas Day

b. VACATION: Eight percent (8%) of the straight time rate, multiplied by the total hours worked.

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at https://www.dol.gov/agencies/whd/government-contracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

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Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

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Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION"

"General Decision Number: MA20240010 03/22/2024

Superseded General Decision Number: MA20230010

State: Massachusetts

Construction Types: Heavy (Heavy and Marine)

Counties: Berkshire, Franklin, Hampden and Hampshire Counties in Massachusetts.

HEAVY CONSTRUCTION PROJECTS; AND MARINE CONSTRUCTION PROJECTS

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(1).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	. Executive Order 14026 generally applies to the contract. . The contractor must pay all covered workers at least $17.20 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2024.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least $12.90 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2024.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at http://www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/05/2024
1	01/19/2024
2	02/09/2024
3	03/01/2024
4	03/22/2024

BOIL0029-001 01/01/2021

	Rates	Fringes
BOILERMAKER......................	$ 45.87	29.02

BRMA0001-005 08/01/2023

SPRINGFIELD CHAPTER

	Rates	Fringes
BRICKLAYER BRICKLAYERS; CEMENT MASONS; PLASTERERS; STONE MASONS; MARBLE, TILE & TERRAZZO WORKERS............	$ 50.81	32.27

BRMA0001-007 08/01/2023

SPRINGFIELD/PITTSFIELD CHAPTER
BERKSHIRE COUNTY

	Rates	Fringes
BRICKLAYER BRICKLAYERS; CEMENT MASONS; PLASTERERS; STONE MASONS; MARBLE, TILE & TERRAZZO WORKERS............	$ 50.81	32.27

CARP0056-004 08/01/2022

	Rates	Fringes
DIVER TENDER.....................	$ 52.15	34.10
DIVER............................	$ 68.70	35.57

CARP0056-009 08/01/2020

	Rates	Fringes
PILEDRIVERMAN....................	$ 49.07	35.57

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* CARP0336-005 03/01/2024

FRANKLIN COUNTY (Erving, Orange, North Orange, and Warwick)

	Rates	Fringes
CARPENTER........................	$ 40.96	27.39

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* CARP0336-010 03/01/2024

BERKSHIRE

	Rates	Fringes
CARPENTER........................	$ 40.96	27.39

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* CARP0336-012 03/01/2024

HAMPDEN; HAMPSHIRE; AND FRANKLIN (Remainder of County)

	Rates	Fringes
CARPENTER........................	$ 40.96	27.39

CARP1121-004 01/01/2024

	Rates	Fringes
MILLWRIGHT.......................	$ 41.20	32.99

ELEC0007-002 07/02/2023

HAMPDEN (Except Chester & Holyoke); HAMPSHIRE (Belchertown, Ware)

	Rates	Fringes

ELECTRICIAN	$ 48.01	27.71

ELEC0007-003 07/02/2023

BERKSHIRE; FRANKLIN; HAMPDEN (Chester, Holyoke); HAMPSHIRE (Except Belchertown, Ware)

	Rates	Fringes
ELECTRICIAN	$ 48.01	27.71

ENGI0098-007 12/01/2016

	Rates	Fringes
Power equipment operators:		
Group 1	$ 33.68	23.96+A
Group 2	$ 33.37	23.96+A
Group 3	$ 33.15	23.96+A
Group 4	$ 32.54	23.96+A
Group 5	$ 29.92	23.96+A
Group 6	$ 28.80	23.96+A
Group 7	$ 26.86	23.96+A
Group 8	$ 305.95	23.96+A
Group 9	$ 230.69	23.96+A
Group 10	$ 35.17	23.96+A
Group 11	$ 38.18	23.96+A
Group 12	$ 39.68	23.96+A
Group 13	$ 40.68	23.96+A
Group 14	$ 41.68	23.96+A
Group 15	$ 43.18	23.96+A

HAZARDOUS WASTE PREMIUM $2.00

FOOTNOTE FOR POWER EQUIPMENT OPERATORS:
Group 8 and Group 9 are per day wages.

A. Paid Holidays: New year's Day, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Columbus Day, Veterans Day, Thanksgiving Day and Christmas Day

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

Group 1: Shovels; crawlers and truck cranes including all tower; self-propelled hydraulic cranes 10 tons and over; draglines; clam shells; cableways; shaft hoists; mucking machines derricks; backhoes; bulldozers; gradalls; elevating graders; pile drivers; concrete pavers; trenching machines; front end loaders- 5 1/2 cu yds and over; dual drum paver; automatic grader-excavator(C.M.I. or equal);

scrapers towing pan or wagon; tandem dozers or push cats(2 units in tandem); shotcrete machine; tunnel boring machine; combination backhoe/loader 3/4 cu yd hoe or over; jet engine dryer; tree shredder; post hole digger; post hole hammer; post extractor; truck mounted concrete pump with boom; roto-mill; Grader; Horizontal Drilling Machine; John Henry Rock Drill and similar equipment.

Group 2: Rotary drill with mounted compressor; compressor house (3 to 6 compressors); rock and earth boring machines (excluding McCarthy and similar drills); front end loaders 4 cu yds to 5 1/2 cu yds); forklifts-7 ft lift and over 3 ton capacity; scraper 21 yds and over (struck load); sonic hammer console; reclaimers road planer/milling machine; cal tracks; ballast regulators; rail anchor machines; switch tampers, asphalt pavers; mechanic; welder and transfer machine.

Group 3: Combination backhoe/loader up to 3/4 cu yd; scrapers up to 21 cu yd (struck load, self propelled or tractor drawn); tireman; front end loaders up to 4 yds; well drillers; engineer or fireman on high pressure boiler; self-loading batch plant; well point operators electric pumps used in well point system; pumps, 16 inches and over (total discharge); compressor, one or two 900 cu ft and over; powered grease truck; tunnel locomotives and dingys; grout pumps; hydraulic jacks; boom truck; hydraulic cranes-up to 10 ton.

Group 4: Asphalt rollers; self-powered rollers and compactors; tractor without blade drawing sheepsfoot roller; rubber tire roller; vibratory roller or other type of compactors including machines for pulverizing and aerating soil; york rake.

Group 5: Hoists; conveyors; power pavement breakers; self-powered concrete pavement finishing machines; two bag mixers with skip; McCarthy and similar drills; batch plants (not self loading); bulk cement plants; self-propelled material spreaders; three or more 10 KW light plants; 30 KW or more generators; power broom.

Group 6: Compressor (one or two) 315 cu ft to 900 cu ft; pumps 4 inches to 16 inches (total discharge).

Group 7: Compressors up to 315 cu ft; small mixers with skip; pumps up to 4 inches; power heaters; oiler; A-frame trucks; forklifts-up to 7 ft. lift and up to 3 ton capacity; hydro broom; stud welder.

Group 8: Truck crane crews
Group 9: Oiler
Group 10: Master Mechanic
Group 11: Boom lengths over 150 feet including jib
Group 12: Boom lengths over 200 feet including jib
Group 13: Boom lengths over 250 feet including jib
Group 14: Boom lengths over 300 feet including jib

Group 15: Boom lengths over 350 feet including jib

IRON0007-014 09/16/2023

BERKSHIRE (Becket, East Otis, Hinsdale, Monterey, New Marlboro, North Otis, Otis, Peru, Sandisfield, Savoy, Sheffield, Washington, Windsor); FRANKLIN; HAMPDEN; HAMPSHIRE

	Rates	Fringes
IRONWORKER	$ 39.05	32.42

IRON0012-003 07/01/2023

BERKSHIRE (Lee)

	Rates	Fringes
IRONWORKER	$ 34.50	26.83

IRON0012-004 07/01/2023

BERKSHIRE (Remainder of County)

	Rates	Fringes
Ironworkers:		
Sheeter	$ 34.75	26.83
Structural, Ornamental, Reinforcing, Fence Erector, Machinery Mover, Rigger, Rodman, Stone Derrickman	$ 34.50	26.83

LABO0022-002 12/01/2023

FRANKLIN (Orange, Warwick)

	Rates	Fringes
Laborers:		
GROUP 1	$ 37.86	27.59
GROUP 2	$ 38.11	27.59
GROUP 3	$ 38.61	27.59
GROUP 4	$ 38.86	27.59
GROUP 5	$ 38.61	27.59
GROUP 6	$ 39.86	27.59

LABORERS CLASSIFICATIONS

GROUP 1: Laborers; carpenter tenders; cement finisher tenders, plasterer tenders

GROUP 2: Asphalt raker; fence and guard rail erector; laser beam operator; mason tenmder; pipelayer; pneumatic drill operator; pneumatic tool operator; wagon drill operatorm jackhammer operator, pavement breaker, carbide core drilling machine, chain saw operator, barco type jumping tampers, concrete pump, motorized mortar miner, ride-on motorized buggy

GROUP 3: Air track operator; block paver; rammer; curb setter, hydraulic and similar self-powered drills

GROUP 4: Blaster; powderman

GROUP 5: Precast floor and roof, plank erector

GROUP 6: Asbestos Abatement, Toxic and Hazardous waste laborers

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LABO0473-005 12/01/2021

FRANKLIN (Except Orange and Warrick); HAMPDEN and HAMPSHIRE COUNTIES (with the exception of Chesterfield, Cummington, Goshen, Middlefield, Plainfield, and Worthington)

	Rates	Fringes
Laborers:		
Group 1.....................	$ 30.37	24.64
Group 2.....................	$ 30.62	24.64
Group 3.....................	$ 31.12	24.64
Group 4.....................	$ 31.37	24.64
Group 5.....................	$ 24.50	24.64
Group 6.....................	$ 32.37	24.64

LABORERS CLASSIFICATIONS

Group 1: Carpenter tenders, cement finisher tenders, laborers, wrecking laborers

Group 2: Asphalt rakers, fence and guard rail erectors, laser beam operator, mason tender, pipelayer, pneumatic drill operator, pneumatic tool operator, wagon drill operator

Group 3: Air track operator, block pavers, rammers, curb setters

Group 4: Blasters, powdermen

Group 5: Flaggers

Group 6: Asbestos abatement, toxic and Hazardous waste laborers

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LABO0473-006 12/01/2021

BERKSHIRE; HAMPSHIRE COUNTIES (the towns of Chesterfield, Cummington, Goshen, Middlefield, Plainfield, and Worthington only)

	Rates	Fringes
Laborers:		
Group 1	$ 30.37	24.49
Group 2	$ 30.62	24.49
Group 3	$ 31.12	24.49
Group 4	$ 31.37	24.49
Group 5	$ 24.50	24.49
Group 6	$ 32.37	24.49

LABORERS CLASSIFICATIONS

Group 1: Carpenter tenders, cement finisher tenders, laborers, wrecking laborers

Group 2: Asphalt rakers, fence and guard rail erectors, laser beam operator, mason tender, pipelayer, pneumatic drill operator, pneumatic tool operator, wagon drill operator

Group 3: Air track operator, block pavers, rammers, curb setters

Group 4: Blasters, powdermen

Group 5: Flaggers

Group 6: Asbestos abatement, toxic and Hazardous waste laborers

---

LABO1421-002 12/01/2021

	Rates	Fringes
Laborers:		
Group 1	$ 41.33	27.37
Group 2	$ 42.08	27.35
Group 3	$ 42.33	27.35
Group 4	$ 37.33	27.35
Group 5	$ 40.43	27.35
Group 6	$ 41.33	27.37

Group 1: Adzeman, Wrecking Laborer.
Group 2: Burners, Jackhammers.
Group 3: Small Backhoes, Loaders on tracks, Bobcat Type Loaders, Hydraulic ""Brock"" Type Hammer Operators, Concrete Cutting Saws.
Group 4: Yardman (Salvage Yard Only).
Group 5: Yardman, Burners, Sawyers.
Group 6: Asbestos, Lead Paint, Toxic and Hazardous Waste.

PAIN0035-010 07/01/2023

	Rates	Fringes
PAINTER		
NEW CONSTRUCTION:		
Brush, Taper	$ 36.93	31.10
Spray, Sandblast	$ 38.33	31.10
REPAINT:		
Bridge	$ 55.51	35.10
Brush, Taper	$ 33.75	31.10
Spray, Sandblast	$ 35.65	31.10

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* PLUM0004-003 03/01/2024

FRANKLIN (Orange)

	Rates	Fringes
Plumber and Steamfitter	$ 53.95	28.42

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* PLUM0104-004 03/17/2024

BERKSHIRE (Becket, Otis, Sandisfield); FRANKLIN (Except Monroe, Rowe, and the Western part of Charlemont); HAMPDEN; HAMPSHIRE

	Rates	Fringes

```
Plumbers and Pipefitters.........$ 47.51           29.35

FOOTNOTE:
  A.  Two paid holidays, Independence Day and Labor Day,
  provided the employee has been employed seven days prior to
  the holiday by the same employer

----------------------------------------------------------------
* PLUM0104-009 03/17/2024

BERKSHIRE (Except Otis, Becket, Sandisfield); FRANKLIN (Monroe,
Rowe and the Western part of Charlemont)


                                  Rates          Fringes

Plumber and Steamfitter..........$ 47.51           29.35

FOOTNOTE FOR PLUMBERS & STEAMFITTERS:
  A.  Paid holidays:  Independence Day and Labor Day, provided
  the employee has been employed seven days prior to the
  holiday by the same employer.

----------------------------------------------------------------
 TEAM0379-001 06/01/2023

                                  Rates          Fringes

Truck drivers:
     Group 1.....................$ 38.78        31.86+a+b
     Group 2.....................$ 38.95        31.86+a+b
     Group 3.....................$ 39.02        31.86+a+b
     Group 4.....................$ 39.14        31.86+a+b
     Group 5.....................$ 39.24        31.86+a+b
     Group 6.....................$ 39.53        31.86+a+b
     Group 7.....................$ 39.82        31.86+a+b

POWER TRUCKS $.25 DIFFERENTIAL BY AXLE
TUNNEL WORK (UNDERGROUND ONLY) $.40 DIFFERENTIAL BY AXLE
  HAZARDOUS MATERIALS (IN HOT ZONE ONLY) $2.00 PREMIUM


                       TRUCK DRIVERS CLASSIFICATIONS

Group 1:  Station wagons; panel trucks; and pickup trucks

Group 2:  Two axle equipment; & forklift operator

Group 3:  Three axle equipment and tireman
```

Group 4: Four and Five Axle equipment

Group 5: Specialized earth moving equipment under 35 tons other than conventional type trucks; low bed; vachual; mechanics, paving restoration equipment

Group 6: Specialized earth moving equipment over 35 tons

Group 7: Trailers for earth moving equipment (double hookup)

FOOTNOTES:

A. PAID HOLIDAYS: New Year's Day, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Patriot's Day, Columbus Day, Veteran's Day, Thanksgiving Day and Christmas Day

B. PAID VACATION: Employees with 4 months to 1 year of service receive 1/2 day's pay per month; 1 week vacation for 1 - 5 years of service; 2 weeks vacation for 5 - 10 years of service; and 3 weeks vacation for more than 10 years of service

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WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at https://www.dol.gov/agencies/whd/government-contracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- an existing published wage determination
- a survey underlying a wage determination
- a Wage and Hour Division letter setting forth a position on a wage determination matter
- a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the

Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION"

DOCUMENT A00803

GEOTECHNICAL REPORT

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Weston & Sampson

55 Walkers Brook Drive, Reading, MA 01867 (HQ)
Tel: 978.532.1900

WSE Project No. 2180468

October 28, 2022

Massachusetts Department of Transportation
c/o Mr. Scott Bruso, P.E.
Weston & Sampson
100 Foxboro Boulevard, Suite 350
Foxboro, Massachusetts, 02035

Re: ***Geotechnical Engineering Report (REVISION 1)***
Replacement of State Bridge No. C-10-002
Sand Mill Road over Dry Book
Cheshire, Massachusetts

Weston & Sampson is pleased to submit our Geotechnical Engineering Report for the subject project. This report presents a description of our services, a summary of field explorations, descriptions of site and subsurface conditions, and geotechnical recommendations for design and construction of the proposed bridge replacement.

Our services were completed in general accordance with the *Massachusetts Department of Transportation LRFD Bridge Manual*. Our recommendations were developed in general accordance with the *AASHTO LRFD Bridge Design Specifications*.

We appreciate the opportunity to be of service to you. If you have questions concerning this report or require additional information, please contact us at 978-532-1900.

Very truly yours,
WESTON & SAMPSON ENGINEERS, INC.

Stefanie Bridges

Stefanie Bridges, PE
Geotechnical Project Manager

JENNIFER A.C. MacGREGOR
CIVIL
No. 45230

Jennifer MacGregor, PE
Technical Leader

Bridge Replacement
State Bridge C-10-002
Sand Mill Road over Dry Brook

Cheshire, Massachusetts

Geotechnical Engineering Report

Prepared for:
MassDOT

Prepared by:
Weston & Sampson Engineers, Inc.
WSE Project No. 2180468

October 22, 2021
(REVISED October 28, 2022)

55 Walkers Brook Drive, Reading, MA 01867 (HQ)
Tel: 978.`532.1900

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FIGURES

APPENDICES

1.0 EXECUTIVE SUMMARY

This report summarizes our geotechnical evaluation for the proposed replacement of MassDOT Bridge No. C-10-002 carrying Sand Mill Road over Dry Brook in Cheshire, Massachusetts. The existing single-span bridge was constructed in 1939. The existing bridge superstructure consists of six steel stringers supporting a 6.5-inch-thick reinforced concrete deck with a 4-inch-thick asphalt concrete wearing surface and is supported by gravity concrete walls and abutments.

The proposed project includes complete bridge replacement (superstructure and substructure). The preferred superstructure option consists of precast concrete butted deck beams with cast-in-place (CIP) composite concrete deck. The preferred substructure replacement option consists of new CIP concrete cantilever abutments with splayed wingwalls.

Weston & Sampson completed a subsurface exploration program consisting of three borings and six probes to assess the subsurface conditions at the project site. The subsurface conditions generally consisted of fill overlying native sand and dense or hard glacial deposits. Possible weathered bedrock was encountered at a depth of about 66 feet behind the south abutment. Our borings behind the north abutment encountered refusal at a maximum depth of 37 feet on suspected boulders.

Based on the observed subsurface conditions, the proposed rehabilitation is feasible, and the new abutments and wingwalls may be supported on conventional spread footing foundations bearing within the native sand and/or glacial deposits. Recommended design geotechnical parameters, bearing resistance, estimated settlement, and construction considerations are provided herein.

2.0 INTRODUCTION

This report presents the results of Weston & Sampson's geotechnical engineering evaluation for the proposed replacement of the Sand Mill Road over the Dry Brook Bridge (Bridge No. C-10-002) in Cheshire, Massachusetts. The report includes the results of subsurface explorations at the bridge and provides geotechnical design recommendations and construction considerations for the new abutments and wingwalls. The bridge location relative to surrounding physical features is shown in ***Figure 1 – Site Plan***.

This report had been prepared in general accordance with the 2013 Massachusetts Department of Transportation (MassDOT) Load and Resistance Factor Design (LRFD) Bridge Design Manual and January 2020 updates, and the American Association of State Highway and Transportation Officials (AASHTO) LRFD Bridge Design Specifications, Ninth Edition, 2020.

Our understanding of the existing and proposed conditions is based on the following:

- Construction plan for Sand Mill – Savoy Road over Stony Brook Bridge No. C-10-2, by W. & L. Engineering Co., dated November 11, 1938;
- Repair plans for Sand Mill Road over Dry Brook Bridge No. C-10-002 (03G), by Foresight Land Services Inc., dated September 9, 2016;
- MassDOT Structures Inspection Field Report, Routine and Special Member Inspections, Structure No. C10002-03G-MUN-NBI, dated July 24, 2014;
- MassDOT Structures Inspection Field Report, Special Member Inspections, Structure No. C10002-03G-MUN-NBI, dated July 20, 2017;
- Bridge Type Selection Worksheet (BTSW), Sand Mill Road over Dry Brook Bridge No. C-10-002 (03G), by Weston & Sampson, dated August 17, 2021.

Project details including, but not limited to, the proposed structure type, configuration, grading, related site improvements, and proposed construction approach were not finalized at the time of the report. Conclusions and recommendations presented in this report are based on our understanding of the proposed rehabilitation as described herein, subsurface conditions encountered at discrete exploration locations, the provisions of the Limitations section of this report, and the document titled "Important Information about this Geotechnical Engineering Report" by Geoprofessional Business Association (GBA), Inc., enclosed as *Appendix F*. We should be contacted to review and modify our recommendations as necessary as the design is finalized. Additional investigations, laboratory testing, analyses, and recommendations may be necessary during final design.

2.1 Survey and Datum

Existing site topography and dimensions discussed in this report are based on the site survey prepared by GCG Associates, Inc., dated April 4, 2018. Elevations are in feet and reference the North American Vertical Datum of 1988 (NAVD88).

2.2 Site Description and Existing Conditions

The existing single simple span bridge was constructed in 1939 and carries vehicular traffic in a generally north-south direction over Dry Brook. Site photographs showing the existing bridge and surrounding area are included in *Appendix A.*

The existing bridge superstructure consists of six steel stringers supporting a 6.5-inch-thick reinforced concrete deck with a 4-inch-thick asphalt concrete wearing surface. Street grades on the bridge range from about Elevation (El.) 1178.4 to 1178.9. The span length is approximately 43.9 feet. The bridge has an out-to-out deck width of approximately 23 feet and carries two 10-foot-wide traffic lanes (northbound and southbound). There are no sidewalks, and the travel lanes are bounded by 18-inch curbs on either side. The bridge has 30-degree skew. The existing superstructure is shown in *Photos 1 and 2* in *Appendix A.* Superstructure repairs were performed in 2016, which included replacement and reinforcement of portions of the stringers and bridge deck.

The bridge substructure consists of gravity concrete abutments with wingwalls. Based on information presented on the 1938 bridge design drawings (included as *Appendix B*), the abutments are supported on gravity abutments with bearing depth of approximately 13.5 feet below the roadway surface. The bridge does not have approach slabs. . The southwest wingwall abuts a drainage outfall with a concrete headwall shown in *Photo 5*. The north abutment is shown in *Photo 6*. The maximum design bearing pressure for the abutments and wingwalls was not noted on the available 1938 design drawings.

Overhead wires are located along the east side of the bridge. The bridge does not carry any utility pipes.

The Dry Brook flows from east to west. The river channel is approximately 36-feet-wide below the bridge. Riprap slope armoring of unknown thickness is present on both sides of the stream bank adjacent to the wingwalls upstream of the bridge as shown in *Photos 3 and 4*. We understand MassDOT will be completing a hydraulic study to estimate design river water levels and scour depths at the bridge.

2.3 Proposed Rehabilitation

The 2014 and 2017 inspection reports indicate that the existing superstructure is deficient with a rating below satisfactory, and MassDOT has proposed complete bridge replacement. Project details were not finalized at the time of this report, but based on information provided in the BTSW, the preferred superstructure option consists of precast concrete butted deck beams with cast-in-place (CIP) composite concrete deck. The proposed bridge will have a span length of approximately 46 feet and will provide two 10-foot-wide travel lanes with two 2-foot-wide shoulders, for an overall (curb-to-curb) width of approximately 24 feet.

The existing substructure will be demolished in full. The preferred substructure replacement option consists of new CIP concrete cantilever abutments with splayed wingwalls. We understand the abutments and wingwalls will bear at El. 1162.5, approximately 16 to 16.5 feet below roadway grades.

Based on preliminary loading estimates provided by Weston & Sampson's structural engineers, we understand that the proposed unfactored superstructure dead loads are approximately 5 kips per linear foot (klf) on each abutment. Unfactored live loads are approximately 4 klf on each abutment. No significant roadway grade changes are currently planned as part of the proposed construction.

3.0 SUBSURFACE CONDITIONS

3.1 Geologic Setting

Based on the map titled “Preliminary materials map, Windsor quadrangle” (Holmes, GW., 1965), the soils in the vicinity of the bridge consist of deposits of glacial till described as boulders, gravel, sand, silt, and clay, nonsorted to poorly sorted, with a few areas of stratified sand and gravel.

According to surficial geology information available from the Massachusetts Office of Geographic Information (MassGIS), the thickness of the surficial soils reportedly ranges from 50 to 100 feet. Rock outcrops and shallow bedrock in the area of the site were not mapped.

As documented in “Bedrock Geologic Map of Massachusetts” (Zen et al., 1983), bedrock in the vicinity of the bridge is part of the Walloomsac formation and consists primarily of graphitic quartz phyllite and schist containing minor lenses of limestone.

3.2 Subsurface Explorations

Subsurface conditions were explored by advancing three borings (BB-1, BB-2A, and BB-2B) and six probes (P-1A through P-1C, and P-2A through P-2C) between January 29 and February 8, 2019. The borings and probes were completed by Seaboard Drilling Inc. (Seaboard), of Chicopee, Massachusetts using a truck mounted drill rig at the approximate locations shown in *Figure 1.* Weston & Sampson geotechnical engineering staff monitored drilling activities in the field and prepared logs for each exploration. Various sampling and drilling methods were used as described in the following sections.

3.2.1 Probes

Probes P-1A through P-1C and probes P-2A through P-2C were conducted at the south and north abutments, respectively, to evaluate the abutment geometry. The probes were generally located within the reported foundation footprint of the abutments, at distances perpendicular to the abutment face ranging from approximately 3.5 feet to 6.5 feet. Seaboard advanced the probes to refusal using a hollow stem auger, and no soil samples were collected. Refusal depths ranged from about 1.9 to 7 feet. Based on drilling behavior, the refusals were on suspected cobbles and boulders rather than on the back of the abutment, and therefore the depth back of abutment geometry and bottom of footing (BOF) depth could not be determined from the probes. A summary table presenting the results of the probes is included with the boring logs in ***Appendix C***.

3.2.2 Borings

A summary of the locations and depths of the borings drilled at the site is provided in the following table.

Table 3-1: Boring Summary

Boring ID	Location	Depth
BB-1	Behind south abutment	66.5 feet
BB-2A	Behind north abutment	2.1 feet (to drilling refusal)
BB-2B	Behind north abutment	37 feet

When advancing through soils, standard penetration tests (SPTs) were completed at 2 to 5-foot intervals by driving a split spoon sampler with a safety hammer .

We attempted to locate our borings to core through the existing abutment footing, however the footing was not encountered in either boring. Due to time constraints, additional offset borings could not be completed. Boring BB-1 was advanced to refusal at a depth of about 61 feet, whereafter five feet of coring through possible stacked boulders was completed using NX sized coring equipment. Additional coring could not be completed at BB-1 due to casing refusal on a possible boulder and borehole caving. Boring BB-2A was advanced to refusal on apparent cobble/boulder prior to being offset several feet to the location of boring BB-2B.

Following completion of drilling, BB-1 and BB-2A/B were backfilled with cuttings and silica sand, and the surface patched with asphalt cold patch.

Subsurface conditions encountered in the borings are described in Section 3.4 and in the boring logs included in *Appendix C*.

3.3 Sample Review and Laboratory Testing

Soil and rock samples obtained from the borings were reviewed by a Weston & Sampson geotechnical engineer at our office in Reading, MA. Three soil samples were selected and submitted to Geotesting Express of Acton, MA for grain size analysis (ASTM D422). The moisture, organic and/or fines contents of four additional soil samples were confirmed through in-house lab testing. The test results are included on the boring logs, and test reports from Geotesting Express are included in *Appendix D.*

3.4 Subsurface Profile

3.4.1 General

Subsurface conditions encountered in the borings were generally consistent with the mapped surficial geology and site history. The conditions encountered in our borings are described below, in general order of occurrence with depth. Depths provided herein are relative to the pavement surface.

The subsurface description is based on a limited number of borings. A subsurface profile showing the interpreted soil and rock strata relative to site features is presented in *Figure 2 – Subsurface Profile*.

Variations may occur and should be expected between boring locations. The strata boundaries shown in our boring logs and subsurface profile are based on our interpretations and the actual transition may be gradual. Refer to the boring logs for detailed descriptions of the soil and rock samples collected.

Surficial Materials- The borings encountered 3 to 5 inches of asphalt concrete (AC) pavement at the ground surface.

Fill- Medium dense to very dense granular fill was encountered below the pavement, and generally consisted of SAND and/or GRAVEL with trace to some silt. Debris (AC fragments) was observed within some of the fill samples. Cobbles and/or boulders were present within the fill based on drilling conditions in the borings and probes. The fill extended to a depth of 10 feet in BB-1 and 15 feet in BB-2. Boring BB-2A terminated within the fill layer due to drilling refusal at a depth of 2 feet.

Sand- Generally medium dense to dense, native sand was encountered below the fill and extended to depths of about 14 feet in BB-1, and 26 feet in BB-2B. The sand was fine to medium or fine to coarse grained and contained varying amount of gravel (trace to gravelly), silt (trace to some), and up to trace organics.

Glacial Till- Glacial till was encountered below the sand in borings BB-1 and BB-2B. This stratum consisted generally of hard SILT with varying amounts of sand (little to sandy), gravel (trace to some), and clay (trace to little), or very dense fine to coarse silty SAND with little to some gravel. Cobbles and boulders were present within this stratum based on the observed drilling conditions. Boring BB-2B terminated within the glacial till at a depth of 37 feet, and the till extended to a depth of about 66 feet in boring BB-1. In BB-1, rock coring was completed through possible stacked boulders (based on drilling action) near the bottom of the glacial till stratum from a depth of about 61 to 66 feet. Metasedimentary quartz boulder pieces were recovered.

Weathered Rock- Possible weathered rock was encountered below the glacial till at a depth of about 66 feet in boring BB-1. The recovered sample was decomposed to fine to coarse SAND with little gravel and little silt. The boring was terminated due to drilling refusal and borehole caving within the possible weathered rock at a depth of 66.5 feet.

3.4.2 Groundwater

Groundwater was not measured during drilling in boring BB-1 due to the introduction of water into the borehole which obscures the static groundwater reading. Groundwater was at a depth of about 9 feet during drilling at BB-2B based on wet samples. Groundwater at the boring locations is expected to be approximately equal with the river level. River level was measured at approximately 9 feet below street grade (El. 1,170) during drilling.

We anticipate that river level and groundwater levels will fluctuate with season, variations in precipitation, construction in the area, and other factors. Perched groundwater conditions could exist close to the ground surface, especially during and after extended periods of wet weather. Ordinary High Water and 100-Year Flood elevations used for design should be based on the Hydraulic Study Report to be completed by MassDOT. The river should be assumed to be dry when evaluating lateral stability, overturning, and bearing resistance.

3.4.3 Geotechnical Design Parameters

Recommended design parameters for the soil encountered in our explorations, as applicable for the project, are summarized in *Table 3-2*. Supporting calculations are included in *Appendix E*.

Table 3-2: Geotechnical Design Parameters

Soil Type	Unit Weight, γ (pcf)	Effective Friction Angle, ϕ (°)	Effective Cohesion, c (psf)
Existing Fill	120	30	0
Sand	120	33	0
Glacial Till	125	35	0

3.4.4 Seismic Considerations

The recommended seismic design parameters for the site have been evaluated in accordance with the AASHTO Guide Specifications for LRFD Seismic Bridge Design Manual – 2nd Edition, 2011 (with interims through 2015). Based on the data from the borings conducted at the site, the subsurface profile of this site (from the ground surface down) is representative of Site Class D. The Seismic Design Category (SDC) for the site is SDC A. Based on the soil and groundwater conditions encountered at and below foundation bearing elevations, we anticipate the risk structurally damaging ground motions due to liquefaction is low. Per AASHTO (2011) Section 6.8, a detailed liquefaction assessment is required only for SDCs C and D, and therefore is not required for this site.

4.0 GEOTECHNICAL RECOMMENDATIONS

4.1 General

The proposed bridge substructure can be supported on footings bearing on medium dense or denser native sand, glacial till, or on Structural Fill placed above these materials. Based on the conditions encountered in our borings and the bearing depths for the proposed substructures, we anticipate the south abutment will bear within native sand, and the north abutment will bear within the glacial till deposits as illustrated on *Figure 2*.

Design of the proposed substructure should be in accordance with the latest editions of the MassDOT LRFD Bridge Manual, and the AASHTO LRFD Bridge Design Specifications. Geotechnical recommendations for design and construction of the proposed improvements are provided in the following sections. Our recommendations are based on preliminary structure details, grades, and assumed loading conditions as stated herein. Geotechnical design calculations are provided in *Appendix E.*

4.2 Shallow Foundations

4.2.1 Bearing Resistance

Recommended nominal bearing resistance for existing and proposed substructure foundations supported on the native sand and glacial till are provided in Table 4-1 for various effective footing widths. The values provided in the table assume design scour elevation is equal to bottom of footing elevation (i.e., no footing embedment below riverbed). We should be contacted to provide updated bearing resistance based on design scour depths following completion of the hydraulic study by MassDOT.

Table 4-1: Nominal Bearing Resistance for Foundations

Effective Footing Width, B' (ft)⁽¹⁾	Nominal Bearing Resistance, q_n (ksf)	
	North Abutment (Bearing on Native Sand)	South Abutment (Bearing on Glacial Till)
11.5	14.9	20.1
10.5	14.0	18.9
9.5	13.1	17.6
8.5	12.2	16.3
7.5	11.2	15.0

(1) *Effective footing width (B') should be determined in accordance with AASHTO (2020) Section 10.6.1.3, where B' is equal to the actual footing width minus two times the loading eccentricity parallel to dimension B.*

The nominal resistance should be multiplied by the following resistance factors (ϕ) to determine factored bearing resistance in accordance with AASHTO (2020) sections 10.5.5.2 and 11.5.7:

Service Limit State:	1.0
Extreme Limit State:	1.0
Strength Limit State (Wingwalls):	0.55
Strength Limit State (Abutments):	0.45

4.2.2 Settlement

The relationship between bearing stress and estimated settlement for various effective footing widths is provided in *Figure 3* and should be used to estimate the magnitude of settlement for the proposed loads. Service limit state bearing pressures should be used when evaluating settlement. The majority of settlement is anticipated to be elastic settlement which will occur immediately after construction.

4.3 Sliding and Overturning

Sliding stability for the abutments and wingwalls should be evaluated at the Strength Limit state using a resistance factor of 0.80 for shear resistance between soil and foundation, as specified in AASHTO (2020) Table 10.5.5.2.2.-1. The design lateral pressures should consider appropriate loading conditions and load combinations as required by AASHTO, including earth pressures, hydrostatic, traffic, wind, seismic, and other loads. For new substructure elements backfilled with Gravel Borrow (MassDOT M.1.03.0 Type B) as recommended herein, lateral earth pressures should be computed per AASHTO (2020) Section 3.11.5 based on an angle of internal friction of 35°, a total unit weight of 125 pcf, and an interface friction angle (δ) of 23°.

Abutments and wingwalls shall satisfy eccentricity requirements as given in AASHTO (2020) Section 11.6.3.3, which states that the location of the resultant of the reaction forces shall be within the middle two-thirds of the base width.

If the abutment is restrained from lateral movement, at-rest earth pressures should be used in the analyses. If the abutment is free to rotate, active earth pressures may be used. Wall rotation associated with development of active pressures is expected to be approximately 1 percent the exposed wall height.

A frictional sliding coefficient of 0.35 may be assumed at the base of the abutment when evaluating resistance to lateral loads. Passive pressures should be ignored when evaluating abutment sliding and overturning, in accordance with the MassDOT LRFD Bridge Manual.

4.4 Overall Stability

The proposed abutments will bear within medium dense to dense sand, or hard glacial till. Weston & Sampson completed a preliminary overall stability analysis of the proposed abutments using the program Slide2 by Rocscience. Based on our analysis, the proposed abutments have adequate factors of safety (FOS) against global instability for both static and seismic conditions as defined by AASHTO (2020) Section 11.6.3.7. Analysis output is provided in *Appendix F.*

4.5 Slopes and Frost Protection

The abutment and wingwall foundations should be embedded at least 4.0 feet below the nearest adjacent ground surface exposed to freezing. Proposed slopes along the toe of the wingwalls and abutments should be inclined no steeper than 2H:1V. The edge of the wingwall and abutment footings should be set back from the face of slopes as required to maintain minimum 4.0 feet of embedment. All slopes should be protected from erosion during and immediately following construction.

We recommend that areas in front of abutments and wingwalls be protected from scour using a minimum 18-inch-thick layer of riprap conforming to MassDOT M.02.4 (Modified Rockfill). Portions of slopes below the 100-year flood elevation should be armored with a minimum 3-foot-thick layer of riprap conforming to MassDOT M2.02.0. Riprap thicknesses and geometry should be in accordance with the Drawing 2.4.1 of the MassDOT LRFD Bridge Manual. Riprap size should be confirmed using FHWA procedures and predicted stream flow velocities from the hydraulic study

The riprap slope armoring should be underlain by a minimum 12-inch-thick bedding layer of crushed stone meeting the gradation requirements of M2.01.2. The toe of the armoring should be embedded (“keyed”) into existing undisturbed soils a minimum of 3 feet below finished grades along the toe of the slope, and the base of the key should have a minimum width of 3 feet. Armoring and portions of riprap blankets below the 100-year flood elevation should include a layer of geotextile filter fabric between the soils and the bedding layer.

5.0 EARTHWORK AND CONSTRUCTION RECOMMENDATIONS

5.1 Site and Subgrade Preparation

Site preparation should consist of removal of existing pavement, curbing, vegetation, topsoil, tree roots greater than 1-inch in diameter (as well as concentrations of smaller roots), existing structures, and debris within the limits of the proposed construction.

Existing fill should be removed to expose undisturbed native sand and glacial till soils and replaced with Structural Fill within the zone of influence of new abutment and wingwall footings. The zone-of-influence is defined as a plane extending horizontally from the edge of the footing a distance of 2 feet, and then downward at 1H:1V slopes. Existing granular fill may be suitable to remain below proposed pavements or approach slabs (if proposed) provided the exposed subgrade is evaluated by the Geotechnical Engineer during construction. We recommend a minimum of 12 inches of compacted Structural Fill be placed below pavement or slab subbase.

Exposed subgrades should be proof compacted and observed by the Geotechnical Engineer prior to placement of backfill and construction of footings, slabs, and pavements. Unsuitable or disturbed soils, or soils exhibiting excessive rutting or pumping will require over-excavation and backfilling with compacted Structural Fill.

Silty soils, such as the glacial till at the site, are highly susceptible to softening and disturbance by construction activity during wet or freezing weather. Construction traffic should not operate directly on subgrades. Subgrade protection is the responsibility of the contractor and special precautions and protective measures appropriate for the weather and traffic conditions during construction should be used during earthwork and foundation construction to preserve the integrity of subgrades.

A few inches of angular crushed stone can be placed and compacted at the base of footing excavations to protect subgrades from disturbance during construction and wet weather conditions. If construction occurs during freezing conditions, insulating blankets, heaters, or other suitable measures should be employed to prevent subgrades from freezing until the foundations are backfilled sufficiently to prevent frost from reaching the footing subgrades and penetrating beneath foundation elements. The contractor is responsible for subgrade protection.

5.2 Excavation Considerations

5.2.1 Temporary Excavation Support

Excavations will be required for demolition of the existing structure, construction of new abutments and wingwalls, and utility removal or installation. Temporary excavation support will likely be required for excavation depths greater than 4 feet and where groundwater seepage is present. Temporary excavation support should also be anticipated if the final design requires excavations within the zone-of-influence beneath existing footings, structures, utilities, site features, or property lines.

The selection, design, and construction of excavation support systems should be the responsibility of the Contractor. The shoring system should be designed and stamped by a professional engineer licensed in the Commonwealth of Massachusetts to support lateral earth pressures, construction surcharge loads, unbalanced hydrostatic pressures, and surcharges from adjacent structures and utilities, if present. At a minimum, a lateral temporary construction surcharge of 100 psf should be applied uniformly over the height of the wall. All excavations should be made in accordance with applicable OSHA safety regulations. Recommended soil strength parameters for design of excavation support systems are provided in Table 5-1 below.

Table 5-1: Recommended Soil Parameters for Design of Temporary Earth Support

Parameter	Values for:		
	Existing Fill	Sand	Glacial Till
Angle of Internal Friction, ϕ	30°	33°	35°
Unit Weight, γ (pounds per cubic foot)	120	120	125
Buoyant Unit Weight, γ' (pounds per cubic foot)	57.6	57.6	62.6
At-Rest Earth Pressure Coefficient, K_o	0.50	0.46	0.43
Active Earth Pressure Coefficient, K_a	0.33	0.29	0.27
Passive Earth Pressure Coefficient, K_p	3.00	3.39	3.69

Shoring systems restrained from lateral movement should be designed using at-rest lateral earth pressures. Shoring systems which can be allowed to deflect 1 to 2 percent of the exposed wall height may be designed assuming active earth pressure conditions.

5.2.2 Water Control

Groundwater elevation is expected to be approximately equal with the river level at the time of construction. Groundwater and surface water should be controlled to complete excavations, subgrade preparation, and foundation construction in dry conditions and to maintain the integrity of existing soil deposits and bearing surfaces. Temporary grading during construction should be performed so that pooling or ponding of water does not occur within the construction area.

Temporary cofferdams will be required for work adjacent to and within the river channel, such as during construction of new wingwall sections. Steel sheetpile cofferdams may be difficult to install due to the presence of cobbles, boulders, and hard glacial soils which may limit sheetpile penetration. Therefore, we recommend use of a temporary gravity dam, such as a bladder dam or sandbags, to divert river water around the work zone.

Dewatering systems and cofferdams should be selected and designed by the Contractor and capable of adapting to variable flows and conditions. Flow rates for dewatering are likely to vary depending on location, soil type, and the season during which the excavation occurs. Water control systems should be capable of maintaining groundwater at least 24 inches below the bottom of excavations and should be designed and operated to prevent pumping of soil, loss of fines, and adverse effects to existing structures. If possible, pumped water should be recharged on site.

5.3 Fill

Structural Fill should be used as backfill behind abutments and wingwalls, below footings and approach slabs (if proposed), and within 2 feet of finished grades in pavement areas. Structural Fill should consist of imported, granular soil free from organic matter, clay, and deleterious materials, and should conform to the requirements MassDOT M1.03.0 (Type B Gravel Borrow) or MassDOT M2.01.7 (Dense Graded Crushed Stone) of the MassDOT Standard Specifications.

Imported soils or on-site granular soils containing less than 20 percent fines and free of organics, contamination, and other deleterious materials may be suitable for use as Common Fill in non-structural areas, landscape areas, or at depths greater than 2 feet below finished grades within pavement areas. We anticipate that some of the existing fill and native sand will be suitable for reuse as Common Fill. Onsite silt, silty sand, and soils containing organics are not considered suitable for reuse.

Fill materials should have a maximum particle size of 3 inches and be placed in lifts no greater than 6 inches (loose measure). Maximum dry density (MDD) for each fill material should be determined by AASHTO T180 (modified Proctor). Fill for structures, sidewalks, or paved areas should be compacted to at least 95% of MDD and fill below landscaped areas should be compacted to at least 92% of MDD. In-place density testing should be completed on each lift of fill during construction. Moisture content should be maintained within 3 percent of optimum during placement and compaction. Moisture conditioning, if required, could consist of drying by scarification and frequent mixing in thin lifts during warm, dry conditions.

6.0 LIMITATIONS

6.1 Observation of Construction

Satisfactory earthwork and foundation performance depends to a large degree on the quality of construction. The actual subsurface conditions encountered during construction may vary from those encountered in the subsurface investigations and may require revisions to the recommendations provided in this report. Recognition of changed conditions often requires experience; therefore, qualified personnel should visit the site with sufficient frequency to detect whether subsurface conditions change significantly from those anticipated. In addition, sufficient monitoring of the contractor's activities is a key part of determining that the work is completed in accordance with the construction drawings and specifications.

6.2 Variations of Subsurface Conditions and Use of Report

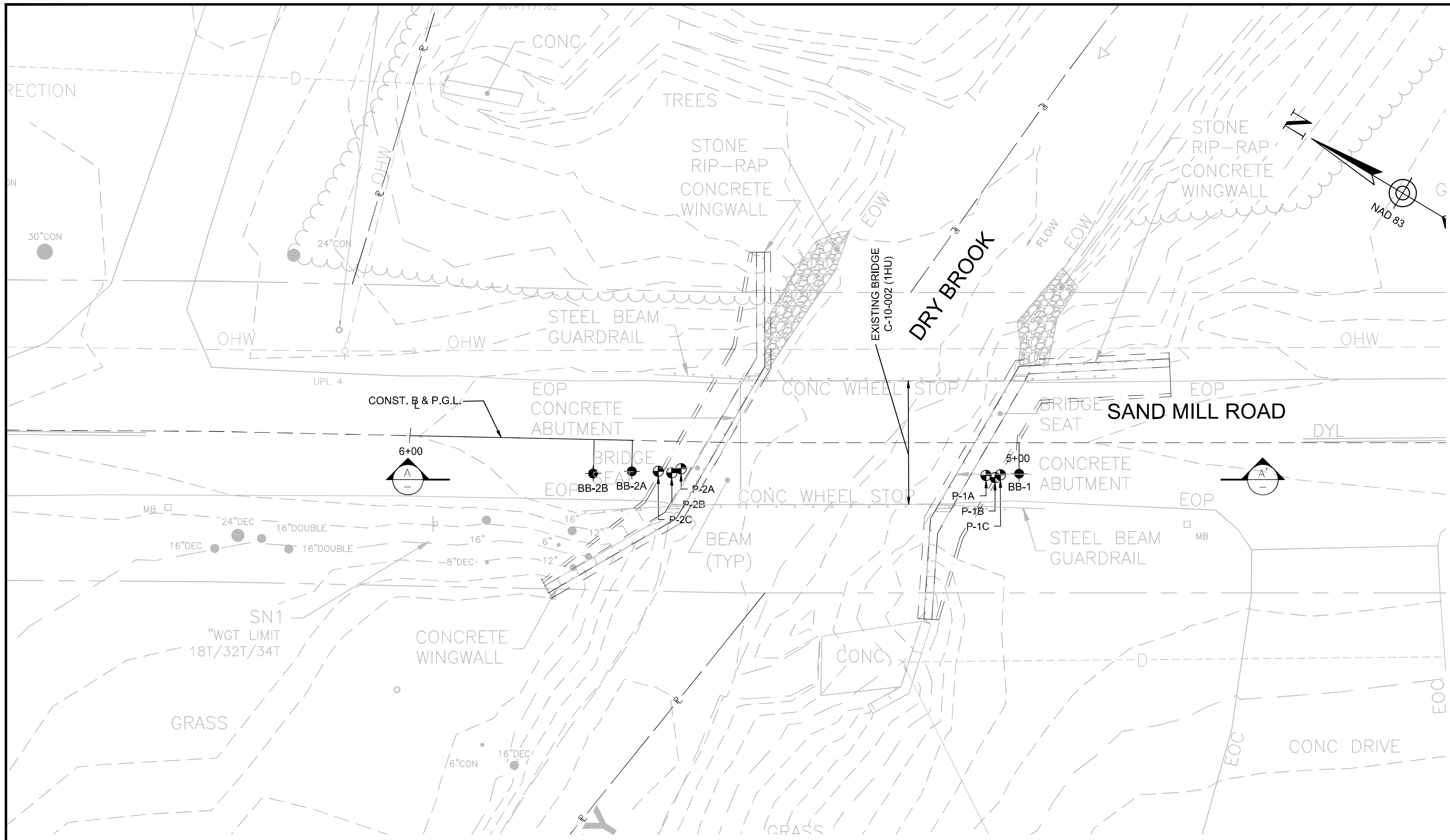
We have prepared this report for use by the Massachusetts Department of Transportation and members of the design and construction team for the subject project and site, only. The data and report can be used for estimating purposes, but our report, conclusions, and interpretations should not be construed as a warranty of the subsurface conditions and are not applicable to other sites.

Soil borings indicate conditions only at specific locations and only to the depths penetrated. They do not necessarily reflect subsurface conditions that may exist between exploration locations. If subsurface conditions differing from those described are noted during the course of excavation and construction, reevaluation will be necessary. Additional information about interpretation and use of this report is included in *Appendix F.*

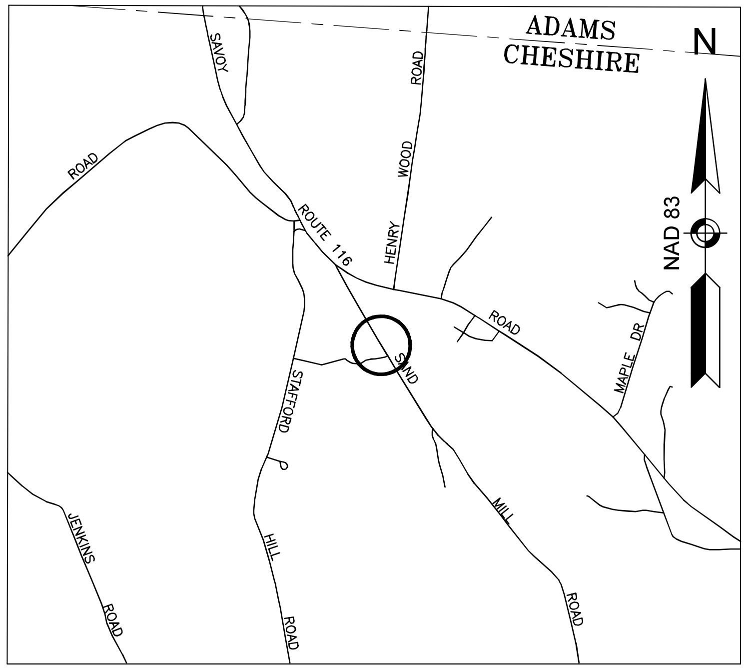
Site development plans and design details were not finalized at the time this report was prepared. If changes are made in site grades, configuration, design loads, or type of construction for the structure, the conclusions and recommendations may not be applicable. If design changes are made, we should be retained to review our conclusions and recommendations and provide a written evaluation or modification.

Within the limitations of scope, schedule, and budget, our services have been executed in accordance with generally accepted practices in this area at the time this report was prepared. No warranty or other conditions, expressed or implied, are given.

FIGURES



BORING PLAN
SCALE 1"= 10'



LOCUS MAP
SCALE 1"= 500'

NOTES:

1. THIS DRAWING AND SITE LAYOUT ARE BASED ON THE SITE SURVEY PLAN PREPARED BY GCG ASSOCIATES, DATED APRIL 4, 2018.
2. SUBSURFACE EXPLORATIONS WERE COMPLETED BY SEABOARD DRILLING INC. OF CHICOPEE, MASSACHUSETTS AND OBSERVED BY WESTON & SAMPSON FROM JANUARY 29 TO FEBRUARY 8, 2019.
3. THE BORING LOCATIONS ARE BASED ON TAPED DISTANCES TO EXISTING SITE FEATURES AND ARE APPROXIMATE.
4. ELEVATIONS REFER TO THE 1988 NORTH AMERICAN VERTICAL DATUM (NAVD 88).

BORING	NORTHING	EASTING
BB-1	3042600.6580	222583.4838
BB-2A	3042655.7327	222551.2818
BB-2B	3042661.0351	222547.7167
P-1A	3042605.2012	222580.4420
P-1B	3042603.7352	222580.9041
P-1C	3042603.2126	222581.7370
P-2A	3042648.9677	222555.7869
P-2B	3042649.9571	222554.4250
P-2C	3042651.9999	222553.5023

LEGEND:

BORINGS SHOWN AS: ⌖ BB–1

PROBES SHOWN AS: ◐ P–1

A A' SUBSURFACE PROFILE ALIGNMENT (REFER TO FIGURE 2)

Weston & Sampson

100 Foxborough Blvd., S.250 Foxborough, MA
(508) 698-3034 (800) Sampson
www.westonandsampson.com

PROJECT FILE NO. 608857

massDOT Massachusetts Department of Transportation Highway Division

FIGURE 1 – SITE PLAN

CHESHIRE

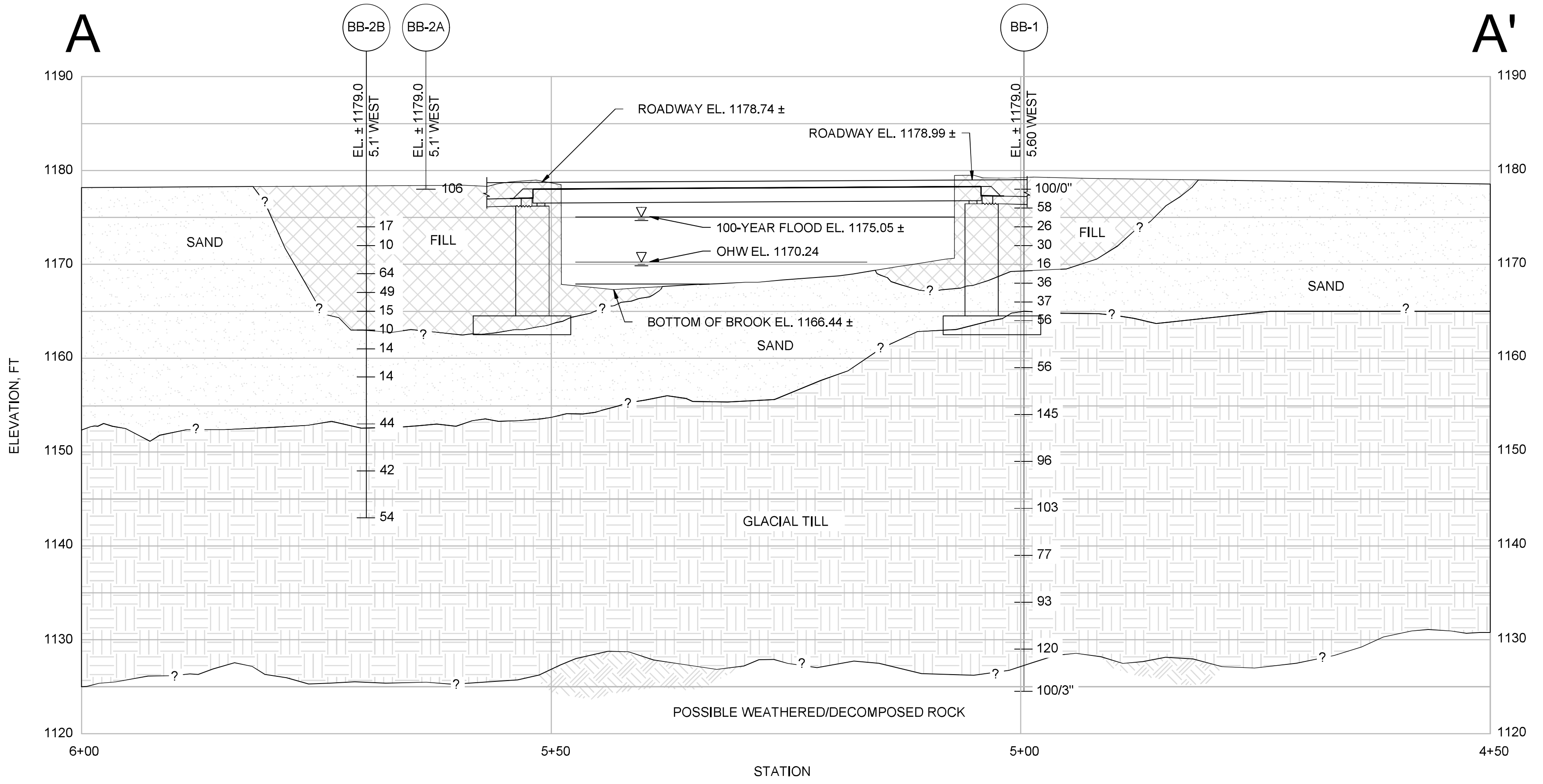
SAND MILL ROAD OVER
DRY BROOK

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION

SCALE: AS NOTED OCTOBER 22, 2021

BRIDGE NO. C–10–002 (*)

9.23.2021 SAND MILL RD_CHESHIRE_SUBSURFACE PROFILE.DWG Plotted on 21-Oct-2021 10:21 AM



SUBSURFACE PROFILE
SCALE 1"= 8'

NOTES:

1. SUBSURFACE EXPLORATIONS WERE COMPLETED BY SEABOARD DRILLING, INC. OF CHICOPEE, MA AND OBSERVED BY WESTON & SAMPSON FROM JANUARY 29 TO FEBRUARY 8, 2019.
2. ELEVATIONS REFERENCE THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
3. THIS IS A GENERALIZED SUBSURFACE PROFILE AND IS INTENDED TO CONVEY THE TRENDS IN SUBSURFACE CONDITIONS. THE BOUNDARIES BETWEEN STRATA ARE APPROXIMATE BASED ON WIDELY SPACED EXPLORATIONS AND SAMPLES. ACTUAL TRANSITIONS MAY BE GRADUAL. VARIATIONS SHOULD BE EXPECTED BETWEEN BORING LOCATIONS.
4. REFER TO BORING LOGS FOR DETAILED DESCRIPTIONS OF THE SOIL AND ROCK SAMPLES COLLECTED.
5. RIVERBED ELEVATION IS APPROXIMATE BASED ON SPOT MEASUREMENTS PROVIDED ON SITE SURVEY PLAN BY GCG ASSOCIATES DATED APRIL 4, 2018.
6. REFER TO FIGURE 1 FOR THE LOCATION OF THE PROFILE LINE A-A'.
7. PROPOSED BRIDGE GEOMETRY SHOWN IS SHOWN FOR ILLUSTRATIVE PURPOSES ONLY AND MAY BE SUBJECT TO CHANGE.

LEGEND:

?⌣? ESTIMATED STRATIGRAPHIC BOUNDARY

▨ FILL - SAND AND/OR GRAVEL WITH VARYING AMOUNTS OF SILT, COBBLES, AND DEBRIS.

▭ SAND - FINE TO MEDIUM OR FINE TO COARSE GRAINED SAND WITH VARYING AMOUNTS OF GRAVEL AND SILT AND UP TO TRACE ORGANICS

▤ GLACIAL TILL - SILT WITH VARYING AMOUNTS OF SAND, GRAVEL, AND CLAY, OR FINE TO COARSE-GRAINED SILTY SAND WITH VARYING AMOUNTS OF GRAVEL. CONTAINS COBBLES AND BOULDERS.

▒ POSSIBLE WEATHERED/DECOMPOSED ROCK.

BORING NO.
SURFACE EL.
OFFSET

XX = SPT N-VALUE FOR SOIL SAMPLES

XX% = RQD VALUE (FOR ROCK SAMPLES)

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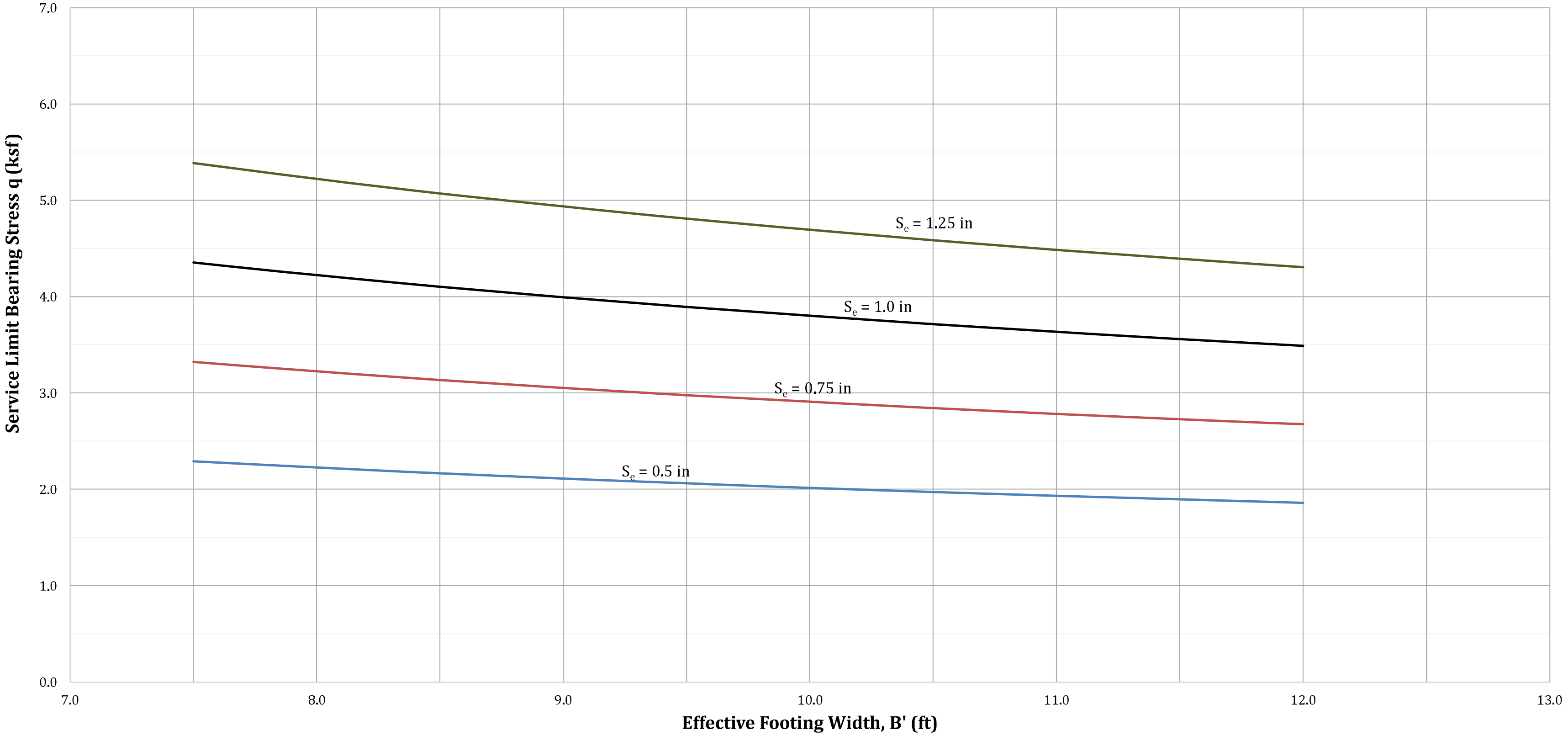
PROJECT FILE NO. 608857

massDOT
FIGURE 2 – SUBSURFACE PROFILE
CHESHIRE
SAND MILL ROAD OVER DRY BROOK
MASSACHUSETTS DEPARTMENT OF TRANSPORTATION HIGHWAY DIVISION
SCALE: AS NOTED OCTOBER 22, 2021
BRIDGE NO. C-10-002 (*)

9.23.2021 SAND MILL RD_CHESHIRE_SUBSURFACE PROFILE.DWG Plotted on 24-Sep-2021 11:59 AM

Service Limit Bearing Pressures for Prescribed Magnitudes of Settlement
North Abutment



NOTES (1) Estimated settlement is based on a 30-foot-long abutment footing bearing on native medium dense to dense sand.

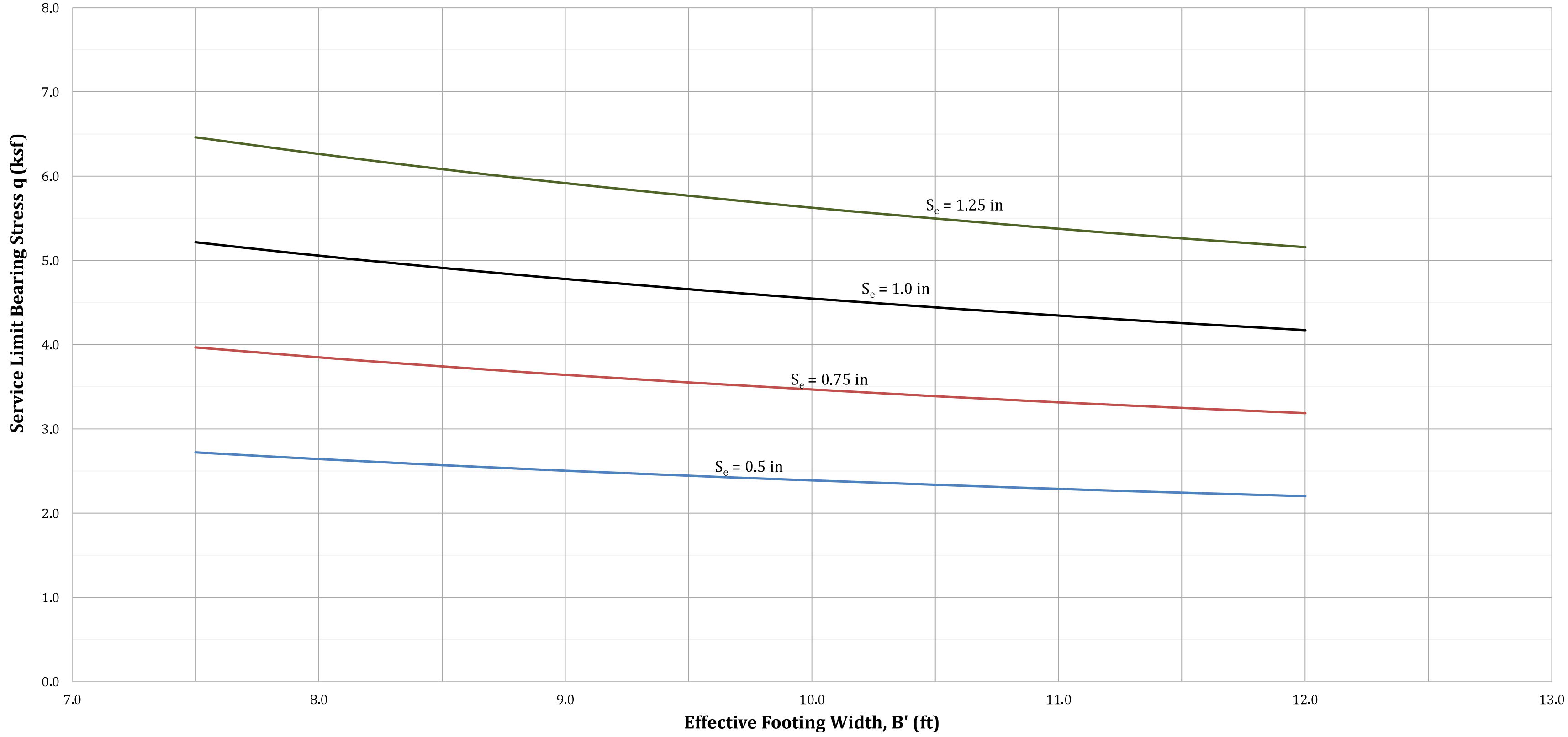
Weston & Sampson
55 Walkers Brook Dr., Suite 100, Reading, MA 01867
Tel: 978.532.1900

Sand Mill Road Bridge over Dry Brook
(C-10-002)

WSE Project No.: 20180468
Drawn By: BG
Checked By: SJB
Date: 3/15/2018

Figure 3a - Estimated Settlement, North Abutment

Service Limit Bearing Pressures for Prescribed Magnitudes of Settlement
South Abutment



NOTES (1) Estimated settlement is based on a 30-foot-long abutment footing bearing on glacial till.

55 Walkers Brook Dr., Suite 100, Reading, MA 01867
Tel: 978.532.1900

Sand Mill Road Bridge over Dry Brook
(C-10-002)

WSE Project No.: 20180468
Drawn By: BG
Checked By: SJB
Date: 3/15/2018

Figure 3b - Estimated Settlement, South Abutment

APPENDIX A

Site Photos

Appendix A
Site Photographs - Bridge No. C-10-002 in Cheshire, MA

Photo 1 – View of bridge looking north from behind the south abutment.

Photo 2 – View of bridge looking south from behind the north abutment.

Photo 3 – View of the northeast wingwall and rip-rap riverbank protection.

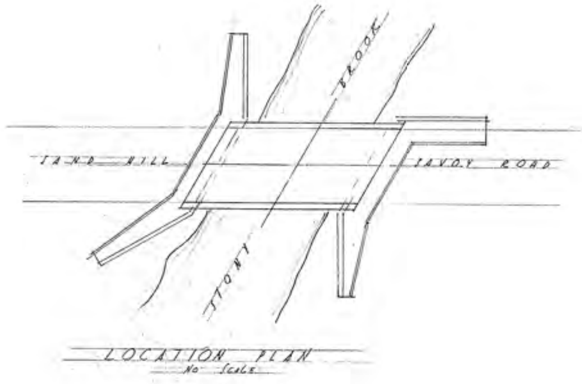
Photo 4 – View of the southeast wingwall and rip-rap riverbank protection.

Photo 5 – View of the southwest wingwall and concrete headwall with drainage outfall (outlined) from the bridge deck.

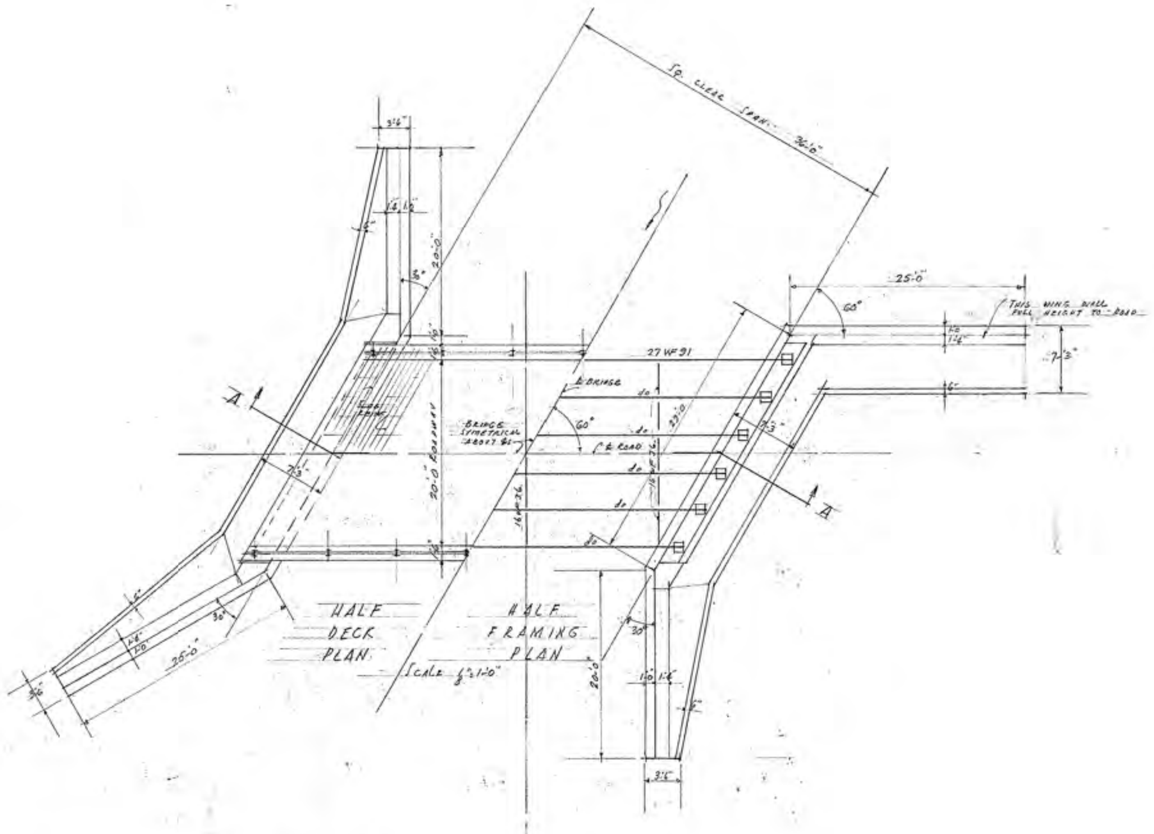
Photo 6 – View of the north abutment from the south bank of Dry Brook.

APPENDIX B

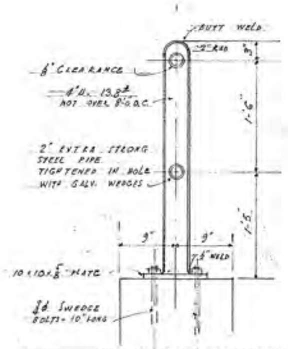
1938 Bridge Drawings



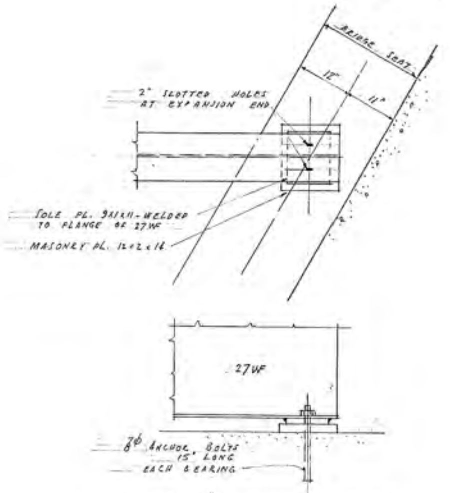
LOCATION PLAN
No Scale



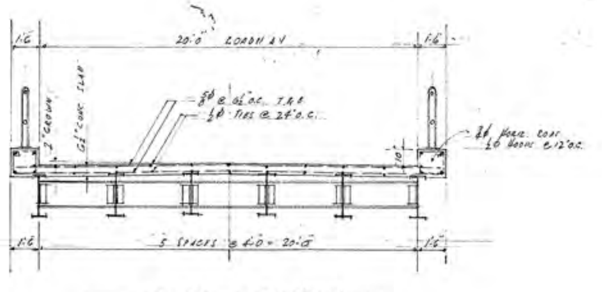
HALF DECK PLAN
HALF FRAMING PLAN
Scale 1/8"=1'-0"



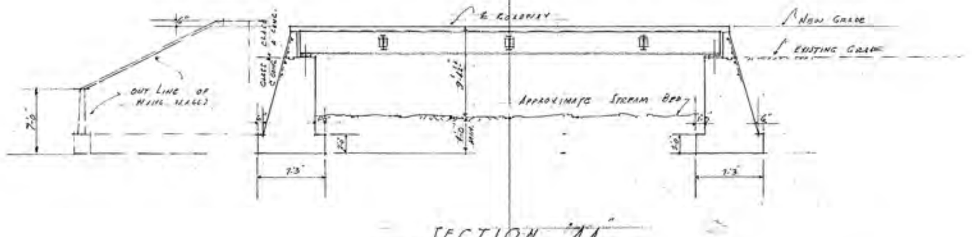
DETAIL OF FENCE
Scale 1"=1'-0"



DETAIL AT BRIDGE SEAT
Scale 3/4"=1'-0"



CROSS SECTION
Scale 1/2"=1'-0"



SECTION "AA"
Scale 1/8"=1'-0"

ESTIMATED QUANTITIES
(NOT GUARANTEED)

EXCAVATION (BRIDGE)	550 CU. YDS.
EXCAVATION (TRENCH LEDGE)	50 CU. YDS.
EXCAVATION (CONCRETE)	10 CU. YDS.
EXCAVATION (CHANNEL)	4200 CU. YDS.
BORROW GRAVEL	350 CU. YDS.
CONCRETE (CLASS A)	26 CU. YDS.
CONCRETE (CLASS C)	250 CU. YDS.
STRUCTURAL STEEL	31456 POUNDS
REINFORCING STEEL	8400 POUNDS
BITUMINOUS CONCRETE SURFACING (CLASS I)	- TONS
BITUMINOUS WATERPROOFING	- SQ. YDS.
RAIL STEEL FENCE	93 LIN. FT.
WELDED IRON FENCE	- LIN. FT.
STEEL SHEETING	47500 POUNDS
LUMBER SHEETING	- M. FT. B. M.
LUMBER PLATFORMS	- M. FT. B. M.
RIP RAP	40 CU. YDS.

GENERAL NOTES

FOUNDATIONS: MAY BE ALTERED IF NECESSARY TO SUIT CONDITIONS OF CONSTRUCTION.

WEEP HOLES: TO BE PROVIDED IN ABUTMENTS AND WING WALLS WITH INLETS PROTECTED BY BROKEN STONE OR SCREENED GRAVEL AS DIRECTED BY THE ENGINEER

DESIGN: ACCORDING TO SPECIFICATIONS OF THE AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS (1935 ED.) FOR H-15 LOADING.

CONCRETE: CONCRETE FOR DECK SLABS CLASS "A" CONCRETE FOR ABUTMENT AND WING WALLS CLASS "C".

STEEL SHEETING: AS DIRECTED BY THE ENGINEER DRIVE AND LEAVE IN PLACE 23 POUND STEEL SHEET PILING ± 10' -0" LONG ON STREAM FACES OF ALL ABUTMENTS AND WING WALLS; ALSO TURN ACROSS ENDS OF WING WALL AND RETURN 6' -0" ALONG BACK OF SAME. USE WOOD SHEETING IN REMAINDER OF ABUTMENT AND WING WALLS.

FOR
CONSTRUCTION
DATE 11/15/38

REVISION DATE NOV. 11, 1938
ORIGINAL DATE OCT. 11, 1938

W. & L. ENGINEERING CO. ENGINEERS
MAURICE A. REIDY CONSULTANT

THE COMMONWEALTH OF MASSACHUSETTS
PROPOSED BRIDGE
CHESHIRE
BRIDGE No. 4 (REVISED)
SAND MILL - SAVOY ROAD
OVER STONY BROOK
SCALES AS NOTED
OFFICE OF
DEPARTMENT OF PUBLIC WORKS
100 NASHUA ST., BOSTON, MASS.
OCTOBER 1938

BRIDGE ENGINEER
CHIEF ENGINEER

DESIGNED BY JJON TRACED BY CHECKED BY

DATE OF ISSUE

ADVERTISING	CONSTRUCTION				

BRIDGE Nº C-10-2

C-10

Appendix C

Boring Logs and Probe Notes

Weston & Sampson

BORING NUMBER: BB-1

PAGE 1 OF 3

CLIENT: Massachusetts Department of Transportation
PROJECT NUMBER: 2180468
PROJECT: Sand Mill Road Bridge over Dry Brook
LOCATION: Cheshire, Massachusetts
LOGGED BY: B. Goffin
CHECKED BY: S. Bridges

CONTRACTOR: Seaboard Drilling
FOREMAN/DRILLER: Mike Glynn
DRILL RIG TYPE: B-53 Mobil Drill Truck
OTHER EQUIPMENT: -
DRILLING METHOD: Cased rotary (drive-and-wash)
CASING/AUGER SIZE: 4.5 in. (OD) flush joint casing
SAMPLING METHOD: Standard penetration test (SPT)
SAMPLER HAMMER: 140-lb. winch operated safety hammer
BORING LOCATION: See site plan.
GROUND ELEV: 1179 ft. +/- (NAVD 88)
DATE STARTED: 1/29/2019
DATE COMPLETED: 2/7/2019

Sample Description

General Format: Density/consistency, color, classification name (secondary PRIMARY, additional); moisture, additional information. [UNIT NAME and/or ORIGIN]

Soil Classification Name Guide based on Constituent Percentages

Mineral Soil		Organic Soils	
GRAVEL, SAND, SILT, CLAY	> 50%	PEAT	> 50%
gravelly, sandy, silty, clayey	35 - 50%	organic (soil name)	15 - 50%
some	20 - 35%	(soil name) with some organics	5 - 15%
little	10 - 20%		
trace	0 - 10%	trace organics	< 5%

Data Plots

Laboratory Test Data:
PL = Plastic Limit, %
MC = Moisture content, %
LL = Liquid Limit, %

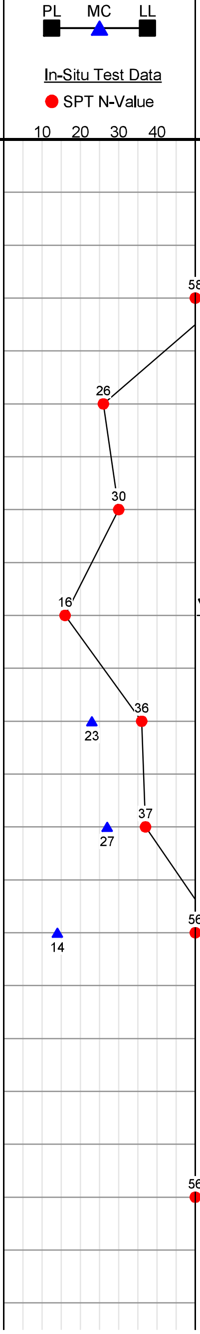
In-Situ Test Data
● SPT N-Value

Remarks and Additional Tests

WOR = Weight of rods
WOH = Weight of hammer
P200 = Percent passing the #200 sieve (laborator value)
OC = Organic content, % (laboratory value)

Groundwater Observations

Date: 2/7/2019
Depth: 9 ft. +/-



Depth Scale, ft.	Sample Type	Blows on Sampler/6" *Blows on Casing/12"*	N-Value, Blows/ft.	Sample Recovery, in. / Sample Penetration, in.	Strata Description and Graphic Log	Sample Description	Remarks and Additional Tests
0						(5") ASPHALT CONCRETE PAVEMENT.	
1		100/0"	-	0/0	FILL	*No recovery.*	Possible frost interference between 1 and 3 ft.
2 - 4	☒	74 39 19 95	58	16/24		Very dense, brown, gravelly fine to coarse SAND, trace silt; moist. [FILL]	
4 - 6	☒	34 15 11 11	26	9/24		Medium dense, brown, fine to coarse SAND, little gravel, little silt; moist. [FILL]	
6 - 8	☒	11 10 20 8	30	9/24		Medium dense, brown, fine to coarse sandy GRAVEL, little silt; moist. [FILL]	Roller bit grinding from approximately 7 to 10 ft.
8 - 10	☒	5 8 8 10	16	0/24		*No recovery.*	▼ (Based on wet samples.)
10 - 12	☒	37 26 10 12	36	10/24	SAND	Dense, gray-brown, fine to medium SAND, some gravel, little silt, trace organics (fine roots, stem); wet; strong organic odor.	OC = 2%
12 - 14	☒	24 11 26 32	37	9/24		Dense, gray-brown, fine to medium SAND, some silt, little gravel, trace organics (fine roots, stem); wet; strong organic odor.	OC = 2% Roller bit grinding from approximately 12.5 to 13.5 ft.
14 - 16	☒	18 25 31 25	56	10/24	GLACIAL TILL	Hard, brown, fine sandy SILT, some gravel, trace coarse sand, trace clay; wet. [GLACIAL TILL]	P200 = 63%
16 - 19							Roller bit grinding from approximately 18 to 19 ft.
19 - 21	☒	36 33 23 29	56	14/24		Hard, brown, SILT, some fine sand, little gravel, trace clay; wet. [GLACIAL TILL]	
22							

SAMPLE LEGEND

☒ Standard split spoon sampler driven w/ 140-lb. hammer (24" long, 2" OD, 1-3/8" ID)

■ Thin-walled tube sampler pushed w/ rig hydraulics (30" long, 3" ID)

▯ NX rock core sampler advanced using rotary drilling methods (5' long, 3" ID)

⧗ Modified split spoon sampler driven w/ 140-lb. hammer (24" long, 3" OD, 2-3/8" ID)

N-VALUE RELATIONSHIPS

N-VALUE BLOWS/FT.	DENSITY OF GRANULAR SOILS	N-VALUE BLOWS/FT.	CONSISTENCY OF COHESIVE SOILS
0 - 4	Very Loose	< 2	Very Soft
4 - 10	Loose	2 - 4	Soft
10 - 30	Medium Dense	4 - 8	Medium Stiff
30 - 50	Dense	8 - 15	Stiff
> 50	Very Dense	15 - 30	Very Stiff
		> 30	Hard

GENERAL NOTES

1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.
2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.

Weston & Sampson

BORING NUMBER: **BB-1**

PAGE 2 OF 3

CLIENT: Massachusetts Department of Transportation
PROJECT NUMBER: 2180468
PROJECT: Sand Mill Road Bridge over Dry Brook
LOCATION: Cheshire, Massachusetts
LOGGED BY: B. Goffin
CHECKED BY: S. Bridges

CONTRACTOR: Seaboard Drilling
FOREMAN/DRILLER: Mike Glynn
DRILL RIG TYPE: B-53 Mobil Drill Truck
OTHER EQUIPMENT: -
DRILLING METHOD: Cased rotary (drive-and-wash)
CASING/AUGER SIZE: 4.5 in. (OD) flush joint casing
SAMPLING METHOD: Standard penetration test (SPT)
SAMPLER HAMMER: 140-lb. winch operated safety hammer
BORING LOCATION: See site plan.
GROUND ELEV: 1179 ft. +/- (NAVD 88)
DATE STARTED: 1/29/2019
DATE COMPLETED: 2/7/2019

Sample Description

General Format: Density/consistency, color, classification name (secondary PRIMARY, additional); moisture, additional information. [UNIT NAME and/or ORIGIN]

Soil Classification Name Guide based on Constituent Percentages

Mineral Soil	GRAVEL, SAND, SILT, CLAY	> 50%
	gravelly, sandy, silty, clayey	35 - 50%
	some	20 - 35%
	little	10 - 20%
	trace	0 - 10%

Organic Soils	PEAT	> 50%
	organic (soil name)	15 - 50%
	(soil name) with some organics	5 - 15%
	trace organics	< 5%

Data Plots

Laboratory Test Data:
PL = Plastic Limit, %
MC = Moisture content, %
LL = Liquid Limit, %

In-Situ Test Data
● SPT N-Value

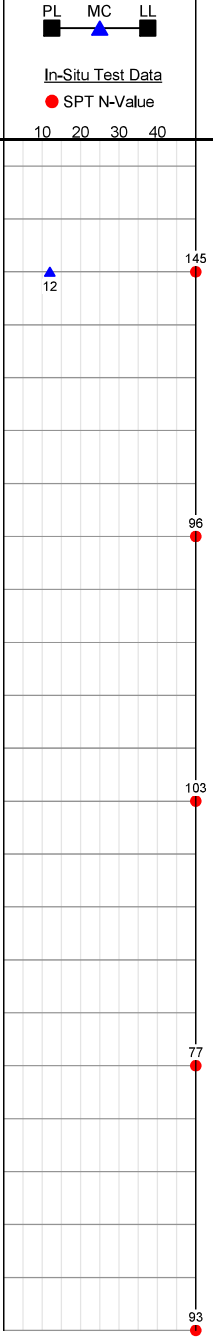
Remarks and Additional Tests

WOR = Weight of rods
WOH = Weight of hammer
P200 = Percent passing the #200 sieve (laborator value)
OC = Organic content, % (laboratory value)

Groundwater Observations

Date: 2/7/2019
Depth: 9 ft. +/-

Depth Scale, ft.	Sample Type	Blows on Sampler/6" *Blows on Casing/12"*	N-Value, Blows/ft.	Sample Recovery, in. / Sampler Penetration, in.	Strata Description and Graphic Log	Sample Description	Remarks and Additional Tests
23							Roller bit grinding on possible cobble/boulder from approximately 23 to 24 ft.
24	☒	56 76 69 75	145	18/24		Hard, brownish gray, SILT, little fine sand, trace gravel, trace coarse sand, trace clay; wet. [GLACIAL TILL]	Gravel = 9% Sand = 21% Fines = 70% Atterberg Limits: Non-Plastic.
26							Slow drilling from aprroximately 26 to 35 ft.
28.5							Roller bit grinding from approximately 28.5 to 29 ft.
29	☒	35 47 49 41	96	18/24		Hard, brownish gray, SILT, little fine sand, little clay, trace gravel, trace coarse sand; wet. [GLACIAL TILL]	
34	☒	49 59 44 64	103	16/24	GLACIAL TILL	Hard, brownish gray, SILT, little fine sand, little clay, little gravel, trace coarse sand; wet. [GLACIAL TILL]	
38.5							Roller bit grinding from approximately 38.5 to 39 ft.
39	☒	43 38 39 47	77	16/24		Hard, grayish brown, SILT, little fine sand, little clay, little gravel, trace coarse sand; wet. [GLACIAL TILL]	
42							Roller bit grinding on possible cobble/boulder from approximately 42 to 43.5 ft.
44	☒	42 51				Hard, grayish brown, SILT, little fine sand, little clay, little gravel, trace coarse sand; wet. [GLACIAL TILL]	



W&S BORING LOG - MODIFIED - DATA TEMPLATE - WSE STANDARD LOGS.GDT - 2/28/19 16:28 - \\WSE03.LOCAL\WSE\PROJECTS\MA\MASSDOT\7888 STATEWIDE\CHESHIRE BRIDGE_C-10-002\GEOTECHNICAL\FIELD\BORINGS\DRAFT BORING LOGS.GPJ

SAMPLE LEGEND

☒ Standard split spoon sampler driven w/ 140-lb. hammer (24" long, 2" OD, 1-3/8" ID)

■ Thin-walled tube sampler pushed w/ rig hydraulics (30" long, 3" ID)

▯ NX rock core sampler advanced using rotary drilling methods (5' long, 3" ID)

⧗ Modified split spoon sampler driven w/ 140-lb. hammer (24" long, 3" OD, 2-3/8" ID)

N-VALUE RELATIONSHIPS

N-VALUE BLOWS/FT.	DENSITY OF GRANULAR SOILS
0 - 4	Very Loose
4 - 10	Loose
10 - 30	Medium Dense
30 - 50	Dense
> 50	Very Dense

N-VALUE BLOWS/FT.	CONSISTENCY OF COHESIVE SOILS
< 2	Very Soft
2 - 4	Soft
4 - 8	Medium Stiff
8 - 15	Stiff
15 - 30	Very Stiff
> 30	Hard

GENERAL NOTES

1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.
2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.

BORING NUMBER: **BB-1**

PAGE 3 OF 3

CLIENT: Massachusetts Department of Transportation
PROJECT NUMBER: 2180468
PROJECT: Sand Mill Road Bridge over Dry Brook
LOCATION: Cheshire, Massachusetts
LOGGED BY: B. Goffin
CHECKED BY: S. Bridges

CONTRACTOR: Seaboard Drilling
FOREMAN/DRILLER: Mike Glynn
DRILL RIG TYPE: B-53 Mobil Drill Truck
OTHER EQUIPMENT: -
DRILLING METHOD: Cased rotary (drive-and-wash)
CASING/AUGER SIZE: 4.5 in. (OD) flush joint casing
SAMPLING METHOD: Standard penetration test (SPT)
SAMPLER HAMMER: 140-lb. winch operated safety hammer
BORING LOCATION: See site plan.
GROUND ELEV: 1179 ft. +/- (NAVD 88)
DATE STARTED: 1/29/2019
DATE COMPLETED: 2/7/2019

Sample Description

General Format: Density/consistency, color, classification name (secondary PRIMARY, additional); moisture, additional information. [UNIT NAME and/or ORIGIN]

Soil Classification Name Guide based on Constituent Percentages

Mineral Soil	GRAVEL, SAND, SILT, CLAY	> 50%	Organic Soils	PEAT	> 50%
	gravelly, sandy, silty, clayey	35 - 50%		organic (soil name)	15 - 50%
	some	20 - 35%		(soil name) with some organics	5 - 15%
	little	10 - 20%			
	trace	0 - 10%		trace organics	< 5%

Data Plots

Laboratory Test Data:
PL = Plastic Limit, %
MC = Moisture content, %
LL = Liquid Limit, %

PL MC LL

In-Situ Test Data
● SPT N-Value

Remarks and Additional Tests

WOR = Weight of rods
WOH = Weight of hammer
P200 = Percent passing the #200 sieve (laborator value)
OC = Organic content, % (laboratory value)

Groundwater Observations

Date: 2/7/2019
Depth: 9 ft. +/-

Depth Scale, ft.	Sample Type	Blows on Sampler/6" *Blows on Casing/12"*	N-Value, Blows/ft.	Sample Recovery, in. / Sampler Penetration, in.	Strata Description and Graphic Log	Sample Description	Data Plots (SPT N-Value)	Remarks and Additional Tests
45.5–46	☒	42 37	93	20/24	GLACIAL TILL		93	
48								Roller bit grinding from approximately 48 to 48.5 ft.
49–51	☒	51 68 52 53	120	16/24		Hard, grayish brown, SILT, some gravel, little fine sand, little clay, trace coarse sand; wet. [GLACIAL TILL]	120	Roller bit grinding from approximately 49.5 to 50 ft. Roller bit grinding from approximately 50.5 to 51 ft.
54–54.75	☒	40 100/3"	-	9/9		Hard, brown to gray, SILT, little fine sand, little clay, trace to little coarse sand, trace gravel; wet. [GLACIAL TILL]		Roller bit grinding from approximately 54.5 to 55 ft.
60								Casing driven to 59.8 ft. Roller bit grinding on possible boulder from approximately 60.1 to 61.1 ft. Roller bit refusal at 61.1 ft. Begin coring.
61.1–66	▮			12/60	POSSIBLE BOULDERS	Recovered metasedimentary quartz boulder pieces.		Core time per foot (min): 1.08, 1.75, 2.25, 1.33, 1.42 Core bit grinding intermittently from 62 to 65.5 ft. Possibly coring through stacked boulders.
66–66.5	☒	100/5"	-	5/5		Brown to orange brown, fine to coarse SAND, little gravel, little silt. - Decomposed rock.		

End of boring at 66.5 ft. due to hole collapse.

SAMPLE LEGEND

☒ Standard split spoon sampler driven w/ 140-lb. hammer (24" long, 2" OD, 1-3/8" ID)

▮ Thin-walled tube sampler pushed w/ rig hydraulics (30" long, 3" ID)

▯ NX rock core sampler advanced using rotary drilling methods (5' long, 3" ID)

⧗ Modified split spoon sampler driven w/ 140-lb. hammer (24" long, 3" OD, 2-3/8" ID)

N-VALUE RELATIONSHIPS

N-VALUE BLOWS/FT.	DENSITY OF GRANULAR SOILS	N-VALUE BLOWS/FT.	CONSISTENCY OF COHESIVE SOILS
0 - 4	Very Loose	< 2	Very Soft
4 - 10	Loose	2 - 4	Soft
10 - 30	Medium Dense	4 - 8	Medium Stiff
30 - 50	Dense	8 - 15	Stiff
> 50	Very Dense	15 - 30	Very Stiff
		> 30	Hard

GENERAL NOTES

1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.
2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.

W&S BORING LOG - MODIFIED - DATA TEMPLATE - WSE STANDARD LOGS.GDT - 2/28/19 16:28 - \\WSE03.LOCAL\WSE\PROJECTS\MA\MASSDOT\17888 STATEWIDE\CHESHIRE BRIDGE_C-10-002\GEOTECHNICAL\FIELD\BORINGS\DRAFT BORING LOGS.GPJ

BORING NUMBER: **BB-2A**

PAGE 1 OF 1

CLIENT: Massachusetts Department of Transportation
PROJECT NUMBER: 2180468
PROJECT: Sand Mill Road Bridge over Dry Brook
LOCATION: Cheshire, Massachusetts
LOGGED BY: B. Goffin
CHECKED BY: S. Bridges

CONTRACTOR: Seaboard Drilling
FOREMAN/DRILLER: Mike Glynn
DRILL RIG TYPE: B-53 Mobil Drill Truck
OTHER EQUIPMENT: -
DRILLING METHOD: Hollow-Stem Auger (HSA)
CASING/AUGER SIZE: 4-1/4 in. (ID) HSA
SAMPLING METHOD: Standard penetration test (SPT)
SAMPLER HAMMER: 140-lb. winch operated safety hammer
BORING LOCATION: See site plan.
GROUND ELEV: 1179 ft. +/- (NAVD 88)
DATE STARTED: 2/7/2019
DATE COMPLETED: 2/7/2019

Sample Description

General Format: Density/consistency, color, classification name (secondary PRIMARY, additional); moisture, additional information. [UNIT NAME and/or ORIGIN]

Soil Classification Name Guide based on Constituent Percentages

Mineral Soil	GRAVEL, SAND, SILT, CLAY	> 50%	Organic Soils	PEAT	> 50%
	gravelly, sandy, silty, clayey	35 - 50%		organic (soil name)	15 - 50%
	some	20 - 35%		(soil name) with some organics	5 - 15%
	little	10 - 20%			
	trace	0 - 10%		trace organics	< 5%

Data Plots

Laboratory Test Data:
PL = Plastic Limit, %
MC = Moisture content, %
LL = Liquid Limit, %

■ PL ▲ MC ■ LL

In-Situ Test Data
● SPT N-Value

Remarks and Additional Tests

WOR = Weight of rods
WOH = Weight of hammer
P200 = Percent passing the #200 sieve (laborator value)
OC = Organic content, % (laboratory value)

Groundwater Observations

Date: 2/7/2019
Depth: Not observed

Depth Scale, ft.	Sample Type	Blows on Sampler/6" *Blows on Casing/12"*	N-Value, Blows/ft.	Sample Recovery, in. Sampler Penetration, in.	Strata Description and Graphic Log	Sample Description	Data Plots 10 20 30 40	Remarks and Additional Tests
1 2	☒	23 26 80 100/3"	106	14/21	FILL	(3") ASPHALT CONCRETE PAVEMENT. Top 2" - Dark gray, fine to coarse SAND, little gravel, trace silt, trace debris (asphalt); moist. [FILL] Bottom 12" - Brown, fine to medium SAND, some gravel, little silt; moist. [FILL]		Cobble fragments in sampler tip. Auger grinding on cobbles from approximately 1.5 to 2.1 ft.

End of boring at 2.1 ft. due to auger refusal on cobbles. Offset to BB-2B.

SAMPLE LEGEND

☒	Standard split spoon sampler driven w/ 140-lb. hammer (24" long, 2" OD, 1-3/8" ID)	▯	NX rock core sampler advanced using rotary drilling methods (5' long, 3" ID)
■	Thin-walled tube sampler pushed w/ rig hydraulics (30" long, 3" ID)	⧗	Modified split spoon sampler driven w/ 140-lb. hammer (24" long, 3" OD, 2-3/8" ID)

N-VALUE RELATIONSHIPS

N-VALUE BLOWS/FT.	DENSITY OF GRANULAR SOILS	N-VALUE BLOWS/FT.	CONSISTENCY OF COHESIVE SOILS
0 - 4	Very Loose	< 2	Very Soft
4 - 10	Loose	2 - 4	Soft
10 - 30	Medium Dense	4 - 8	Medium Stiff
30 - 50	Dense	8 - 15	Stiff
> 50	Very Dense	15 - 30	Very Stiff
		> 30	Hard

GENERAL NOTES

1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.
2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.

Weston & Sampson

BORING NUMBER: **BB-2B**

PAGE 1 OF 2

CLIENT: Massachusetts Department of Transportatio
PROJECT NUMBER: 2180468
PROJECT: Sand Mill Road Bridge over Dry Brook
LOCATION: Cheshire, Massachusetts
LOGGED BY: B. Goffin
CHECKED BY: S. Bridges

CONTRACTOR: Seaboard Drilling
FOREMAN/DRILLER: Mike Glynn
DRILL RIG TYPE: B-53 Mobil Drill Truck
OTHER EQUIPMENT: -
DRILLING METHOD: Hollow-Stem Auger (HSA)
CASING/AUGER SIZE: 4-1/4 in. (ID) HSA
SAMPLING METHOD: Standard penetration test (SPT)
SAMPLER HAMMER: 140-lb. winch operated safety hamm
BORING LOCATION: See site plan.
GROUND ELEV: 1179 ft. +/- (NAVD 88)
DATE STARTED: 2/8/2019
DATE COMPLETED: 2/8/2019

Sample Description

General Format: Density/consistency, color, classification name (secondary PRIMARY, additional); moisture, additional information. [UNIT NAME and/or ORIGIN]

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Mineral Soil	GRAVEL, SAND, SILT, CLAY	> 50%	Organic Soils	PEAT	> 50%
	gravelly, sandy, silty, clayey	35 - 50%		organic (soil name)	15 - 50%
	some	20 - 35%		(soil name) with some organics	5 - 15%
	little	10 - 20%			
	trace	0 - 10%		trace organics	< 5%

Remarks and Additional Tests

WOR = Weight of rods
WOH = Weight of hammer
P200 = Percent passing the #200 sieve (laborator value)
OC = Organic content, % (laboratory value)

Groundwater Observations

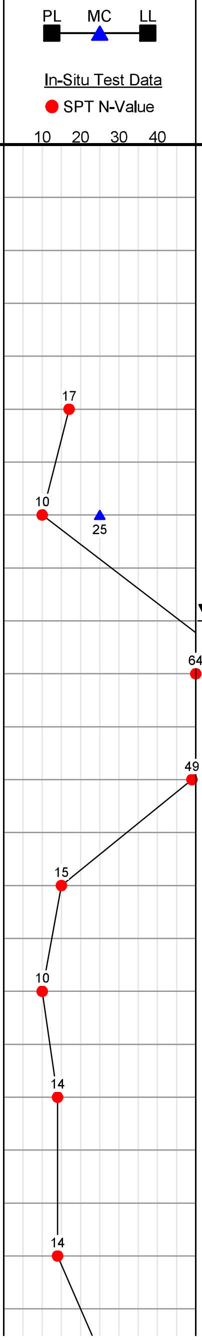
Date: 2/8/2019
Depth: 9 ft. +/-

Depth Scale, ft.	Sample Type	Blows on Sampler/6" *Blows on Casing/12"*	N-Value, Blows/ft.	Sample Recovery, in. / Sampler Penetration, in.	Strata Description and Graphic Log	Sample Description	Remarks and Additional Tests
0						(3") ASPHALT CONCRETE PAVEMENT.	
0 - 4						Augered to 4 ft. No sample collected. *(Refer to log BB-2A)*	Auger grinding from approximately 2 to 3 ft.
4 - 6	☒	9 9 8 8	17	15/24	FILL	Medium dense, brown, fine to medium SAND, some silt, little gravel; moist. [FILL]	Gravel = 12% Sand = 60% Fines = 27%
6 - 8	☒	6 5 5 9	10	14/24		Medium dense, brown, fine to medium SAND, some silt, little gravel, trace debris (gray/black soil); moist. [FILL]	P200 = 25% Auger grinding from approximately 7.5 to 9 ft.
9							(Based on wet samples.)
9 - 11	☒	16 22 42 52	64	5/24		Very dense, brown, fine to coarse sandy GRAVEL, some silt; wet. [FILL]	Auger grinding from approximately 10 to 12 ft.
11 - 13	☒	38 32 17 14	49	5/24		Dense, brown, GRAVEL, little fine to coarse sand, little silt; wet. [FILL]	
13 - 15	☒	7 6 9 6	15	7/24		Medium dense, brown, fine to coarse gravelly SAND, little silt, trace debris (asphalt fragments); wet. [FILL]	
15 - 17	☒	4 5 5 5	10	11/24	SAND	Loose, gray brown, fine to coarse SAND, some gravel, little silt; wet.	
17 - 19	☒	4 6 8 7	14	14/24		Medium dense, gray brown, fine to coarse SAND, some gravel, trace silt; wet.	Gravel = 21% Sand = 70% Fines = 9%
20 - 22	☒	4 7 7 8	14	9/24		Medium dense, brown, fine to coarse SAND, trace silt, trace gravel; wet.	

Data Plots

Laboratory Test Data:
PL = Plastic Limit, %
MC = Moisture content, %
LL = Liquid Limit, %

In-Situ Test Data
● SPT N-Value



SAMPLE LEGEND

☒ Standard split spoon sampler driven w/ 140-lb. hammer (24" long, 2" OD, 1-3/8" ID)
■ Thin-walled tube sampler pushed w/ rig hydraulics (30" long, 3" ID)
▯ NX rock core sampler advanced using rotary drilling methods (5' long, 3" ID)
⧗ Modified split spoon sampler driven w/ 140-lb. hammer (24" long, 3" OD, 2-3/8" ID)

N-VALUE RELATIONSHIPS

N-VALUE BLOWS/FT.	DENSITY OF GRANULAR SOILS	N-VALUE BLOWS/FT.	CONSISTENCY OF COHESIVE SOILS
0 - 4	Very Loose	< 2	Very Soft
4 - 10	Loose	2 - 4	Soft
10 - 30	Medium Dense	4 - 8	Medium Stiff
30 - 50	Dense	8 - 15	Stiff
> 50	Very Dense	15 - 30	Very Stiff
		> 30	Hard

GENERAL NOTES

1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.
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BORING NUMBER: **BB-2B**

PAGE 2 OF 2

CLIENT: Massachusetts Department of Transportatio
PROJECT NUMBER: 2180468
PROJECT: Sand Mill Road Bridge over Dry Brook
LOCATION: Cheshire, Massachusetts
LOGGED BY: B. Goffin
CHECKED BY: S. Bridges

CONTRACTOR: Seaboard Drilling
FOREMAN/DRILLER: Mike Glynn
DRILL RIG TYPE: B-53 Mobil Drill Truck
OTHER EQUIPMENT: -
DRILLING METHOD: Hollow-Stem Auger (HSA)
CASING/AUGER SIZE: 4-1/4 in. (ID) HSA
SAMPLING METHOD: Standard penetration test (SPT)
SAMPLER HAMMER: 140-lb. winch operated safety hamm
BORING LOCATION: See site plan.
GROUND ELEV: 1179 ft. +/- (NAVD 88)
DATE STARTED: 2/8/2019
DATE COMPLETED: 2/8/2019

Sample Description

General Format: Density/consistency, color, classification name (secondary PRIMARY, additional); moisture, additional information. [UNIT NAME and/or ORIGIN]

Soil Classification Name Guide based on Constituent Percentages

Mineral Soil	
GRAVEL, SAND, SILT, CLAY	> 50%
gravelly, sandy, silty, clayey	35 - 50%
some	20 - 35%
little	10 - 20%
trace	0 - 10%

Organic Soils	
PEAT	> 50%
organic (soil name)	15 - 50%
(soil name) with some organics	5 - 15%
trace organics	< 5%

Data Plots

Laboratory Test Data:
PL = Plastic Limit, %
MC = Moisture content, %
LL = Liquid Limit, %

■ PL ▲ MC ■ LL

In-Situ Test Data
● SPT N-Value

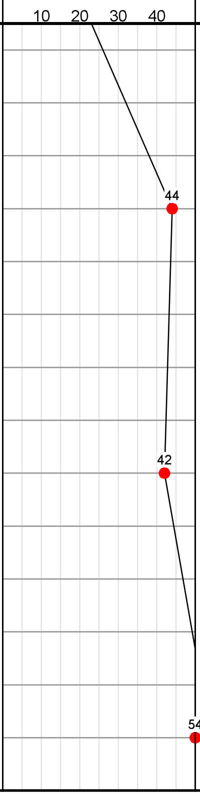
Remarks and Additional Tests

WOR = Weight of rods
WOH = Weight of hammer
P200 = Percent passing the #200 sieve (laborator value)
OC = Organic content, % (laboratory value)

Groundwater Observations

Date: 2/8/2019
Depth: 9 ft. +/-

Depth Scale, ft.	Sample Type	Blows on Sampler/6" *Blows on Casing/12"*	N-Value, Blows/ft.	Sample Recovery, in. / Sample Penetration, in.	Strata Description and Graphic Log	Sample Description	Remarks and Additional Tests
23 24					SAND		Auger grinding from approximately 24 to 24.5 ft.
25 26 27	☒	5 14 30 27	44	11/24	SAND GLACIAL TILL	Top 10" - Gray brown, gravelly fine to coarse SAND, trace silt; wet. Bottom 1" - Light gray, silty fine to coarse SAND, some gravel; wet. [GLACIAL TILL]	Slow drilling from aprroximately 26 to 35 ft.
28 29					GLACIAL TILL		
30 31 32	☒	16 21 21 17	42	12/24	GLACIAL TILL	Hard, grayish brown, SILT, some fine sand, little gravel, trace coarse sand, trace clay; wet. [GLACIAL TILL]	
33 34					GLACIAL TILL		
35 36 37	☒	37 25 29 28	54	10/24	GLACIAL TILL	Hard, grayish brown, SILT, little fine sand, trace gravel, trace coarse sand, trace clay; wet. [GLACIAL TILL]	



End of boring at 37 ft.

W&S BORING LOG - MODIFIED - DATA TEMPLATE - WSE STANDARD LOGS.GDT - 2/28/19 16:28 - \\WSE03.LOCAL\WSE\PROJECTS\MA\MASSDOT\7888 STATEWIDE\CHESHIRE BRIDGE_C-10-002\GEOTECHNICAL\FIELD\BORINGS\DRAFT BORING LOGS.GPJ

SAMPLE LEGEND

☒ Standard split spoon sampler driven w/ 140-lb. hammer (24" long, 2" OD, 1-3/8" ID)

■ Thin-walled tube sampler pushed w/ rig hydraulics (30" long, 3" ID)

▮ NX rock core sampler advanced using rotary drilling methods (5' long, 3" ID)

⧗ Modified split spoon sampler driven w/ 140-lb. hammer (24" long, 3" OD, 2-3/8" ID)

N-VALUE RELATIONSHIPS

N-VALUE BLOWS/FT.	DENSITY OF GRANULAR SOILS
0 - 4	Very Loose
4 - 10	Loose
10 - 30	Medium Dense
30 - 50	Dense
> 50	Very Dense

N-VALUE BLOWS/FT.	CONSISTENCY OF COHESIVE SOILS
< 2	Very Soft
2 - 4	Soft
4 - 8	Medium Stiff
8 - 15	Stiff
15 - 30	Very Stiff
> 30	Hard

GENERAL NOTES

1. The stratification lines represent the approximate boundary between soil types; actual transitions may be gradual.
2. Water level readings have been made in the drill holes at the times and conditions stated on the boring log. Fluctuations in the level of groundwater may occur due to other factors than those presented at the time measurements are made.

BORING NUMBER: **BB-2B**

Abutment Probe Summary

Project	**Sand Mill Road Bridge over Dry Brook, Cheshire, MA**
Compiled by	B. Goffin
Checked by	S. Bridges

Probe #	Location	Distance from Abutment Face	Asphalt Concrete Pavement Thickness	Depth to Refusal	Comments
P-1A	South Abutment	4.3 ft.	5 in.	3.1 ft.	Auger grinding from 2.6 to 3.1 ft. on cobbles/boulders.
P-1B		5.8 ft.	5 in.	3.0 ft.	Auger grinding from 2.7 to 3.0 ft. on cobbles/boulders.
P-1C		6.3 ft.	5 in.	7 ft.	Auger grinding intermittently from 2.8 to 7 ft. on possible cobbles/boulders.
P-2A	North Abutment	3.4 ft.	3 in.	1.9 ft.	Auger grinding from 1.5 to 1.9 ft on cobbles/boulders.
P-2B		4.6 ft.	3 in.	1.9 ft.	Auger grinding from 0.8 to 1.9 ft. on cobbles/boulders.
P-2C		6.5 ft.	4 in.	2.8 ft.	Auger grinding from 2.0 to 2.8 ft. on cobbles/boulders.

Notes:

1. Abutment probes were completed by Seaboard Drilling Inc. of Chicopee, Massachusetts using a B-53 Mobil Drill truck with 8-1/8 in. (OD) hollow-stem auger, and observed by Weston & Sampson between January 29 and February 8, 2019.

2. Abutment probes were generally performed within the approximate footprints of the bridge abutments based on information presented on the 1938 plans. Distances as reported above were measured from the abutment face and perpendicular to abutment face. Refer to Site Plan for abutment probe locations.

APPENDIX D

Laboratory Test Results

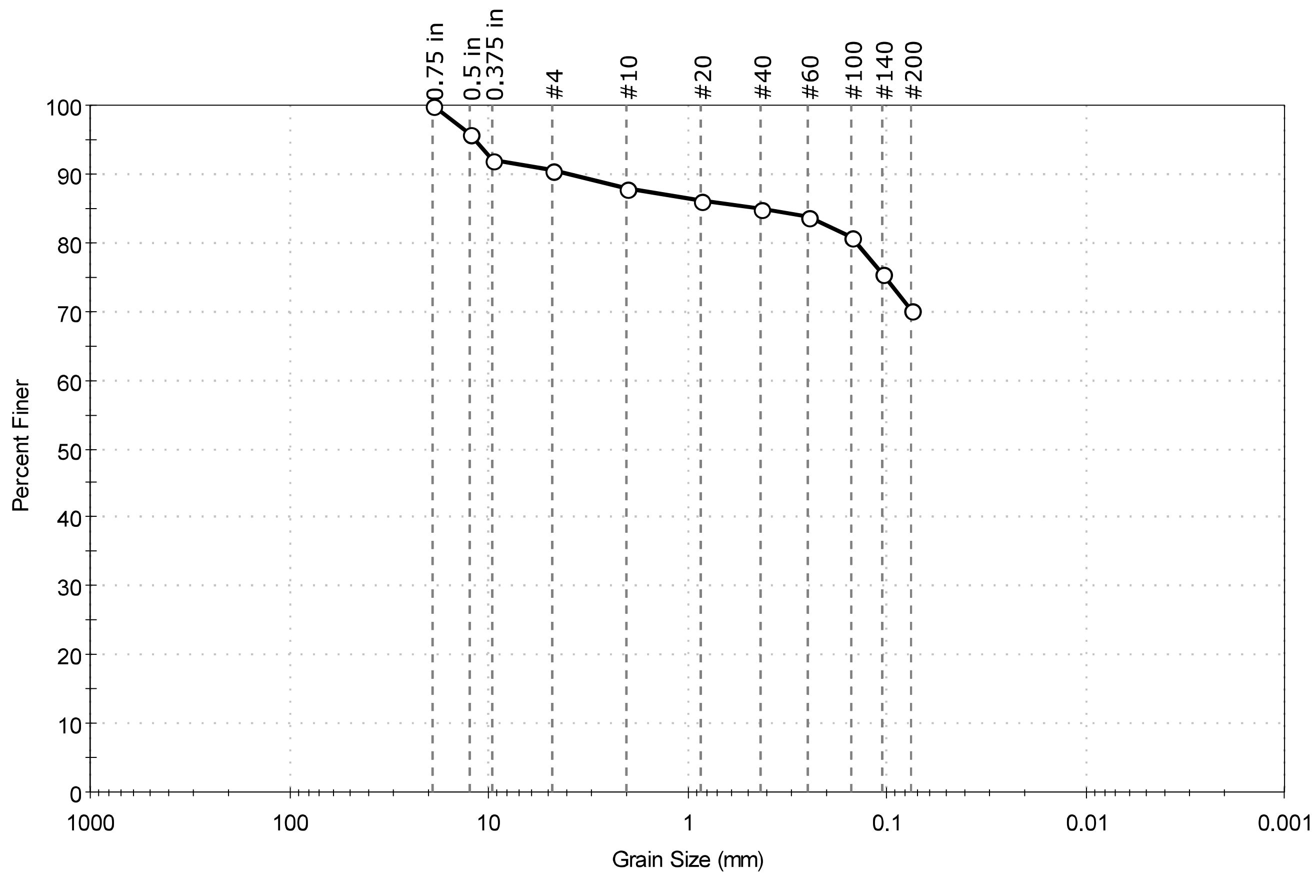
GeoTesting EXPRESS

Client:	Weston & Sampson Engineers		
Project:	Sandmill Rd Bridge		
Location:	Cheshire, MA	Project No:	GTX-309562

Boring ID:	B-1	Sample Type:	bag	Tested By:	GA
Sample ID:	S-10	Test Date:	02/27/19	Checked By:	bfs
Depth :	24-26 ft	Test Id:	495029		

Test Comment: ---
Visual Description: Moist, olive gray silt with sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	9.3	20.5	70.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	96		
0.375 in	9.50	92		
#4	4.75	91		
#10	2.00	88		
#20	0.85	86		
#40	0.42	85		
#60	0.25	84		
#100	0.15	81		
#140	0.11	76		
#200	0.075	70		

Coefficients

D_{85} =0.4478 mm	D_{30} =N/A
D_{60} =N/A	D_{15} =N/A
D_{50} =N/A	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM	SILT with Sand (ML)
AASHTO	Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

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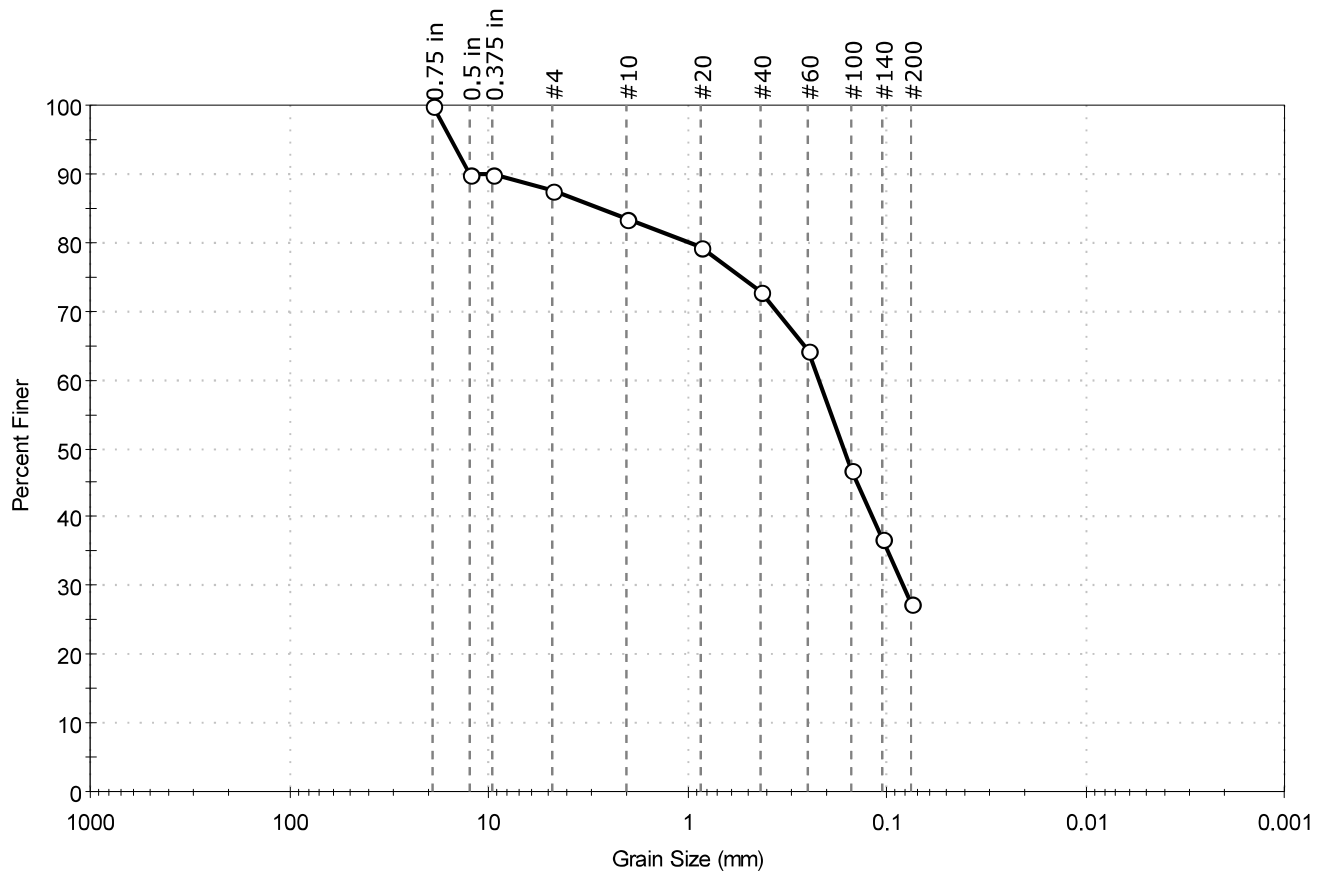
Client: Weston & Sampson Engineers
Project: Sandmill Rd Bridge
Location: Cheshire, MA
Project No: GTX-309562

Boring ID: B-2B
Sample ID: S-1
Depth : 4-6 ft
Sample Type: bag
Test Date: 02/27/19
Test Id: 495030
Tested By: GA
Checked By: bfs

Test Comment: ---
Visual Description: Moist, olive brown silty sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	12.3	60.3	27.4

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	90		
0.375 in	9.50	90		
#4	4.75	88		
#10	2.00	84		
#20	0.85	79		
#40	0.42	73		
#60	0.25	64		
#100	0.15	47		
#140	0.11	37		
#200	0.075	27		

Coefficients

D_{85} =2.6733 mm
D_{30} =0.0826 mm
D_{60} =0.2207 mm
D_{15} =N/A
D_{50} =0.1642 mm
D_{10} =N/A
C_u =N/A
C_c =N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

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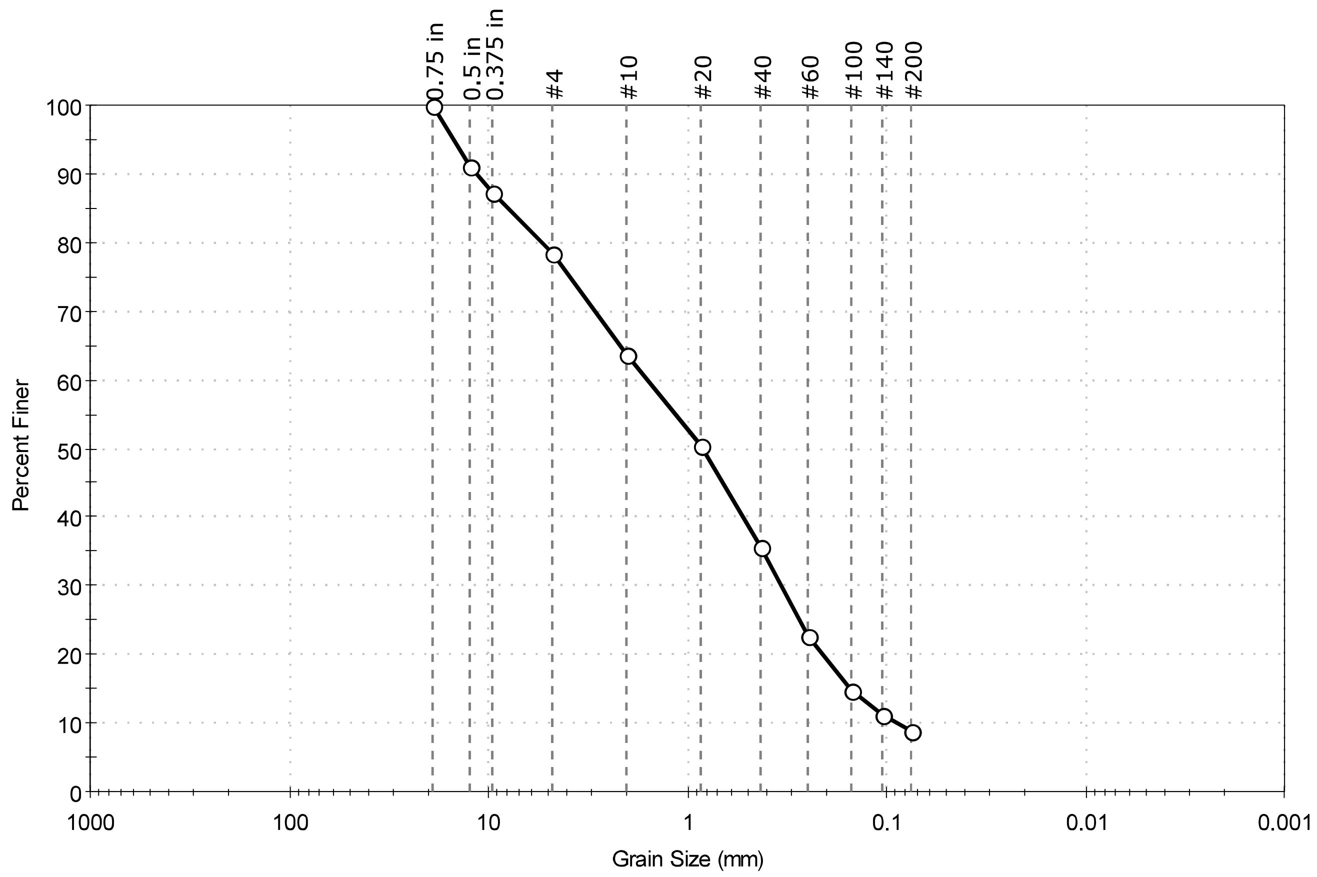
Client:	Weston & Sampson Engineers		
Project:	Sandmill Rd Bridge		
Location:	Cheshire, MA	Project No:	GTX-309562

Boring ID:	B-2B	Sample Type:	bag	Tested By:	GA
Sample ID:	S-7	Test Date:	02/27/19	Checked By:	bfs
Depth :	17-19 ft	Test Id:	495031		

Test Comment: ---
Visual Description: Moist, very dark grayish brown sand with silt and gravel
Sample Comment: ---

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	21.5	69.7	8.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	91		
0.375 in	9.50	87		
#4	4.75	79		
#10	2.00	64		
#20	0.85	51		
#40	0.42	36		
#60	0.25	23		
#100	0.15	15		
#140	0.11	11		
#200	0.075	8.8		

Coefficients

D_{85} =7.9441 mm
D_{30} =0.3376 mm
D_{60} =1.5697 mm
D_{15} =0.1515 mm
D_{50} =0.8287 mm
D_{10} =0.0886 mm
C_u =17.717
C_c =0.820

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (1))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

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Client: Weston & Sampson Engineers
Project: Sandmill Rd Bridge
Location: Cheshire, MA
Project No: GTX-309562

Boring ID: B-1
Sample Type: bag
Tested By: GA
Sample ID: S-10
Test Date: 02/27/19
Checked By: bfs
Depth : 24-26 ft
Test Id: 495032

Test Comment: ---
Visual Description: Moist, olive gray silt with sand
Sample Comment: ---

Atterberg Limits - ASTM D4318

Sample Determined to be non-plastic

Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S-10	B-1	24-26 ft	12	n/a	n/a	n/a	n/a	SILT with Sand (ML)

15% Retained on #40 Sieve
Dry Strength: NONE
Dilatancy: RAPID
Toughness: n/a
The sample was determined to be Non-Plastic

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APPENDIX E

Calculations

Project: Sand Mill Road Bridge over Dry Brook (C-10-002)
Location: Cheshire, MA
WSE Project No: 2180468
Calculation: 001- N-Value Corrections and Friction Angle

Weston & Sampson
55 Walkers Brook Dr., Suite 100, Reading, MA 01867 (HQ)
Tel: 978.532.1900

Calc By: BDG **Check by:** SJB
Date: 3/11/2019 **Date:** 3/15/2019

OBJECTIVE: Estimate soil strength properties for subsurface materials at Sand Mill Road Bridge over Dry Brook based on corrected blow counts in borings BB-1 through BB-2.

REFERENCE:
1) AASHTO LRFD Bridge Design Specifications, 8th Edition, 2017.
2) Correlations of Soil Properties by Michael Carter and Stephen Bentley
3) Boring logs BB-1 through BB-2 (refer to report Appendix)
4) F.H. Kulhawy and P.W. Mayne, "Manual on Estimating Soil Properties for Foundation Design", Research Report Prepared for Electric Power Research Institute, 1980.
4) Das, B. "Foundation Engineering." 5th Ed. (2004).

CALCULATIONS:

Assumptions:

Soil Unit Weight, γ = 120 pcf
Depth to Groundwater, D_w = 9 ft
Water Unit Weight, γ_w = 62.4 pcf
Soil Buoyant Unit Weight, γ_b = 57.6 pcf

Correct Blow Counts for Granular Soils based on Overburden and Hammer Energy:

Strata	Boring	Sample Number	Top Depth	Bottom Depth	N (field)	Hammer Type	Sample Midpoint Depth (ft)	Total Vertical Stress at Midpoint (psf)	Pore Pressure at Midpoint (psf)	Vertical Eff. Stress at Midpoint (psf)	Overburden Correction, C_N (1)	Hammer Efficiency Correction, ER (2)	Corrected Blowcounts , $N1_{60}$ (3)	
Fill	BB-1	S-2	2	4	58	Safety	3	360	0	360	1.575	60%	91	See Note 1.
	BB-1	S-3	4	6	26	Safety	5	600	0	600	1.404	60%	36	
	BB-1	S-4	6	8	30	Safety	7	840	0	840	1.292	60%	38	
	BB-1	S-5	8	10	16	Safety	9	1080	0	1080	1.208	60%	19	
Sand	BB-1	S-6	10	12	36	Safety	11	1320	124.8	1195.2	1.174	60%	42	
	BB-1	S-7	12	14	37	Safety	13	1560	249.6	1310.4	1.143	60%	42	
Glacial Till	BB-1	S-8	14	16	56	Safety	15	1800	374.4	1425.6	1.115	60%	62	
	BB-1	S-9	19	21	56	Safety	20	2400	686.4	1713.6	1.053	60%	58	
	BB-1	S-10	24	26	145	Safety	25	3000	998.4	2001.6	1.002	60%	145	
	BB-1	S-11	29	31	96	Safety	30	3600	1310.4	2289.6	0.957	60%	91	
	BB-1	S-12	34	36	103	Safety	35	4200	1622.4	2577.6	0.917	60%	94	
	BB-1	S-13	39	41	77	Safety	40	4800	1934.4	2865.6	0.882	60%	67	
	BB-1	S-14	44	46	93	Safety	45	5400	2246.4	3153.6	0.850	60%	79	
	BB-1	S-15	49	51	120	Safety	50	6000	2558.4	3441.6	0.820	60%	98	
	BB-1	S-16	54	54.75	100	Safety	54.4	6525	2831.4	3693.6	0.797	60%	79	
	BB-1	S-17	66.1	66.5	100	Safety	66.3	7956	3575.5	4380.5	0.740	60%	73	
	BB-2B	S-1	4	6	17	Safety	5	600	0	600	1.404	60%	23	See Note 2.
	BB-2B	S-2	6	8	10	Safety	7	840	0	840	1.292	60%	12	
	BB-2B	S-3	9	11	64	Safety	10	1200	62.4	1137.6	1.190	60%	76	
	BB-2B	S-4	11	13	49	Safety	12	1440	187.2	1252.8	1.158	60%	56	
	BB-2B	S-5	13	15	15	Safety	14	1680	312	1368	1.129	60%	16	
Sand	BB-2B	S-6	15	17	10	Safety	16	1920	436.8	1483.2	1.102	60%	11	
	BB-2B	S-7	17	19	14	Safety	18	2160	561.6	1598.4	1.077	60%	15	
	BB-2B	S-8	20	22	14	Safety	21	2520	748.8	1771.2	1.042	60%	14	
Glacial Till	BB-2B	S-9	25	27	44	Safety	26	3120	1060.8	2059.2	0.992	60%	43	
	BB-2B	S-10	30	32	42	Safety	31	3720	1372.8	2347.2	0.948	60%	39	
	BB-2B	S-11	35	37	54	Safety	36	4320	1684.8	2635.2	0.910	60%	49	

Notes:
1. At boring BB-1, SPT N-value at 0-2 feet not representative due to cobbles at the bottom of the sampler, and was not considered in this calculation.
2. At boring BB-2, SPT N-value at 0-2 feet not representative due to cobbles at the bottom of the sampler, and was not considered in this calculation.

Estimated Friction Angle for Granular Soils

Existing fill soils encountered in the borings generally consisted of medium dense to very dense sand/gravel with varying amount of silt. The corrected N-values (above) range from 12 to greater than 91 blows ber foot. however higher N-values may be due to cobbles within the fill, Assume **Phi = 30°** based on SPT correlations, and account for potential variations in composition and density of existing fill.

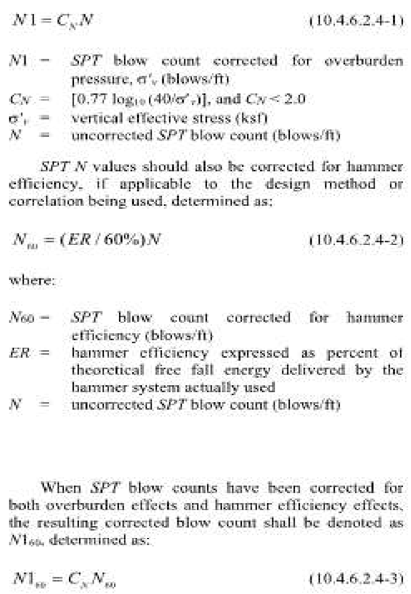
Sand generally consisted of generally fine to medium or coarse grained, medium dense to dense sand with varying amounts of gravel and silt. The corrected N-values (above) range from 11 to 42 blows per foot. Assume **Phi = 33°** degrees based on SPT correlations, and typical values for well graded sand.

Glacial deposits encountered in the borings generally consisted of hard silt with varying amounts of gravel, sand, and clay. The Corrected N-values (above) range from 39 to greater than 100 blows per foot. Assume **Phi = 35°** based on SPT correlations and typical values for dense inorganic silt.

Project: Sand Mill Road Bridge over Dry Brook (C-10-002) **Location:** Cheshire, MA **WSE Project No:** 2180468 **Calculation:** 001- N-Value Corrections and Friction Angle	Weston & Sampson 55 Walkers Brook Dr., Suite 100, Reading, MA 01867 (HQ) Tel: 978.532.1900

REFERENCES:

From AASHTO (2017) Section 10.4.6.2.4:



$$N1 = C_N N \qquad (10.4.6.2.4\text{-}1)$$

$N1$ = *SPT* blow count corrected for overburden pressure, σ'_v (blows/ft)
C_N = $[0.77 \log_{10}(40/\sigma'_v)]$, and $C_N < 2.0$
σ'_v = vertical effective stress (ksf)
N = uncorrected *SPT* blow count (blows/ft)

SPT N values should also be corrected for hammer efficiency, if applicable to the design method or correlation being used, determined as:

$$N_{60} = (ER/60\%)N \qquad (10.4.6.2.4\text{-}2)$$

where:

N_{60} = *SPT* blow count corrected for hammer efficiency (blows/ft)
ER = hammer efficiency expressed as percent of theoretical free fall energy delivered by the hammer system actually used
N = uncorrected *SPT* blow count (blows/ft)

When *SPT* blow counts have been corrected for both overburden effects and hammer efficiency effects, the resulting corrected blow count shall be denoted as $N1_{60}$, determined as:

$$N1_{60} = C_N N_{60} \qquad (10.4.6.2.4\text{-}3)$$

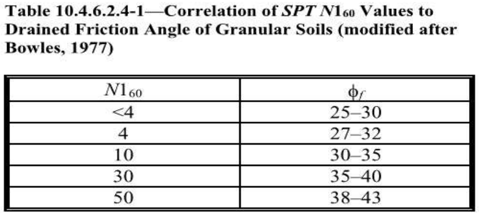


Table 10.4.6.2.4-1—Correlation of *SPT N*1₆₀ Values to Drained Friction Angle of Granular Soils (modified after Bowles, 1977)

$N1_{60}$	ϕ_f
<4	25–30
4	27–32
10	30–35
30	35–40
50	38–43

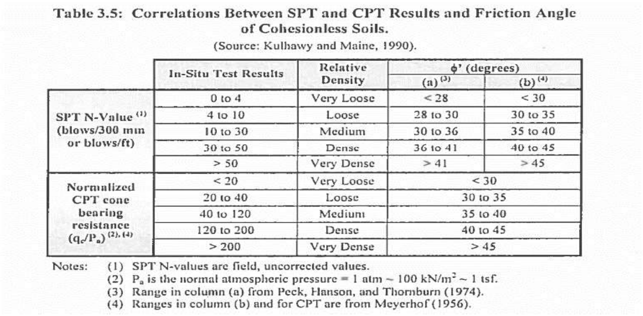
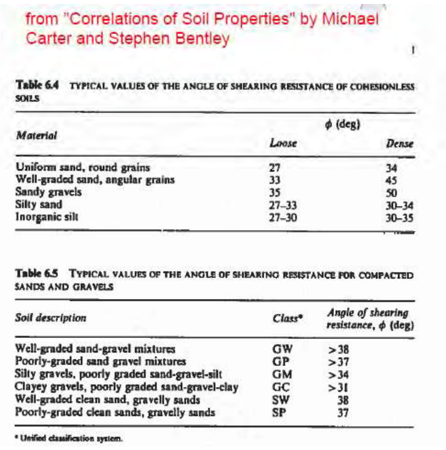


Table 3.5: Correlations Between SPT and CPT Results and Friction Angle of Cohesionless Soils.
(Source: Kulhawy and Maine, 1990).

	In-Situ Test Results	Relative Density	φ' (degrees) (a) (3)	φ' (degrees) (b) (4)
SPT N-Value (1) (blows/300 mm or blows/ft)	0 to 4	Very Loose	< 28	< 30
	4 to 10	Loose	28 to 30	30 to 35
	10 to 30	Medium	30 to 36	35 to 40
	30 to 50	Dense	36 to 41	40 to 45
	> 50	Very Dense	> 41	> 45
Normalized CPT cone bearing resistance (q_c/P_a) (2), (4)	< 20	Very Loose	< 30	
	20 to 40	Loose	30 to 35	
	40 to 120	Medium	35 to 40	
	120 to 200	Dense	40 to 45	
	> 200	Very Dense	> 45	

Notes:
(1) SPT N-values are field, uncorrected values.
(2) P_a is the normal atmospheric pressure = 1 atm ~ 100 kN/m^2 ~ 1 tsf.
(3) Range in column (a) from Peck, Hanson, and Thornburn (1974).
(4) Ranges in column (b) and for CPT are from Meyerhof (1956).

from FHWA Geotechnical Engineering Circular No. 7: Soil Nail Walls; March 2003.



from "Correlations of Soil Properties" by Michael Carter and Stephen Bentley

Table 6.4 TYPICAL VALUES OF THE ANGLE OF SHEARING RESISTANCE OF COHESIONLESS SOILS

Material	φ (deg) Loose	φ (deg) Dense
Uniform sand, round grains	27	34
Well-graded sand, angular grains	33	45
Sandy gravels	35	50
Silty sand	27–33	30–34
Inorganic silt	27–30	30–35

Table 6.5 TYPICAL VALUES OF THE ANGLE OF SHEARING RESISTANCE FOR COMPACTED SANDS AND GRAVELS

Soil description	Class*	Angle of shearing resistance, φ (deg)
Well-graded sand-gravel mixtures	GW	>38
Poorly-graded sand gravel mixtures	GP	>37
Silty gravels, poorly graded sand-gravel-silt	GM	>34
Clayey gravels, poorly graded sand-gravel-clay	GC	>31
Well-graded clean sand, gravelly sands	SW	38
Poorly-graded clean sands, gravelly sands	SP	37

* Unified classification system.

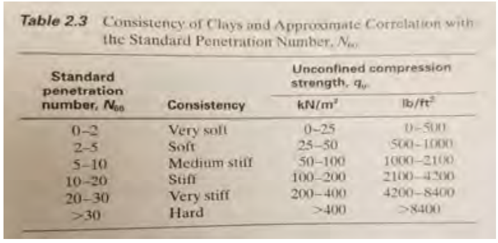


Table 2.3 Consistency of Clays and Approximate Correlation with the Standard Penetration Number, N_{60}

Standard penetration number, N_{60}	Consistency	Unconfined compression strength, q_u kN/m^2	Unconfined compression strength, q_u lb/ft^2
0–2	Very soft	0–25	0–500
2–5	Soft	25–50	500–1000
5–10	Medium stiff	50–100	1000–2100
10–20	Stiff	100–200	2100–4200
20–30	Very stiff	200–400	4200–8400
>30	Hard	>400	>8400

From Das (2004)

Project: Sand Mill Road Bridge over Dry Brook (C-10-002)
Location: Cheshire, MA
WSE Project No: 2180468
Calculation: 002A- Bearing Resistance (North Abutment)

Weston & Sampson
55 Walkers Brook Dr., Suite 100, Reading, MA 01867 (HQ)
Tel: 978.532.1900

Calc By: BDG **Check by:** SJB
Date: 3/18/2019 **Date:** 9/29/2021 (REV 10/26/2022)

OBJECTIVE: Estimate the factored bearing resistance for the north abutment footing at the above referenced site for the Strength Limit and Extreme Limit states for varying load eccentricities.

REFERENCES:
1) AASHTO LRFD Bridge Design Specifications, 7th Edition, 2017.
2) Boring Log boring BB-2 (refer to report Appendix).
3) Das, Braja M. (2002), "Principles of Geotechnical Engineering." Pacific Grove, CA. 5th Ed.

DESIGN BASIS AND ASSUMPTIONS:
- Bearing resistance factors presented in AASHTO (2017) are used in the analysis.
- Shape, depth, and water factors are included in the analysis; inclination factors are ignored.
-Assume scour to the top of the footing, and 2 feet of embedment (for a 2-foot thick footing). Conservatively neglect presence of scour countermeasures.
- Assume ground surface in front of abutment is relatively flat, and therefore modifications for sloping ground are not used.
- Bearing resistance equation for strip footing applies
- North abutment bears within the medium dense sand deposit.

INPUTS

Abutment Geometry:

			Basis / Reference
Proposed Footing Embedment Depth, D_f =	2	ft	Riprap scour protection will be provided. Conservatively assume 2 ft embedment
Footing Width, B=	12	ft	
Footing Length, L =	35.2	ft	Assume groundwater is coincident with river level, and is at or above bearing elevation
Depth to Groundwater, D_w =	0	ft	

Soil Parameters:

			Basis / Reference
Overburden Soil Unit Weight, g =	125	pcf	Medium dense fill
Friction Angle (for bearing soils), f =	33	degrees	Assume the north abutment will bear within medium dense sand based on BB-2B.
Cohesion (for bearing soils), c =	0	psf	Soil is assumed to be cohesionless
Cohesion Bearing Capacity Factor, N_c =	38.6		AASHTO Table 10.6.3.1.2a-1
Embedment Bearing Capacity Factor, N_q =	26.1		AASHTO Table 10.6.3.1.2a-1
Unit Weight Bearing Capacity Factor, N_γ =	35.2		AASHTO Table 10.6.3.1.2a-1

Resistance Factors:

		Basis / Reference
Strength Limit, $\phi_{b\_strength}$ =	0.45	AASHTO Table 10.5.5.2.2-1
Service Limit, $\phi_{b\_service}$ =	1.00	AASHTO Section 10.5.5.3.3

- Factored Bearing Resistance, q_r, estimated using equation 10.6.3.1.1-1: $q_r = q_n j_b$

CALCULATIONS

DETERMINE FACTORED BEARING RESISTANCE, q_r

- Nominal Bearing Resistance, q_n, determined using equation 10.6.3.1.2a-1

$$q_n = cN_{cm} + \gamma D_f N_{qm} C_{wq} + 0.5gB'N_{gm}C_{wg}$$

where: $N_{qm} = N_q s_q d_q i_q$ 0.239996306
$N_{gm} = N_g s_g i_g$
$N_{cm} = N_c s_c i_c$

Eccentricity and Effective Footing Width (See Note 1)				Groundwater Modifications (see Note 2)		Slope Modifications (See Note 3)		Shape Factors (See Note 4)				Depth Factor (see Note 5)
e/B	e [ft]	B' [ft]	B'/L	C_{wq}	C_{wg}	N_{cq}	N_{cg}	s_c	s_g	s_q	D_f/B'	d_q
0.02	0.25	11.50	0.327	0.5	0.5			1.221	0.869	1.212	0.174	1.00
0.04	0.50	11.00	0.313	0.5	0.5			1.211	0.875	1.203	0.182	1.00
0.06	0.75	10.50	0.298	0.5	0.5			1.202	0.881	1.194	0.190	1.00
0.08	1.00	10.00	0.284	0.5	0.5			1.192	0.886	1.184	0.200	1.00
0.10	1.25	9.50	0.270	0.5	0.5			1.182	0.892	1.175	0.211	1.00
0.13	1.50	9.00	0.256	0.5	0.5			1.173	0.898	1.166	0.222	1.00
0.15	1.75	8.50	0.241	0.5	0.5			1.163	0.903	1.157	0.235	1.00
0.17	2.00	8.00	0.227	0.5	0.5			1.154	0.909	1.148	0.250	1.00
0.19	2.25	7.50	0.213	0.5	0.5			1.144	0.915	1.138	0.267	1.00
0.21	2.50	7.00	0.199	0.5	0.5			1.134	0.920	1.129	0.286	1.00

Project: Sand Mill Road Bridge over Dry Brook (C-10-002)
Location: Cheshire, MA
WSE Project No: 2180468
Calculation: 002A- Bearing Resistance (North Abutment)

Weston & Sampson
55 Walkers Brook Dr., Suite 100, Reading, MA 01867 (HQ)
Tel: 978.532.1900

Calc By: BDG **Check by:** SJB
Date: 3/18/2019 **Date:** 9/29/2021 (REV 10/26/2022)

e/B	**B'**	**N_{qm}**	**N_{gm}**	**N_{cm}**	**Nominal Bearing Resitance, q_n**	**Factored Bearing Resitance- Strength Limit, $q_{r\_strength}$**	**Factored Bearing Resitance- Service Limit, $q_{r\_service}$**
	[ft]				[psf]	[psf]	[psf]
0.02	11.50	31.6	30.6	47.1	14,952	**6,728**	**14,952**
0.04	11.00	31.4	30.8	46.8	14,512	**6,530**	**14,512**
0.06	10.50	31.2	31.0	46.4	14,066	**6,330**	**14,066**
0.08	10.00	30.9	31.2	46.0	13,614	**6,126**	**13,614**
0.10	9.50	30.7	31.4	45.6	13,156	**5,920**	**13,156**
0.13	9.00	30.4	31.6	45.3	12,692	**5,711**	**12,692**
0.15	8.50	30.2	31.8	44.9	12,221	**5,499**	**12,221**
0.17	8.00	30.0	32.0	44.5	11,744	**5,285**	**11,744**
0.19	7.50	29.7	32.2	44.2	11,261	**5,067**	**11,261**
0.21	7.00	29.5	32.4	43.8	10,771	**4,847**	**10,771**

Notes:

(1) Effective footing width B' determined based on AASHTO Section 10.6.1.3
(2) Groundwater modification based on factors C_{wq} and C_{wg} from AASHTO Table 10.6.3.1.2a-2
(3) Where applicable, replace Nq and Ng with factors Ncq and Ncg to account for sloping ground in accordance with Section 10.6.3.1.2c
(4) Shape Correction Factors sc, sg, and sq determined using equation in AASHTO Table 10.6.3.1.2a-3
(5) Depth Correction Factor conservatively assumed to be 1.0

Project: Sand Mill Road Bridge over Dry Brook (C-10-002)
Location: Cheshire, MA
WSE Project No: 2180468
Calculation: 002B- Bearing Resistance (South Abutment)

Weston & Sampson
55 Walkers Brook Dr., Suite 100, Reading, MA 01867 (HQ)
Tel: 978.532.1900

Calc By: BDG **Check by:** SJB
Date: 3/18/2019 **Date:** 9/29/2021 (REV 10/26/2022)

OBJECTIVE: Estimate the factored bearing resistance for the north abutment footing at the above referenced site for the Strength Limit and Extreme Limit states for varying load eccentricities.

REFERENCES:
1) AASHTO LRFD Bridge Design Specifications, 7th Edition, 2017.
2) Boring Log boring BB-2 (refer to report Appendix).
3) Das, Braja M. (2002), "Principles of Geotechnical Engineering." Pacific Grove, CA. 5th Ed.

DESIGN BASIS AND ASSUMPTIONS:
- Bearing resistance factors presented in AASHTO (2017) are used in the analysis.
- Shape, depth, and water factors are included in the analysis; inclination factors are ignored.
- Assume scour to the top of the footing, and 2 feet of embedment (for a 2-foot thick footing). Conservatively neglect presence of scour countermeasures.
- Assume ground surface in front of abutment is relatively flat, and therefore modifications for sloping ground are not used.
- Bearing resistance equation for strip footing applies
- North abutment bears within the glacial till deposit.

INPUTS

Abutment Geometry:

			Basis / Reference
Proposed Footing Embedment Depth, D_f =	2	ft	Riprap scour protection will be provided. Conservatively assume 2 ft embedment
Footing Width, B=	12	ft	
Footing Length, L =	35.3	ft	Assume groundwater is coincident with river level, and is at or above bearing elevation
Depth to Groundwater, D_w =	0	ft	

Soil Parameters:

			Basis / Reference
Overburden Soil Unit Weight, g =	125	pcf	Medium dense fill and sand
Friction Angle (for bearing soils), f =	35	degrees	Assume the north abutment will bear within medium dense sand based on BB-2B.
Cohesion (for bearing soils), c =	0	psf	Soil is assumed to be cohesionless
Cohesion Bearing Capacity Factor, N_c =	46.1		AASHTO Table 10.6.3.1.2a-1
Embedment Bearing Capacity Factor, N_q =	33.3		AASHTO Table 10.6.3.1.2a-1
Unit Weight Bearing Capacity Factor, N_γ =	48.0		AASHTO Table 10.6.3.1.2a-1

Resistance Factors:

		Basis / Reference
Strength Limit, $\phi_{b\_strength}$ =	0.45	AASHTO Table 10.5.5.2.2-1
Extreme Limit, $\phi_{b\_extreme}$ =	1.00	AASHTO Section 10.5.5.3.3

- Factored Bearing Resistance, q_r, estimated using equation 10.6.3.1.1-1: $q_r = q_n j_b$

CALCULATIONS

DETERMINE FACTORED BEARING RESISTANCE, q_r

- Nominal Bearing Resistance, q_n, determined using equation 10.6.3.1.2a-1

$$q_n = cN_{cm} + gD_fN_{qm}C_{wq} + 0.5gB'N_{gm}C_{wg}$$

where:
$N_{qm} = N_q s_q d_q i_q$
$N_{gm} = N_g s_g i_g$
$N_{cm} = N_c s_c i_c$

Eccentricity and Effective Footing Width (See Note 1)				Groundwater Modifications (see Note 2)		Slope Modifications (See Note 3)		Shape Factors (See Note 4)				Depth Factor (see Note 5)
e/B	e [ft]	B' [ft]	B'/L	C_{wq}	C_{wg}	N_{cq}	N_{cg}	s_c	s_g	s_q	D_f/B'	d_q
0.02	0.25	11.50	0.326	0.5	0.5			1.235	0.870	1.228	0.174	1.00
0.04	0.50	11.00	0.312	0.5	0.5			1.225	0.875	1.218	0.182	1.00
0.06	0.75	10.50	0.297	0.5	0.5			1.215	0.881	1.208	0.190	1.00
0.08	1.00	10.00	0.283	0.5	0.5			1.205	0.887	1.198	0.200	1.00
0.10	1.25	9.50	0.269	0.5	0.5			1.194	0.892	1.188	0.211	1.00
0.13	1.50	9.00	0.255	0.5	0.5			1.184	0.898	1.179	0.222	1.00
0.15	1.75	8.50	0.241	0.5	0.5			1.174	0.904	1.169	0.235	1.00
0.17	2.00	8.00	0.227	0.5	0.5			1.164	0.909	1.159	0.250	1.00
0.19	2.25	7.50	0.212	0.5	0.5			1.153	0.915	1.149	0.267	1.00
0.21	2.50	7.00	0.198	0.5	0.5			1.143	0.921	1.139	0.286	1.00

e/B	**B'**	**N_{qm}**	**N_{gm}**	**N_{cm}**	**Nominal Bearing Resistance, q_n**	**Factored Bearing Resitance- Strength Limit, $q_{r\_strength}$**	**Factored Bearing Resitance- Extreme Limit, $q_{r\_extreme}$**
	[ft]				[psf]	[psf]	[psf]
0.02	11.50	40.9	41.7	56.9	20,114	**9,051**	**20,114**
0.04	11.00	40.6	42.0	56.5	19,514	**8,781**	**19,514**
0.06	10.50	40.2	42.3	56.0	18,906	**8,507**	**18,906**
0.08	10.00	39.9	42.6	55.5	18,288	**8,230**	**18,288**
0.10	9.50	39.6	42.8	55.1	17,663	**7,948**	**17,663**
0.13	9.00	39.2	43.1	54.6	17,029	**7,663**	**17,029**
0.15	8.50	38.9	43.4	54.1	16,386	**7,374**	**16,386**
0.17	8.00	38.6	43.6	53.6	15,735	**7,081**	**15,735**
0.19	7.50	38.3	43.9	53.2	15,076	**6,784**	**15,076**
0.21	7.00	37.9	44.2	52.7	14,408	**6,483**	**14,408**

Notes:

(1) Effective footing width B' determined based on AASHTO Section 10.6.1.3
(2) Groundwater modification based on factors C_{wq} and C_{wg} from AASHTO Table 10.6.3.1.2a-2
(3) Where applicable, replace Nq and Ng with factors Ncq and Ncg to account for sloping ground in accordance with Section 10.6.3.1.2c
(4) Shape Correction Factors sc, sg, and sq determined using equation in AASHTO Table 10.6.3.1.2a-3
(5) Depth Correction Factor conservatively assumed to be 1.0

References (From AASHTO 2017)

Resistance Factors:

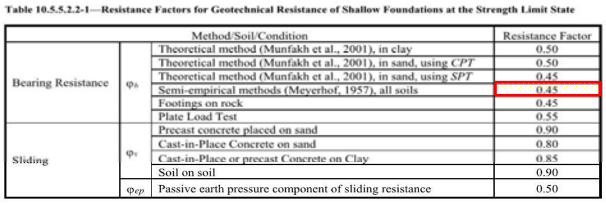


Table 10.5.5.2.2-1—Resistance Factors for Geotechnical Resistance of Shallow Foundations at the Strength Limit State

Method/Soil/Condition			Resistance Factor
Bearing Resistance	φ_b	Theoretical method (Munfakh et al., 2001), in clay	0.50
		Theoretical method (Munfakh et al., 2001), in sand, using *CPT*	0.50
		Theoretical method (Munfakh et al., 2001), in sand, using *SPT*	0.45
		Semi-empirical methods (Meyerhof, 1957), all soils	0.45
		Footings on rock	0.45
		Plate Load Test	0.55
Sliding	φ_τ	Precast concrete placed on sand	0.90
		Cast-in-Place Concrete on sand	0.80
		Cast-in-Place or precast Concrete on Clay	0.85
		Soil on soil	0.90
	φ_{ep}	Passive earth pressure component of sliding resistance	0.50

Eccentricity and Effective Footing Dimensions:

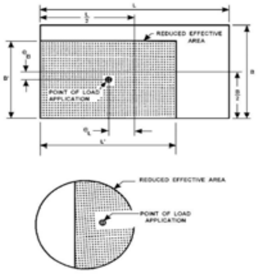
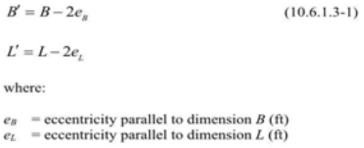


Figure C10.6.1.3-1—Reduced Footing Dimensions

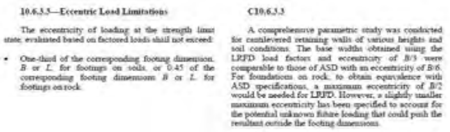


$$B' = B - 2e_B \quad (10.6.1.3\text{-}1)$$

$$L' = L - 2e_L$$

where:

e_B = eccentricity parallel to dimension B (ft)
e_L = eccentricity parallel to dimension L (ft)



10.6.3.3—Eccentric Load Limitations

The eccentricity of loading at the strength limit state, evaluated based on factored loads shall not exceed:

- One-third of the corresponding footing dimension, *B* or *L*, for footings on soils, or 0.45 of the corresponding footing dimensions *B* or *L*, for footings on rock.

C10.6.3.3

A comprehensive parametric study was conducted for cantilevered retaining walls of various heights and soil conditions. The base widths obtained using the LRFD load factors and eccentricity of *B*/3 were comparable to those of ASD with an eccentricity of *B*/6. For foundations on rock, to obtain equivalence with ASD specifications, a maximum eccentricity of *B*/2 would be needed for LRFD. However, a slightly smaller maximum eccentricity has been specified to account for the potential unknown future loading that could push the resultant outside the footing dimensions.

Bearing Capacity Factors

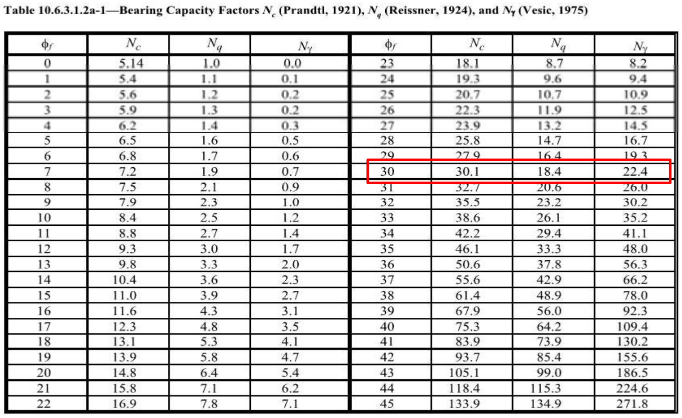
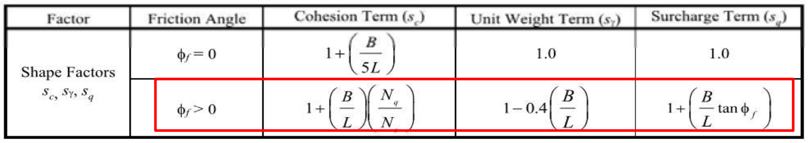


Table 10.6.3.1.2a-1—Bearing Capacity Factors N_c (Prandtl, 1921), N_q (Reissner, 1924), and N_γ (Vesic, 1975)

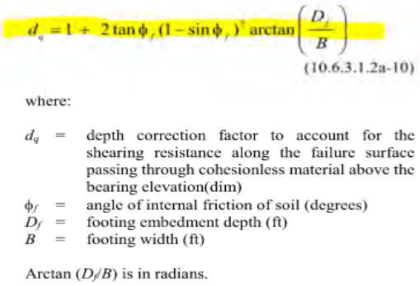
ϕ_f	N_c	N_q	N_γ	ϕ_f	N_c	N_q	N_γ
0	5.14	1.0	0.0	23	18.1	8.7	8.2
1	5.4	1.1	0.1	24	19.3	9.6	9.4
2	5.6	1.2	0.2	25	20.7	10.7	10.9
3	5.9	1.3	0.2	26	22.3	11.9	12.5
4	6.2	1.4	0.3	27	23.9	13.2	14.5
5	6.5	1.6	0.5	28	25.8	14.7	16.7
6	6.8	1.7	0.6	29	27.9	16.4	19.3
7	7.2	1.9	0.7	30	30.1	18.4	22.4
8	7.5	2.1	0.9	31	32.7	20.6	26.0
9	7.9	2.3	1.0	32	35.5	23.2	30.2
10	8.4	2.5	1.2	33	38.6	26.1	35.2
11	8.8	2.7	1.4	34	42.2	29.4	41.1
12	9.3	3.0	1.7	35	46.1	33.3	48.0
13	9.8	3.3	2.0	36	50.6	37.8	56.3
14	10.4	3.6	2.3	37	55.6	42.9	66.2
15	11.0	3.9	2.7	38	61.4	48.9	78.0
16	11.6	4.3	3.1	39	67.9	56.0	92.3
17	12.3	4.8	3.5	40	75.3	64.2	109.4
18	13.1	5.3	4.1	41	83.9	73.9	130.2
19	13.9	5.8	4.7	42	93.7	85.4	155.6
20	14.8	6.4	5.4	43	105.1	99.0	186.5
21	15.8	7.1	6.2	44	118.4	115.3	224.6
22	16.9	7.8	7.1	45	133.9	134.9	271.8

Shape Factors



Factor	Friction Angle	Cohesion Term (s_c)	Unit Weight Term (s_γ)	Surcharge Term (s_q)
Shape Factors s_c, s_γ, s_q	$\phi_f = 0$	$1 + \left(\frac{B}{5L}\right)$	1.0	1.0
	$\phi_f > 0$	$1 + \left(\frac{B}{L}\right)\left(\frac{N_q}{N}\right)$	$1 - 0.4\left(\frac{B}{L}\right)$	$1 + \left(\frac{B}{L}\tan\phi_f\right)$

Dept



$$d_q = 1 + 2\tan\phi_f(1 - \sin\phi_f)^2 \arctan\left(\frac{D_f}{B}\right) \quad (10.6.3.1.2a\text{-}10)$$

where:

d_q = depth correction factor to account for the shearing resistance along the failure surface passing through cohesionless material above the bearing elevation(dim)
ϕ_f = angle of internal friction of soil (degrees)
D_f = footing embedment depth (ft)
B = footing width (ft)

Arctan (D_f/B) is in radians.

Groundwater Modification

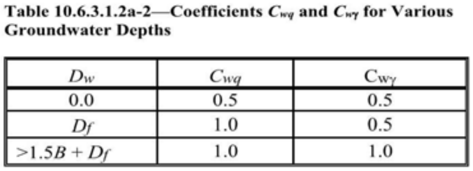


Table 10.6.3.1.2a-2—Coefficients C_{wq} and $C_{w\gamma}$ for Various Groundwater Depths

D_w	C_{wq}	$C_{w\gamma}$
0.0	0.5	0.5
D_f	1.0	0.5
$>1.5B + D_f$	1.0	1.0

Correction Factor $N_{\gamma q}$ for foundations on/near sloping ground

AASHTO Figure 10.6.3.1.2c-1

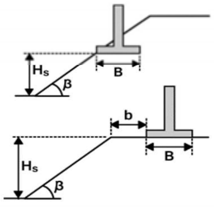


Figure 10.6.3.1.2c-1—Definition of Footing and Slope Geometric Parameters for Determination of RCBC

$$q_{n-sloping\ ground} = RC_{BC} q_n = RC_{BC} \left(cN_c + 0.5 \gamma B N_\gamma \right) \quad (10.6.3.1.2c\text{-}1)$$

where:

$q_{n-sloping\ ground}$ = the nominal footing bearing resistance considering the effect of sloping ground (ksf)

RC_{BC} = reduction coefficient for bearing resistance due to slope effects (dim)

Table 10.6.3.1.2c-1—Reduction Coefficients (*RC_BC*) for Footings Placed on Slopes Composed of either Purely Cohesive Soils, (ϕ = 0); Purely Cohesionless Soils (c'=0); or Soils with both Cohesive and Cohesionless Strength Components

			β=10°				β=20°				β=30°				β=40°			
			Ns				*Ns*				*Ns*				*Ns*			
ϕ (°)	*B/H*	*b/B*	0	2	4	c'=0	0	2	4	c'=0	0	2	4	c'=0	0	2	4	c'=0
0	0.1	0 (On Slope)	0.89	0.89	0.88	0.00	0.89	0.88	0.87	0.00	0.85	0.84	0.83	0.00	0.77	0.76	0.74	0.00
	0.2		0.89	0.88	0.88	0.00	0.89	0.87	0.86	0.00	0.82	0.81	0.78	0.00	0.76	0.73	0.69	0.00
	0.4		0.88	0.87	0.86	0.00	0.89	0.86	0.82	0.00	0.81	0.77	0.66	0.00	0.74	0.68	0.53	0.00
	0.6		0.89	0.87	0.84	0.00	0.88	0.84	0.71	0.00	0.81	0.74	0.53	0.00	0.74	0.64	0.41	0.00
	1		0.87	0.84	0.75	0.00	0.87	0.79	0.56	0.00	0.80	0.66	0.42	0.00	0.73	0.56	0.33	0.00
	1.5		0.87	0.82	0.62	0.00	0.87	0.72	0.47	0.00	0.80	0.61	0.37	0.00	0.73	0.54	0.30	0.00
	3		0.87	0.73	0.47	0.00	0.87	0.67	0.37	0.00	0.83	0.62	0.31	0.00	0.80	0.59	0.28	0.00
20	0.1	0 (On Slope)	0.91	0.91	0.91	0.69	0.80	0.79	0.79	0.22	0.64	0.63	0.61	0.00	0.53	0.52	0.50	0.00
	0.2		0.90	0.89	0.90	0.68	0.75	0.73	0.72	0.21	0.62	0.59	0.56	0.00	0.52	0.49	0.45	0.00
	0.4		0.86	0.86	0.84	0.63	0.73	0.70	0.67	0.22	0.62	0.56	0.51	0.00	0.52	0.45	0.39	0.00
	0.6		0.85	0.84	0.82	0.58	0.73	0.68	0.63	0.22	0.61	0.54	0.47	0.00	0.51	0.41	0.33	0.00
	1		0.85	0.82	0.78	0.58	0.72	0.64	0.58	0.26	0.61	0.50	0.42	0.00	0.52	0.39	0.30	0.00
	1.5		0.86	0.80	0.75	0.58	0.73	0.62	0.54	0.31	0.65	0.50	0.42	0.00	0.60	0.44	0.34	0.00
	3		0.90	0.77	0.72	0.58	0.88	0.66	0.56	0.35	0.86	0.61	0.51	0.00	0.85	0.57	0.46	0.00
30	0.1	0 (On Slope)	0.93	0.92	0.91	0.77	0.65	0.64	0.63	0.40	0.51	0.50	0.48	0.11	0.40	0.37	0.36	0.00
	0.2		0.81	0.82	0.84	0.76	0.64	0.61	0.59	0.39	0.50	0.47	0.44	0.11	0.39	0.35	0.32	0.00
	0.4		0.79	0.79	0.78	0.72	0.63	0.59	0.55	0.37	0.50	0.43	0.39	0.13	0.39	0.32	0.27	0.00
	0.6		0.78	0.77	0.75	0.68	0.62	0.56	0.52	0.36	0.49	0.41	0.36	0.14	0.39	0.30	0.24	0.00
	1		0.79	0.75	0.73	0.67	0.63	0.53	0.49	0.41	0.55	0.41	0.35	0.24	0.48	0.33	0.26	0.00
	1.5		0.79	0.73	0.69	0.66	0.72	0.56	0.50	0.46	0.68	0.47	0.39	0.33	0.64	0.41	0.33	0.00
	3		0.95	0.74	0.70	0.65	0.92	0.66	0.60	0.51	0.90	0.62	0.57	0.43	0.88	0.59	0.51	0.00
40	0.1	0 (On Slope)	0.74	0.77	0.79	0.80	0.52	0.51	0.50	0.38	0.37	0.36	0.34	0.17	0.28	0.26	0.24	0.05
	0.2		0.69	0.69	0.69	0.78	0.51	0.48	0.47	0.37	0.37	0.33	0.30	0.16	0.27	0.23	0.20	0.05
	0.4		0.67	0.69	0.67	0.72	0.50	0.45	0.43	0.36	0.36	0.30	0.26	0.17	0.27	0.20	0.17	0.06
	0.6		0.67	0.67	0.64	0.66	0.50	0.43	0.43	0.34	0.40	0.34	0.26	0.17	0.32	0.22	0.18	0.08
	1		0.69	0.64	0.62	0.70	0.63	0.48	0.43	0.45	0.58	0.39	0.33	0.32	0.54	0.33	0.27	0.24
	1.5		0.76	0.65	0.61	0.74	0.74	0.53	0.48	0.56	0.71	0.47	0.40	0.47	0.68	0.43	0.36	0.41
	3		0.95	0.74	0.71	0.77	0.94	0.68	0.65	0.66	0.91	0.67	0.62	0.62	0.92	0.67	0.59	0.57

Table 10.6.3.1.2c-2—Reduction Coefficients (*RC_BC*) for Footings Placed Adjacent to Slopes Composed of either Purely Cohesive Soils, (ϕ = 0); Purely Cohesionless Soils (c'=0); or Soils with both Cohesive and Cohesionless Strength Components

			β=10°				β=20°				β=30°				β=40°			
			Ns				*Ns*				*Ns*				*Ns*			
ϕ (°)	*B/H*	*b/B*	0	2	4	c'=0	0	2	4	c'=0	0	2	4	c'=0	0	2	4	c'=0
0	0.2	0	0.89	0.88	0.88	0.00	0.89	0.87	0.86	0.00	0.82	0.81	0.78	0.00	0.76	0.73	0.69	0.00
		0.5	0.97	0.96	0.96	0.00	0.95	0.93	0.91	0.00	0.92	0.89	0.87	0.00	0.86	0.83	0.76	0.00
		1.25	1.00	0.99	0.98	0.00	1.00	0.98	0.96	0.00	1.00	0.97	0.95	0.00	0.95	0.91	0.81	0.00
		2.5	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	0.97	0.84	0.00
		5	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.89	0.00
		10	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
	0.5	0	0.92	0.91	0.88	0.00	0.85	0.82	0.76	0.00	0.77	0.73	0.63	0.00	0.71	0.65	0.52	0.00
		0.5	0.96	0.95	0.89	0.00	0.92	0.89	0.78	0.00	0.87	0.84	0.68	0.00	0.83	0.76	0.56	0.00
		1.25	0.98	0.97	0.90	0.00	0.96	0.94	0.80	0.00	0.94	0.92	0.71	0.00	0.90	0.83	0.58	0.00
		2.5	1.00	1.00	1.00	0.00	1.00	1.00	0.86	0.00	1.00	1.00	0.79	0.00	1.00	0.93	0.68	0.00
		5	1.00	1.00	1.00	0.00	1.00	1.00	0.95	0.00	1.00	1.00	0.93	0.00	1.00	1.00	0.88	0.00
		10	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
	1	0	0.87	0.84	0.75	0.00	0.87	0.79	0.56	0.00	0.80	0.66	0.42	0.00	0.73	0.56	0.33	0.00
		0.5	0.95	0.91	0.82	0.00	0.92	0.83	0.65	0.00	0.86	0.73	0.46	0.00	0.81	0.67	0.40	0.00
		1.25	0.97	0.94	0.83	0.00	0.95	0.87	0.67	0.00	0.92	0.81	0.50	0.00	0.89	0.76	0.46	0.00
		2.5	1.00	0.98	0.88	0.00	1.00	0.97	0.77	0.00	1.00	1.00	0.84	0.00	0.99	0.92	0.63	0.00
		5	1.00	1.00	0.95	0.00	1.00	1.00	0.90	0.00	1.00	1.00	0.84	0.00	1.00	1.00	0.83	0.00
		10	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
	2	0	0.87	0.79	0.57	0.00	0.87	0.71	0.44	0.00	0.81	0.62	0.35	0.00	0.75	0.56	0.29	0.00
		0.5	0.97	0.93	0.65	0.00	0.94	0.79	0.49	0.00	0.89	0.72	0.42	0.00	0.85	0.69	0.37	0.00
		1.25	0.99	0.98	0.73	0.00	0.99	0.91	0.57	0.00	0.98	0.86	0.51	0.00	0.96	0.83	0.47	0.00
		2.5	1.00	0.99	0.82	0.00	1.00	0.96	0.69	0.00	1.00	0.95	0.64	0.00	1.00	0.95	0.61	0.00
		5	1.00	1.00	0.96	0.00	1.00	1.00	0.87	0.00	1.00	1.00	0.84	0.00	1.00	1.00	0.81	0.00
		10	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
20	0.2	0	0.90	0.89	0.90	0.68	0.75	0.73	0.72	0.21	0.62	0.59	0.56	0.00	0.52	0.49	0.45	0.00
		0.5	0.78	0.87	0.86	0.70	0.74	0.76	0.74	0.40	0.63	0.65	0.63	0.00	0.52	0.56	0.52	0.00
		1.25	0.86	0.92	0.92	0.82	0.83	0.84	0.83	0.70	0.74	0.75	0.74	0.00	0.63	0.66	0.63	0.00
		2.5	0.96	0.98	0.99	0.83	0.95	0.94	0.95	0.84	0.90	0.89	0.90	0.00	0.78	0.81	0.78	0.00
		5	1.00	1.00	1.00	0.81	1.00	1.00	1.00	0.81	1.00	1.00	1.00	0.00	0.96	0.98	0.96	0.00
		10	1.00	1.00	1.00	0.84	1.00	1.00	1.00	0.81	1.00	1.00	1.00	0.00	0.99	0.99	1.00	0.00
	0.5	0	0.86	0.86	0.84	0.60	0.73	0.70	0.67	0.22	0.62	0.56	0.51	0.00	0.52	0.45	0.39	0.00
		0.5	0.84	0.91	0.92	0.71	0.80	0.80	0.79	0.40	0.70	0.68	0.67	0.00	0.62	0.59	0.56	0.00
		1.25	0.88	1.00	0.97	0.82	0.85	0.88	0.86	0.70	0.76	0.75	0.75	0.00	0.68	0.66	0.64	0.00
		2.5	0.97	1.00	1.00	0.81	0.95	0.97	0.98	0.84	0.90	0.94	0.96	0.00	0.84	0.86	0.87	0.00
		5	1.00	1.00	1.00	0.84	1.00	1.00	1.00	0.81	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
		10	1.00	1.00	1.00	0.84	1.00	1.00	1.00	0.81	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
	1	0	0.85	0.82	0.78	0.58	0.72	0.64	0.58	0.26	0.61	0.50	0.42	0.00	0.52	0.39	0.30	0.00
		0.5	0.84	0.91	0.91	0.71	0.81	0.80	0.79	0.46	0.70	0.69	0.67	0.00	0.64	0.62	0.60	0.00
		1.25	0.87	0.95	0.96	0.82	0.85	0.85	0.85	0.73	0.76	0.76	0.75	0.00	0.71	0.70	0.69	0.00
		2.5	0.97	1.00	1.00	0.82	0.95	0.97	0.98	0.83	0.90	0.94	0.97	0.00	0.86	0.89	0.91	0.00
		5	1.00	1.00	1.00	0.83	1.00	1.00	1.00	0.81	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
		10	1.00	1.00	1.00	0.83	1.00	1.00	1.00	0.81	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
	2	0	0.90	0.90	0.90	0.58	0.87	0.86	0.84	0.33	0.84	0.81	0.78	0.00	0.81	0.77	0.74	0.00
		0.5	0.90	0.93	0.93	0.70	0.88	0.88	0.87	0.54	0.84	0.83	0.81	0.00	0.84	0.82	0.81	0.00
		1.25	0.92	0.97	0.99	0.81	0.90	0.92	0.92	0.77	0.86	0.86	0.86	0.00	0.85	0.85	0.84	0.00
		2.5	0.98	1.00	1.00	0.81	0.97	0.98	1.00	0.81	0.93	0.97	1.00	0.00	0.92	0.96	0.99	0.00
		5	1.00	1.00	1.00	0.82	1.00	1.00	1.00	0.84	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
		10	1.00	1.00	1.00	0.82	1.00	1.00	1.00	0.84	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00

Table 10.6.3.1.2c-2 (cont.)

			β=10°				β=20°				β=30°				β=40°			
			Ns				*Ns*				*Ns*				*Ns*			
ϕ (°)	*B/H*	*b/B*	0	2	4	c'=0	0	2	4	c'=0	0	2	4	c'=0	0	2	4	c'=0
30	0.2	0	0.93	0.92	0.91	0.76	0.65	0.64	0.63	0.39	0.51	0.50	0.48	0.11	0.40	0.37	0.36	0.00
		0.5	0.74	0.81	0.80	0.75	0.70	0.66	0.65	0.50	0.57	0.52	0.49	0.21	0.47	0.42	0.39	0.00
		1.25	0.78	0.85	0.86	0.86	0.74	0.73	0.72	0.72	0.63	0.60	0.59	0.38	0.54	0.50	0.47	0.00
		2.5	0.84	0.92	0.93	0.99	0.81	0.82	0.83	0.94	0.72	0.73	0.74	0.74	0.64	0.62	0.61	0.00
		5	0.95	1.00	1.00	1.00	0.93	0.98	1.00	1.00	0.88	0.95	1.00	0.97	0.80	0.85	0.87	0.00
		10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
	0.5	0	0.79	0.79	0.78	0.70	0.63	0.59	0.55	0.36	0.50	0.43	0.39	0.13	0.39	0.32	0.27	0.00
		0.5	0.76	0.87	0.87	0.74	0.72	0.71	0.70	0.51	0.58	0.56	0.54	0.24	0.49	0.46	0.43	0.00
		1.25	0.79	0.85	0.92	0.87	0.75	0.73	0.76	0.72	0.63	0.62	0.61	0.45	0.54	0.52	0.50	0.00
		2.5	0.87	0.91	1.00	0.99	0.84	0.85	0.90	0.98	0.74	0.78	0.80	0.80	0.67	0.70	0.71	0.00
		5	0.97	1.00	1.00	1.00	0.95	1.00	1.00	1.00	0.90	1.00	1.00	1.00	0.85	0.94	0.98	0.00
		10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
	1	0	0.79	0.75	0.73	0.67	0.63	0.53	0.49	0.41	0.55	0.41	0.35	0.24	0.48	0.33	0.26	0.00
		0.5	0.78	0.87	0.89	0.74	0.75	0.74	0.74	0.51	0.64	0.62	0.60	0.35	0.59	0.56	0.54	0.00
		1.25	0.81	0.90	0.91	0.88	0.78	0.78	0.78	0.72	0.68	0.67	0.66	0.58	0.64	0.62	0.61	0.00
		2.5	0.88	0.99	1.00	0.96	0.85	0.90	0.92	0.95	0.78	0.81	0.84	0.88	0.75	0.78	0.80	0.00
		5	0.97	1.00	1.00	1.00	0.96	1.00	1.00	1.00	0.92	1.00	1.00	1.00	0.89	0.98	1.00	0.00
		10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
	2	0	0.88	0.88	0.87	0.65	0.87	0.85	0.83	0.48	0.85	0.82	0.80	0.38	0.83	0.80	0.76	0.00
		0.5	0.89	0.91	0.91	0.75	0.89	0.89	0.87	0.58	0.88	0.86	0.84	0.51	0.87	0.85	0.82	0.00
		1.25	0.90	0.92	0.93	0.88	0.90	0.90	0.90	0.75	0.89	0.87	0.87	0.70	0.89	0.87	0.86	0.00
		2.5	0.97	1.00	1.00	1.00	0.96	0.97	0.98	0.98	0.92	0.94	0.96	0.95	0.91	0.92	0.94	0.00
		5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
		10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
40	0.2	0	0.69	0.69	0.69	0.78	0.51	0.48	0.47	0.37	0.37	0.33	0.30	0.16	0.27	0.23	0.20	0.05
		0.5	0.65	0.73	0.71	0.74	0.60	0.55	0.53	0.38	0.64	0.38	0.35	0.25	0.34	0.29	0.25	0.13
		1.25	0.68	0.77	0.75	0.86	0.63	0.60	0.58	0.55	0.74	0.44	0.42	0.39	0.39	0.34	0.31	0.25
		2.5	0.72	0.83	0.84	1.00	0.68	0.68	0.68	0.76	0.87	0.53	0.53	0.62	0.45	0.43	0.41	0.48
		5	0.80	0.93	0.95	1.00	0.76	0.82	0.85	1.00	1.00	0.72	0.76	1.00	0.57	0.61	0.63	0.94
		10	0.94	1.00	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.76	0.93	1.00	1.00
	0.5	0	0.67	0.69	0.67	0.69	0.50	0.45	0.43	0.35	0.36	0.30	0.26	0.17	0.27	0.20	0.17	0.07
		0.5	0.68	0.81	0.81	0.73	0.63	0.62	0.61	0.46	0.47	0.44	0.41	0.25	0.39	0.35	0.32	0.09
		1.25	0.70	0.82	0.84	0.85	0.65	0.65	0.66	0.60	0.51	0.49	0.47	0.40	0.43	0.41	0.39	0.18
		2.5	0.76	0.92	0.96	1.00	0.72	0.77	0.80	0.81	0.59	0.62	0.63	0.60	0.54	0.56	0.56	0.37
		5	0.84	1.00	1.00	1.00	0.81	0.91	0.94	1.00	0.71	0.82	0.88	1.00	0.67	0.77	0.83	0.84
		10	0.96	1.00	1.00	1.00	0.94	1.00	1.00	1.00	0.89	1.00	1.00	1.00	0.86	1.00	1.00	1.00
	1	0	0.69	0.64	0.62	0.70	0.63	0.48	0.43	0.45	0.58	0.39	0.33	0.32	0.54	0.33	0.27	0.24
		0.5	0.77	0.81	0.82	0.74	0.75	0.73	0.72	0.49	0.71	0.66	0.62	0.38	0.68	0.62	0.57	0.30
		1.25	0.78	0.84	0.85	0.84	0.77	0.76	0.75	0.64	0.73	0.69	0.66	0.55	0.71	0.66	0.63	0.48
		2.5	0.83	0.92	0.95	1.00	0.81	0.85	0.87	0.85	0.76	0.78	0.79	0.76	0.75	0.76	0.77	0.72
		5	0.89	1.00	1.00	1.00	0.87	0.95	0.98	1.00	0.80	0.90	0.95	1.00	0.80	0.89	0.94	1.00
		10	0.98	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.94	1.00	1.00	1.00	0.93	1.00	1.00	1.00
	2	0	0.93	0.92	0.89	0.45	0.92	0.90	0.87	0.60	0.91	0.88	0.84	0.53	0.89	0.85	0.81	0.47
		0.5	0.93	0.95	0.93	0.76	0.93	0.92	0.90	0.65	0.92	0.89	0.87	0.64	0.92	0.89	0.86	0.60
		1.25	0.93	0.95	0.94	0.86	0.93	0.93	0.92	0.78	0.93	0.91	0.89	0.74	0.93	0.90	0.88	0.74
		2.5	0.94	0.99	1.00	1.00	0.94	0.98	0.98	0.92	0.94	0.97	0.97	0.87	0.94	0.96	0.96	0.88
		5	0.95	1.00	1.00	1.00	0.96	1.00	1.00	1.00	0.98	1.00	1.00	1.00	0.96	1.00	1.00	1.00
		10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00

Project: Sand Mill Road Bridge over Dry Brook (C-10-002)
Location: Cheshire, MA
WSE Project No: 2180468
Calculation: 003-Seismic Site Class

Weston & Sampson
55 Walkers Brook Dr., Suite 100, Reading, MA 01867 (HQ)
Tel: 978.532.1900

Calc By: BDG **Check By:** SJB
Date: 3/13/2019 **Date:** 9/23/2021

OBJECTIVE: Estimate the seismic site class and seismic design parameters for the site based on SPT N-values from site borings, using methodology presented in AASHTO (2017) Section 3.10.3.

REFERENCE:
1) AASHTO LRFD Bridge Design Specifications, 7th Edition, 2017.
2) Boring logs BB-1 and BB-2 (refer to report Appendix)

CALCULATIONS:

Assumptions:

1) Soil borings BB-1 and BB1-4 conducted behind each abutment extended into bedrock, and therefore SPT blow counts (N-values) obtained in these borings are adequate to classify the seismic site class. SPT tests were conducted usign a safety hammer, and N-values are corrected for hammer energy. Use "Method B" presented in AASHTO (2017) Section 3.10.3.1.

2) Based on the conditions observed in the borings, site conditions do not warrant site classifications E or F.

Method B: $\bar{N}$ method

The average $\bar{N}$ for the top 100 ft shall be determined as:

$$\bar{N} = \frac{\sum_{i=1}^{n} d_i}{\sum_{i=1}^{n} \frac{d_i}{N_i}}$$

where:

N_i = Standard Penetration Test blow count of a layer (not to exceed 100 blows/ft in the above expression)

(From AASHTO 2017 Section 3.10.3.1)

Hammer Correction = 1.0

1.0 for donut hammer
1.0 for safety hammer
1.3 for auto hammer

Boring BB-1

Top elevation: 1179 ft. (NAVD88)

Soil Strata	SPT Interval Depth		SPT Elevation	SPT N-value	d_i	d_i / N_i
	Top, ft	Bottom, ft	(mid-interval)			
FILL	0	6	1176.0	26	6.0	0.23
	6	8	1172.0	30	2.0	0.07
	8	10	1170.0	16	2.0	0.13
Sand	10	12	1168.0	36	2.0	0.06
	12	14	37.0	37	2.0	0.05
Glacial Till	14	16	1164.0	56	3.5	0.06
	19	21	1159.0	56	5.0	0.09
	24	26	1154.0	145	5.0	0.03
	29	31	1149.0	96	5.0	0.05
	34	36	1144.0	103	5.0	0.05
	39	41	1139.0	77	5.0	0.06
	44	46	1134.0	93	6.0	0.06
	51	53	1127.0	120	5.0	0.04
	54	54.8	1124.6	100	4.5	0.04
	61.1	66.5	1115.2	100	8.6	0.09
	66.5	100	1095.8	100	33.5	0.34

Sum: 100.0 1.46

$\bar{N}$ = 68.7

Note:
1. SPT N-value at 0-2 and 2-4 feet not representative due to cobbles at the bottom of the sampler, and was not considered in this calculation.
2. Soil between bottom of boring and 100 feet was conservatively assumed to be bedrock with an SPT N-value of 100.

Project: Sand Mill Road Bridge over Dry Brook (C-10-002)
Location: Cheshire, MA
WSE Project No: 2180468
Calculation: 003-Seismic Site Class

Weston & Sampson
55 Walkers Brook Dr., Suite 100, Reading, MA 01867 (HQ)
Tel: 978.532.1900

Calc By: BDG **Check By:** SJB
Date: 3/13/2019 **Date:** 9/23/2021

Boring BB-2
Top elevation: 1179 ft. (NAVD88)

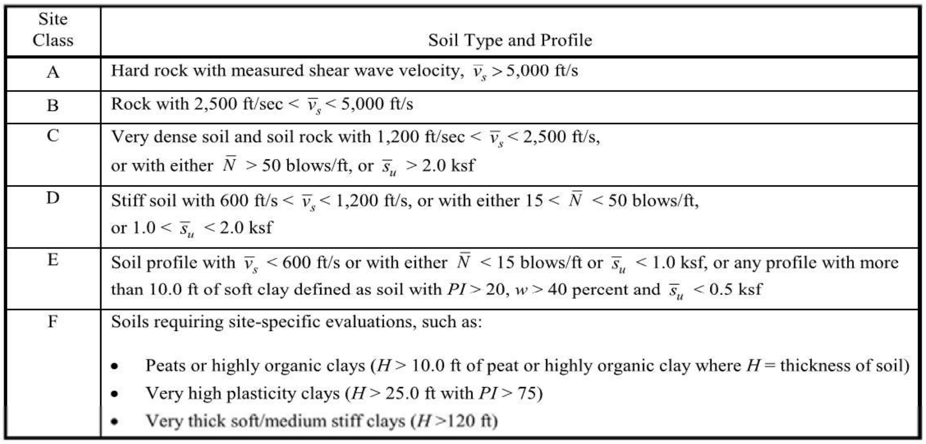
Soil Strata	SPT Interval Depth		SPT Elevation	SPT N-value	d_i	d_i / N_i
	Top, ft	Bottom, ft	(mid-interval)			
Fill	0	6	1176.0	17	6.0	0.35
	6	8	1172.0	10	2.5	0.25
Sand	9	11	1169.0	64	2.5	0.04
	11	13	1167.0	49	2.0	0.04
	13	15	1165.0	15	2.0	0.13
	15	17	1163.0	10	2.0	0.20
	17	19	1161.0	14	2.5	0.18
	20	22	1158.0	14	4.0	0.29
Glacial Till	25	27	1153.0	44	5.0	0.11
	30	32	1148.0	42	5.0	0.12
	35	37	1143.0	54	3.5	0.06
	37	100	1110.5	50	63.0	1.26

Sum: 100.0 3.04

$\bar{N}$ = 32.9

Notes: 1. SPT N-value at 0-2 and 2-4 feet not representative due to cobbles at the bottom of the sampler, and was not considered in this calculation.
2. Soil between 50 and 100 feet was conservatively assumed to be glacial till/berodck with an SPT N-value of 50.

Table 3.10.3.1-1—Site Class Definitions



Site Class	Soil Type and Profile
A	Hard rock with measured shear wave velocity, $\bar{v}_s > 5{,}000$ ft/s
B	Rock with 2,500 ft/sec < $\bar{v}_s$ < 5,000 ft/s
C	Very dense soil and soil rock with 1,200 ft/sec < $\bar{v}_s$ < 2,500 ft/s, or with either $\bar{N}$ > 50 blows/ft, or $\bar{s}_u$ > 2.0 ksf
D	Stiff soil with 600 ft/s < $\bar{v}_s$ < 1,200 ft/s, or with either 15 < $\bar{N}$ < 50 blows/ft, or 1.0 < $\bar{s}_u$ < 2.0 ksf
E	Soil profile with $\bar{v}_s$ < 600 ft/s or with either $\bar{N}$ < 15 blows/ft or $\bar{s}_u$ < 1.0 ksf, or any profile with more than 10.0 ft of soft clay defined as soil with $PI > 20$, $w > 40$ percent and $\bar{s}_u$ < 0.5 ksf
F	Soils requiring site-specific evaluations, such as: • Peats or highly organic clays ($H > 10.0$ ft of peat or highly organic clay where H = thickness of soil) • Very high plasticity clays ($H > 25.0$ ft with $PI > 75$) • Very thick soft/medium stiff clays ($H > 120$ ft)

Based on AASHTO Table 3.10.3.1-1, the Site Class is D

Project:	Sand Mill Road Bridge over Dry Brook (C-10-002)
Location:	Cheshire, MA
WSE Project No:	2180468
Calculation:	004A-Settlement Analysis (North Abutment)

Calc. By:	BDG	3/15/2019
Check By:	SJB	3/15/2019

Objective: Estimate maximum service limit bearing pressures to limit the East abutment settlement to 0.5 to 1.25 inch.

References: 1. AASHTO LRFD Bridge Design Specifications, Eighth Edition, September 2017

Assumptions: Based on boring BB-2 and our understanding of the bearing elevation for the proposed abutment footings, the foundation soils generally consisted of medium dense fine to coarse sand with trace to some gravel and trace silt for the north abutment. Corrected SPT values (N160) for the north abutment foundation soils ranged from 15 to 45 blows per foot for soils within about 2B below the abutment footing (See Calc-001). For this calculation, assume an average N160 of 30 b.p.f. for the north abutment.

Inputs:

Abutment Geometry:

L =	30	ft	footing length
B =	12	ft	footing width
Df =	4	ft	footing embedment depth
Dw =	0	ft	depth to groundwater
σ'_v	230.4	psf	effective stress at bottom of footing

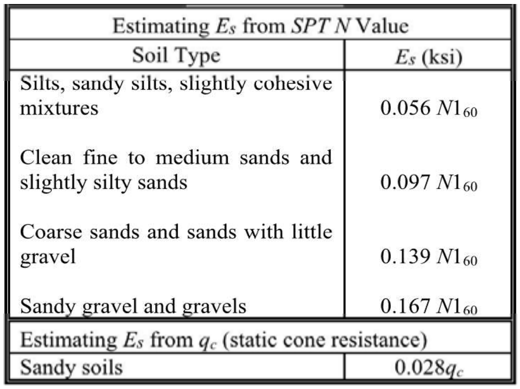
Soil Properties

g_w =	62.4	pcf	Unit weight of water
g =	120	pcf	unit weight of dry soil
g' =	57.6	pcf	effective unit weight of soil
φ_f' =	33	°	Friction angle of foundation soils
$N1_{60}$	30		Average $N1_{60}$ value for soils within 2B below foundation depth
v =	0.3		Poisson's ratio (Based on AASHTO Table C10.4.6.3.1)

Estimate Young's Modulus based on N-value Correlations:

Es = 0.139*$N1_{60}$ (Based on AASHTO Table C10.4.6.3.1 correlations with $N1_{60}$ value for coarse sands and sands with little gravel)

Es = 4.17 ksi



Estimating *Es* from *SPT N* Value	
Soil Type	*Es* (ksi)
Silts, sandy silts, slightly cohesive mixtures	0.056 $N1_{60}$
Clean fine to medium sands and slightly silty sands	0.097 $N1_{60}$
Coarse sands and sands with little gravel	0.139 $N1_{60}$
Sandy gravel and gravels	0.167 $N1_{60}$
Estimating *Es* from q_c (static cone resistance)	
Sandy soils	0.028q_c

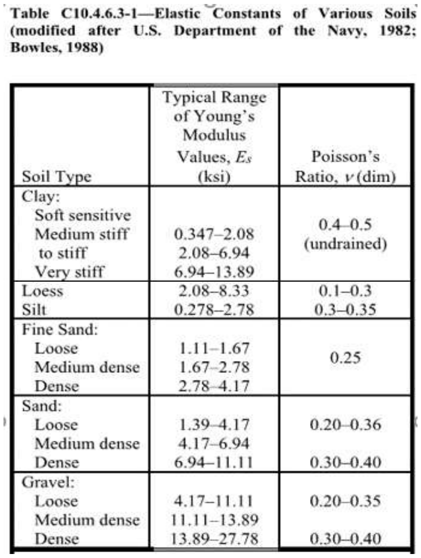


Table C10.4.6.3-1—Elastic Constants of Various Soils (modified after U.S. Department of the Navy, 1982; Bowles, 1988)

Soil Type	Typical Range of Young's Modulus Values, *Es* (ksi)	Poisson's Ratio, *v* (dim)
Clay:		
Soft sensitive	0.347–2.08	0.4–0.5 (undrained)
Medium stiff to stiff	2.08–6.94	
Very stiff	6.94–13.89	
Loess	2.08–8.33	0.1–0.3
Silt	0.278–2.78	0.3–0.35
Fine Sand:		
Loose	1.11–1.67	0.25
Medium dense	1.67–2.78	
Dense	2.78–4.17	
Sand:		
Loose	1.39–4.17	0.20–0.36
Medium dense	4.17–6.94	
Dense	6.94–11.11	0.30–0.40
Gravel:		
Loose	4.17–11.11	0.20–0.35
Medium dense	11.11–13.89	
Dense	13.89–27.78	0.30–0.40

Calculations:

Interpolate Rigidity Factor from AASHTO (2017) Table 10.6.2.4.2-1

β_z = 1.13

L/B = 2.5

L/B =	2	2.5	3
β_z =	1.1	**1.13**	1.15

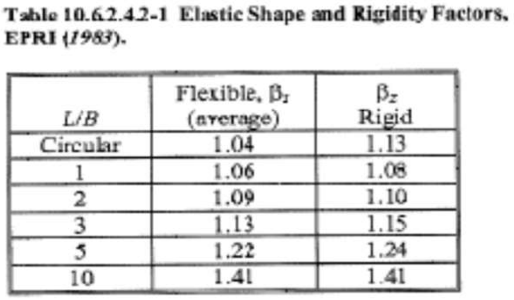


Table 10.6.2.4.2-1 Elastic Shape and Rigidity Factors, EPRI (*1983*).

L/B	Flexible, β_z (average)	β_z Rigid
Circular	1.04	1.13
1	1.06	1.08
2	1.09	1.10
3	1.13	1.15
5	1.22	1.24
10	1.41	1.41

Estimate the vertical stress increase (q0) for various magnitude settlement, using elastic half space method in accordance with AASTHO Section 10.6.2.4.2

$$S_e = \frac{\left[q_o\left(1-\nu^2\right)\sqrt{A'}\right]}{144\ E_s\beta_z} \qquad (10.6.2.4.2\text{-}1)$$

Eccentricity and Effective Footing Width (1)			**Effective Footing Area (L*B')**	**q_0 for various amounts of settlement**			
				S_e = 0.5 in	**S_e = 0.75 in**	**S_e = 1.0 in**	**S_e = 1.25 in**
e/B	**e (ft)**	**B' (ft)**	**A' (ft^2)**	**q0 (ksf)**	**q0 (ksf)**	**q0 (ksf)**	**q0 (ksf)**
0.00	0.00	12.00	360.0	1.9	2.7	3.5	4.3
0.02	0.25	11.50	345.0	1.9	2.7	3.6	4.4
0.04	0.50	11.00	330.0	1.9	2.8	3.6	4.5
0.06	0.75	10.50	315.0	2.0	2.8	3.7	4.6
0.08	1.00	10.00	300.0	2.0	2.9	3.8	4.7
0.10	1.25	9.50	285.0	2.1	3.0	3.9	4.8
0.13	1.50	9.00	270.0	2.1	3.1	4.0	4.9
0.15	1.75	8.50	255.0	2.2	3.1	4.1	5.1
0.17	2.00	8.00	240.0	2.2	3.2	4.2	5.2
0.19	2.25	7.50	225.0	2.3	3.3	4.4	5.4

Project:	Sand Mill Road Bridge over Dry Brook (C-10-002)
Location:	Cheshire, MA
WSE Project No:	2180468
Calculation:	004B-Settlement Analysis (South Abutment)

Weston & Sampson

Calc. By:	BDG	3/15/2019
Check By:	SJB	3/15/2019

Objective: Estimate maximum service limit bearing pressures to limit the south abutment settlement to 0.5 to 1.25 inch.

References: 1. AASHTO LRFD Bridge Design Specifications, Eighth Edition, September 2017

Assumptions: Based on boring BB-1 and our understanding of the bearing elevation for the abutment footings, the foundation soils within 2B below the footing generally consisted of dense fine to medium sand with little to some silt and little to some gravel, and hard glacial till consisting of sandy silt or silt with some dand and little to some gravel. Corrected SPT values (N160) for the south abutment foundation soils ranged from 62 to greater than 100 blows per foot (See Calc-001). For this calculation, assume an average N160 of 90 b.p.f. for the south abutment.

Inputs:

Abutment Geometry:

L =	30	ft	footing length
B =	12	ft	footing width
Df =	4	ft	existing footing embedment depth
Dw =	0	ft	depth to groundwater
σ'_v	230.4	psf	effective stress at bottom of footing

Soil Properties

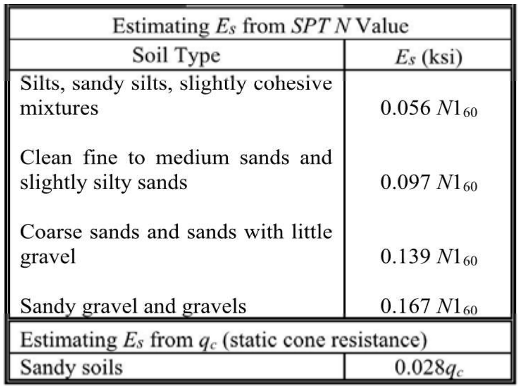
g_w =	62.4	pcf	Unit weight of water
g =	120	pcf	unit weight of dry soil
g' =	57.6	pcf	effective unit weight of soil
φ_f' =	35	°	Friction angle of foundation soils
$N1_{60}$	90		Average $N1_{60}$ value for soils within 2B below foundation depth
v =	0.3		Poisson's ratio (Based on AASHTO Table C10.4.6.3.1)

Estimate Young's Modulus based on N-value Correlations:

Es = .056 N160

Es = 5.04 ksi

(Based on AASHTO Table C10.4.6.3.1 correlations with $N1_{60}$ value for fine to medium sands)



Estimating E_S from SPT N Value	
Soil Type	E_S (ksi)
Silts, sandy silts, slightly cohesive mixtures	$0.056\ N1_{60}$
Clean fine to medium sands and slightly silty sands	$0.097\ N1_{60}$
Coarse sands and sands with little gravel	$0.139\ N1_{60}$
Sandy gravel and gravels	$0.167\ N1_{60}$
Estimating E_S from q_c (static cone resistance)	
Sandy soils	$0.028q_c$

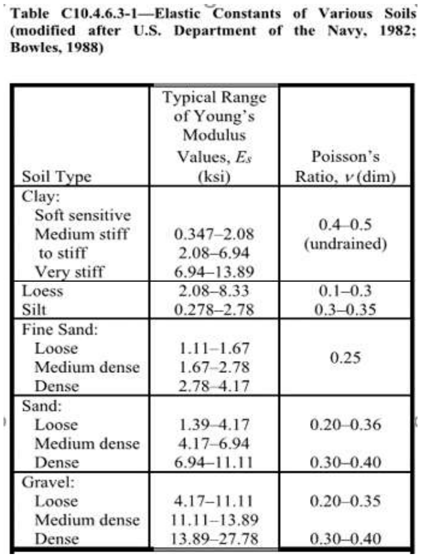


Table C10.4.6.3-1—Elastic Constants of Various Soils (modified after U.S. Department of the Navy, 1982; Bowles, 1988)

Soil Type	Typical Range of Young's Modulus Values, E_s (ksi)	Poisson's Ratio, ν (dim)
Clay:		0.4–0.5 (undrained)
Soft sensitive	0.347–2.08	
Medium stiff to stiff	2.08–6.94	
Very stiff	6.94–13.89	
Loess	2.08–8.33	0.1–0.3
Silt	0.278–2.78	0.3–0.35
Fine Sand:		0.25
Loose	1.11–1.67	
Medium dense	1.67–2.78	
Dense	2.78–4.17	
Sand:		
Loose	1.39–4.17	0.20–0.36
Medium dense	4.17–6.94	
Dense	6.94–11.11	0.30–0.40
Gravel:		
Loose	4.17–11.11	0.20–0.35
Medium dense	11.11–13.89	
Dense	13.89–27.78	0.30–0.40

Calculations:

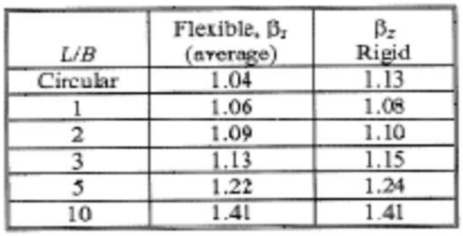
Interpolate Rigidity Factor from AASHTO (2017) Table 10.6.2.4.2-1

β_z = 1.13

L/B = 2.5

L/B =	2	2.5	3
β_z =	1.1	**1.13**	1.15

Table 10.6.2.4.2-1 Elastic Shape and Rigidity Factors, EPRI (*1983*).



L/B	Flexible, β_z (average)	β_z Rigid
Circular	1.04	1.13
1	1.06	1.08
2	1.09	1.10
3	1.13	1.15
5	1.22	1.24
10	1.41	1.41

Estimate the vertical stress increase (q0) for various magnitude settlement, using elastic half space method in accordance with AASTHO Section 10.6.2.4.2

$$S_e = \frac{\left[q_o\left(1-\nu^2\right)\sqrt{A'}\right]}{144\ E_s\beta_z} \qquad (10.6.2.4.2\text{-}1)$$

Eccentricity and Effective Footing Width (1)			**Effective Footing Area (L*B')**	**q_0 for various amounts of settlement**			
				S_e = 0.5 in	**S_e = 0.75 in**	**S_e = 1.0 in**	**S_e = 1.25 in**
e/B	**e (ft)**	**B' (ft)**	**A' (ft^2)**	**q0 (ksf)**	**q0 (ksf)**	**q0 (ksf)**	**q0 (ksf)**
0.00	0.00	12.00	360.0	2.2	3.2	4.2	5.2
0.02	0.25	11.50	345.0	2.2	3.2	4.3	5.3
0.04	0.50	11.00	330.0	2.3	3.3	4.3	5.4
0.06	0.75	10.50	315.0	2.3	3.4	4.4	5.5
0.08	1.00	10.00	300.0	2.4	3.5	4.5	5.6
0.10	1.25	9.50	285.0	2.4	3.6	4.7	5.8
0.13	1.50	9.00	270.0	2.5	3.6	4.8	5.9
0.15	1.75	8.50	255.0	2.6	3.7	4.9	6.1
0.17	2.00	8.00	240.0	2.6	3.9	5.1	6.3
0.19	2.25	7.50	225.0	2.7	4.0	5.2	6.5

Project Number: 2180468
Project Name: Sand Mill Road Bridge over Dry Brook, Cheshire, MA
Calculation: 005-Lateral Earth Pressures for Temp SOE

Weston & Sampson

Calc. By:	BDG	3/18/2019
Check By:	SJB	10/20/2020

Objective: Estimate the lateral earth pressures to use for temporary earth support design of the Sand Mill Road Bridge project

References: Das, Braja M. (1990). Principles of Foundation Engineering- Second Edition

$$K_a = \frac{sin^2(\beta+\phi)}{\sin^2\beta * \sin(\beta-\delta)\left[1+\sqrt{\frac{\sin(\phi+\delta)*\sin(\phi-\alpha)}{\sin(\beta-\delta)*\sin(\alpha+\beta)}}\right]^2} = \frac{A}{B\left[1+\sqrt{\frac{C}{D}}\right]^2}$$

Das, Eq. 5.19 on page 265

$$K_p = \frac{sin^2(\beta-\phi)}{\sin^2\beta * \sin(\beta+\delta)\left[1-\sqrt{\frac{\sin(\phi+\delta)*\sin(\phi+\alpha)}{\sin(\beta+\delta)*\sin(\alpha+\beta)}}\right]^2} = \frac{E}{F\left[1+\sqrt{\frac{G}{H}}\right]^2}$$

Das, Eq. 5.27 on page 273

γ_{water} (pcf) = 62.4

	Degrees	Radians	
Angle of wall, β	90	1.570796	
Angle of Internal Friction, φ	30	0.523599	
Wall Friction, δ	0	0	
slope angle, α	0	0	
A = 0.7500		E =	0.7500
B = 1.0000		F =	1.0000
C = 0.2500		G =	0.2500
D = 1.0000		H =	1.0000

Existing Fill

γ (pcf) =	125
γ' (pcf) =	62.6
Ka =	0.33
Ko =	0.50
Kp =	3.00

	Degrees	Radians	
Angle of wall, β	90	1.570796	
Angle of Internal Friction, φ	33	0.575959	
Wall Friction, δ	0	0	
slope angle, α	0	0	
A = 0.7034		E =	0.7034
B = 1.0000		F =	1.0000
C = 0.2966		G =	0.2966
D = 1.0000		H =	1.0000

Native Sand

Alluvial Deposits

γ (pcf) =	120
γ' (pcf) =	57.6
Ka =	0.29
Ko =	0.46
Kp =	3.39

	Degrees	Radians	
Angle of wall, β	90	1.570796	
Angle of Internal Friction, ϕ	35	0.610865	
Wall Friction, δ	0	0	
slope angle, α	0	0	
A = 0.6710		E =	0.6710
B = 1.0000		F =	1.0000
C = 0.3290		G =	0.3290
D = 1.0000		H =	1.0000

Glacial Till	
γ (pcf) =	125
γ' (pcf) =	62.6
Ka =	0.27
Ko =	0.43
Kp =	3.69

Weston & Sampson

CALCULATION AND ANALYSIS SHEET

Project No.: 2180468 Page **1** of **3**

Project Name: Sand Mill Road Bridge over Dry Brook, Cheshire MA

Calculation No.: Calc-006 **Rev.:** 0

Calculation Title: Global Stability Analysis

1.0 OBJECTIVE

Document the model geometry, stratigraphy, and soil parameters used in Slide for global stability analysis at the Sand Mill Road bridge over Dry Brook in Cheshire, MA.

2.0 SURFACE AND SUBSURFACE PROFIILE

The surface and subsurface profile have been developed based on the observations at borings BB-1, BB-2A and BB-2B. Proposed abutment geometry is based on the schematic drawings included in the August 2021 Bridge Type Selection Worksheet by Weston & Sampson (see *Attachment 1*).

We analyzed a conservative groundwater condition, assuming a dry channel, and groundwater behind the abutment at the Ordinary High Water level (El. 1170).

3.0 STRENGTH PARAMETERS

The strength parameters are summarized in Table 3-3 of the Geotechnical Report, copied below.

Soil Type	Unit Weight, γ (pcf)	Effective Friction Angle, ϕ (°)	Effective Cohesion, c (psf)
New Gravel Borrow Fill	125	35	0
Sand	120	33	0
Glacial Till	125	35	0

4.0 LOADS

Superstructure loads:
Based on preliminary estimates provided by Weston & Sampson's structural engineers on June 24, 2020 (see *Attachment 2*), unfactored superstructure dead loads are approximately 5.1 klf and live loads are approximately 4 klf on each abutment. Factored Loads for the Strength Limit are approximately 6.6 klf (dead loads) and 7.1 klf (live loads) on each abutment.

Live Loads on Approach:
A Live Load Surcharge (LS) was applied behind the wall. Per AASHTO (2020) Table 3.11.6.4-1, unfactored LS was computed based on an equivalent soil height (h_{eq}) of 3 feet for a 10-ft high abutment:

Calc. By: S. Bridges, 9/23/2021

Checked by: D. Dwyer 9/24/2021

CALCULATION AND ANALYSIS SHEET

Project No.: 2180468 Page **2** of **3**

Project Name: Sand Mill Road Bridge over Dry Brook, Cheshire MA

Calculation No.: Calc-006 **Rev.:** 0

Calculation Title: Global Stability Analysis

$LS = \gamma_s * h_{eq} = 125 \text{ pcf} * 3\text{ft} = 375 \text{ psf}$

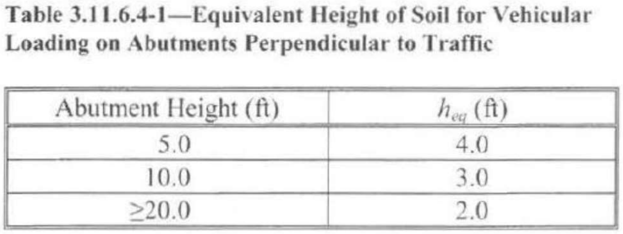


Table 3.11.6.4-1—Equivalent Height of Soil for Vehicular Loading on Abutments Perpendicular to Traffic

Abutment Height (ft)	h_{eq} (ft)
5.0	4.0
10.0	3.0
≥20.0	2.0

Seismic Loads:
Seismic loading is applied using a pseudo-static analysis methods, assuming a horizontal seismic coefficient equal to 0.5 times the site modified PGA (PGA_M). PGA_M is equal to F_{PGA} x PGA (1.6 x 0.057) = 0.09 (refer to Calc-003). Therefore, our analysis used a horizontal seismic coeffient of 0.045. Seismic loading is evaluated under the Extreme Limit state.

Summary of Loads

The table below summarizes the loads used in our analyses:

Load Type	Unfactored Load	Strength 1		Extreme 1	
		Load Factor[(1)]	Factored Load	Load Factor[(1)]	Factored Load
Superstructure DL	5.1 klf	See Attach. 2	6.6 klf	1.0	5.1
Superstructure LL	4.0 klf	See Attach. 2	7.1 klf	1.0	4.0
Total Superstructure Load:	9.1	N/A	13.7 klf	N/A	9.1 klf
Live Load Surcharge (LS)	375 psf	1.75	656 psf	1.0	375 psf

(1) Based on AASHTO (2020) Table 3.4.1-1

5.0 TARGET FACTOR OF SAFETY

Per AASHTO Section 11.6.3.7, where subsurface conditions are well defined, overall stability should be evaluated at the Strength 1 loading condition using a resistance factor,φ, of 0.75 for the Strength Limit which corresponds to a target factor of safety of about 1.3. Per section 11.5.8, a resistance factor of 0.9 is used for the Extreme Limit, which corresponds to a target factor of safety of 1.1.

Calc. By: S. Bridges, 9/23/2021

Checked by: D. Dwyer 9/24/2021

CALCULATION AND ANALYSIS SHEET

Project No.: 2180468 Page **3** of **3**

Project Name: Sand Mill Road Bridge over Dry Brook, Cheshire MA

Calculation No.: Calc-006 **Rev.:** 0

Calculation Title: Global Stability Analysis

6.0 RESULTS

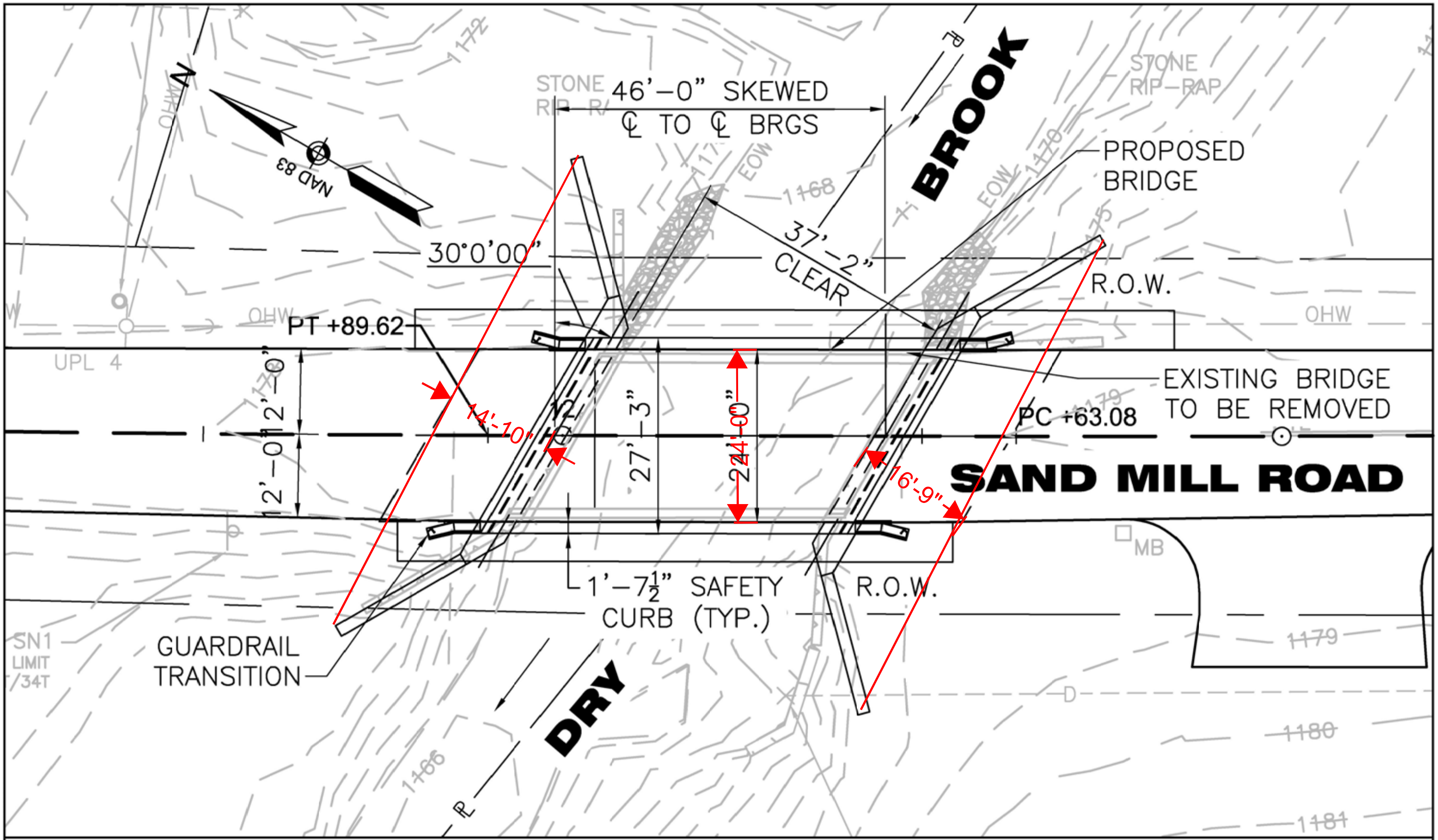
We used the slope stability program Slide2 by Rocscience to calculate the factor of safety (FS) for sliding failure using non-circular, optimized failure surfaces and Spencer's method of analysis. The program output is included in ***Attachment 3.***

Computed Factor of Safety

Analysis	Computed FS	Target FS
Static (Strength Limit)	1.5	1.3
Seismic (Extreme Limit)	1.5	1.1

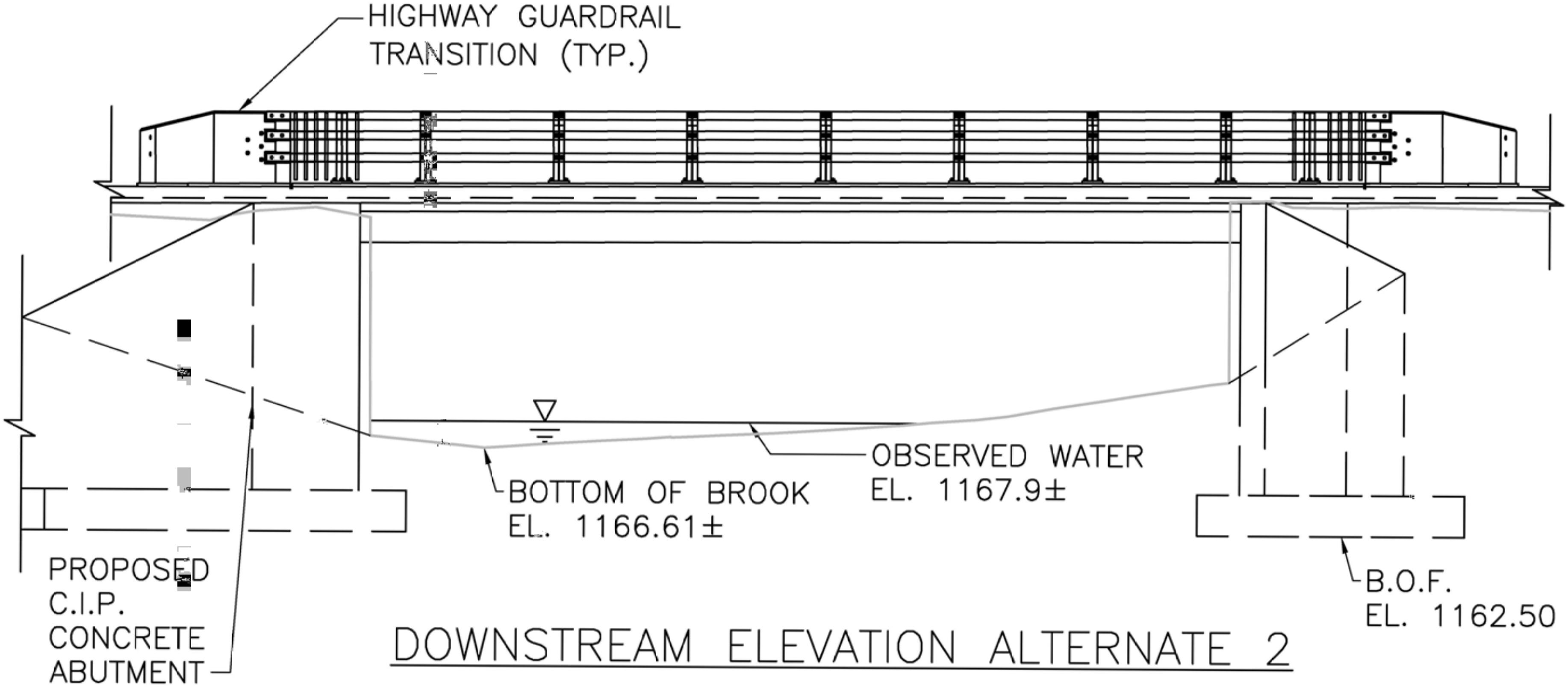
Calc. By: S. Bridges, 9/23/2021

Checked by: D. Dwyer 9/24/2021



PROPOSED PLAN VIEW - ALTERNATIVE 1
STEEL STRINGER WITH COMPOSITE CONCRETE DECK
BRIDGE NO. C-10-002
SAND MILL ROAD OVER DRY BROOK
CHESHIRE, MASSACHUSETTS
SCALE: 1" = 20'-0"

Weston & Sampson



DOWNSTREAM ELEVATION ALTERNATE 2

SCALE: ⅛" = 1'–0"

DOWNSTREAM ELEVATION - ALTERNATIVE 2
VOIDED SLAB BUTTED DECK BEAM WITH COMPOSITE DECK
BRIDGE NO. C-10-002
SAND MILL ROAD OVER DRY BROOK
CHESHIRE, MASSACHUSETTS
SCALE: AS NOTED

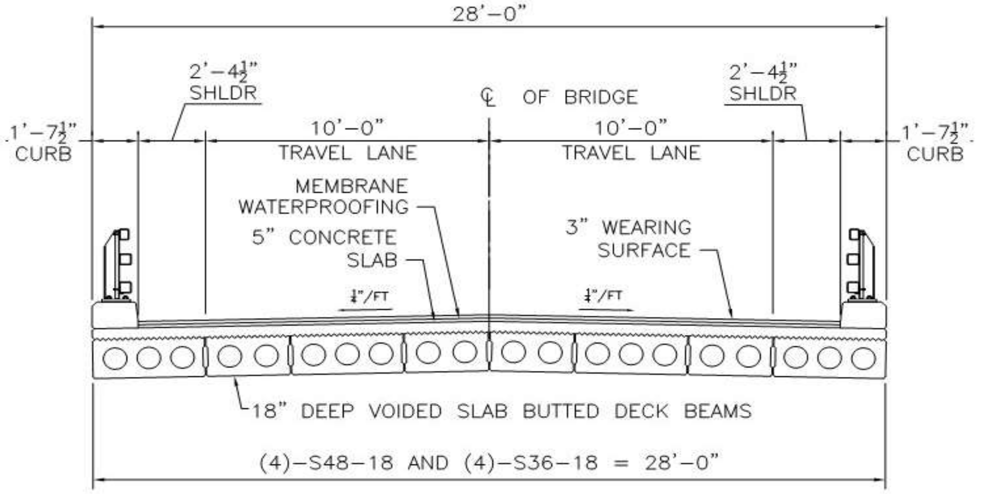
Weston & Sampson

Weston & Sampson

CITY: CHESHIRE
JOB NO.:
CARRIES: Sand Mill Road
CALCULATED BY: MAC DATE: 6.24.20
CHECKED BY: DATE:
OVER: Dry Brook
BRIDGE NO.: C-10-002

PRELIMINARY LOADS FOR GEOTECH

Superstructure loads are based on the Alternative Section Below (Heavier than steel stringers)
Only vertical loads calc'ed for Superstructure and Substructure.
Substructure is assumed to be cast-in-place on spread footings



Bridge Geometry

bridge span	46.0	ft	skew dim.
overall beam lengths	47.3	ft	skew dim.
bridge width	28.0	ft	normal width
curb width	1.625	ft	
pavement width	24.75	ft	
El. Bottom Footing	1162.50	ft	Proposed
El. Finish Grade	1178.99	ft	From profile
Abutment length	35.80	ft	based on 30 degree skew

AASHTO LOAD FACTORS

DC	1.25
DW	1.5
LL	1.75
EV	1.35

PRELIMINARY LOADS FOR GEOTECH

Calculate the Superstructure Dead Loads / Abutment - DL

Beams

3 foot beams			
length	47.3	ft	
unit weight	483	lbs/ft	
quantity	4	EA	
Total	91.4	kips	
4 foot beams			
length	47.3	ft	
unit weight	626	lbs/ft	
quantity	4	EA	
Total	118.4	kips	
EA. Abutment	104.9	kips	DL BEAMS / Abutment

Concrete Overlay

averge thickness	0.42	ft	
width	28	ft	
length	47.3	ft	
Total	82.8	kips	
EA. Abutment	41.4	kips	DL OVERLAY / Abutment

Concrete Curbs

averge thickness	0.96	ft	
width	1.625	ft	
length	47.3	ft	
Total	22.1	kips	
EA. Abutment	11.0	kips	DL CURB / Abutment

Bridge Guardrail

length	53.3	ft	
unit weight	85	lbs/ft	
quantity	2	EA	
Total	9.1	kips	
EA. Abutment	4.5	kips	DL GR / Abutment

Bituminous Pavement - DW

averge thickness	0.25	ft	
width	24.75	ft	
length	47.3	ft	
Total	41.0	kips	
EA. Abutment	20.5	kips	DL PAVEMENT / Abutment

Max $SSDC_{unfact}$	161.9	kip	DC Load
Max $SSDC_{unfact}$	4.5	kip/ft	DC Load / ft of Abutment
Max DW_{unfact}	20.5	kip	DW Load
Max DW_{unfact}	0.57	kip/ft	DW Load / ft of Abutment

PRELIMINARY LOADS FOR GEOTECH

Calculate the Superstructure Live Loads / Abutment - LL

AASHTO Loading HL-93

design span	46.0	ft
# of lanes	2	

Design Truck			***Design Tandem***			***Design Lane***		
a_1	8	kip	ta_1	25	kip	lane	0.64	klf
a_2	32	kip	ta_2	25	kip	width	10	ft
a_3	32	kip						
s_1	14	ft	ts_1	4	ft			
s_2	14	ft						
IM	1.0	Substructure	IM	1.0	Substructure	IM	1.0	N/A

Determine the maximum reaction to the abutment for number of lanes considered.

Max reaction from the Design Trucks and Lane

R_{truck}	57.39	kip	per lane / No Impact
R_{tandem}	47.83	kip	per lane / No Impact
R_{lane}	14.72	kip	per lane / No Impact

Multiple Presence Factor 1.00
AASHTO LRFD Table 3.6.1.1.2-1

Max reaction Combinations to the Abutment

$R_{truck + lane}$	144.22	kip	truck combined with lane (IM applied) x 2 Lanes
$R_{tandem + lane}$	125.09	kip	tandem combined with lane (IM applied) x 2 Lanes

LL to the Abutment

Max LL_{unfact}	144.22	kip	applied to abutment
Max LL_{unfact}	4.03	kip/ft	applied to abutment / ft

PRELIMINARY LOADS FOR GEOTECH

Calculate the Substructure Dead Loads / Abutment - DL

Footing Concrete

thickness	2.00	ft	
width	11	ft	
length	35.8	ft	
Total	118.1	kips	

Stem Concrete

width	3.00	ft	
height	12.32	ft	
length	35.8	ft	
Total	198.5	kips	

Approach Slab Concrete

width	24.00	ft	
thickness	0.83	ft	
length	15.0	ft	
Total	22.5	kips	

Earth on Toe and Heel

average width	8.00	ft	
average height	8.22	ft	assume 2/3*H as higher backfill on the heel and less on toe
length	35.8	ft	
Total	294.1	kips	assume 125 pcf for backfill

Max $\text{SUBDC}_{\text{unfact}}$	339.1	kip	DC Load
Max $\text{SUBDC}_{\text{unfact}}$	9.5	kip/ft	DC Load / ft of Abutment
Max $\text{ABUTEV}_{\text{unfact}}$	294.1	kip	EV Load
Max $\text{ABUTEV}_{\text{unfact}}$	8.2	kip/ft	EV Load / ft of Abutment

Calculate the Wingwall Dead Loads - DL

Footing Concrete

thickness	2.00	ft	
width	10	ft	
length	21.0	ft	assumes one wingwall at one corner
Total	63.0	kips	

Wingwall Concrete

width	1.67	ft	
height	10.9933	ft	assumes 2/3 H of the wingwall at corner of bridge
length	20.0	ft	
Total	55.0	kips	

Earth on Toe and Heel

average width	8.33	ft	
average height	7.33	ft	assume 2/3*H as higher backfill on the heel and less on toe
length	21.0	ft	
Total	160.3	kips	assume 125 pcf for backfill

Max $\text{WWDC}_{\text{unfact}}$	118.0	kip	DC Load
Max $\text{WWDC}_{\text{unfact}}$	5.6	kip/ft	DC Load / ft of WW
Max $\text{WWEV}_{\text{unfact}}$	160.3	kip	EV Load
Max $\text{WWEV}_{\text{unfact}}$	7.6	kip/ft	EV Load / ft of WW

PRELIMINARY LOADS FOR GEOTECH

SUMMARY TABLE

Description	Service		Strength 1	
	kip	kip/ft	kip	kip/ft
Superstructure DC	161.9	4.5	202.3	5.7
Superstructure DW	20.5	0.6	30.7	0.9
Live Load LL	144.2	4.0	252.4	7.1
Abutment DC	339.1	9.5	423.9	11.8
Abutment EV	294.1	8.2	397.0	11.1
Total	**959.8**	**26.8**	**1306.4**	**36.5**
Wingwall DC	118.0	5.6	147.5	7.0
Wingwall EV	160.3	7.6	216.4	10.3
Total	**278.3**	**13.3**	**363.9**	**17.3**

AASHTO LOAD FACTORS

DC	1.25
DW	1.5
LL	1.75
EV	1.35

Abutment Line loads based on length of	35.80	ft
Wingwall Line loads based on length of	21.0	ft

LL based on 2 loaded lanes

Eccentricity is assumed to be zero (concentric Loading)

Horizontal Loads not provided.

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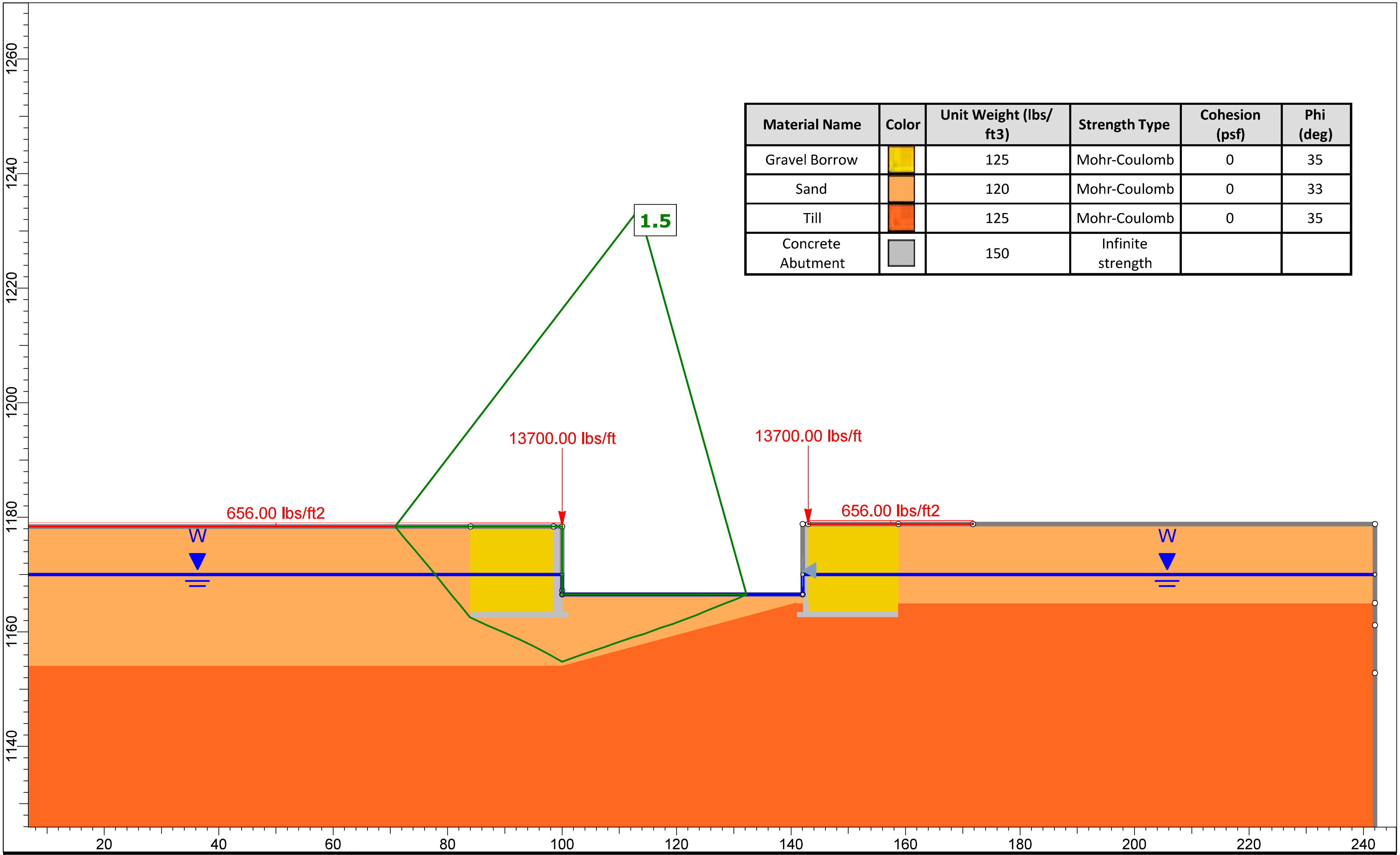
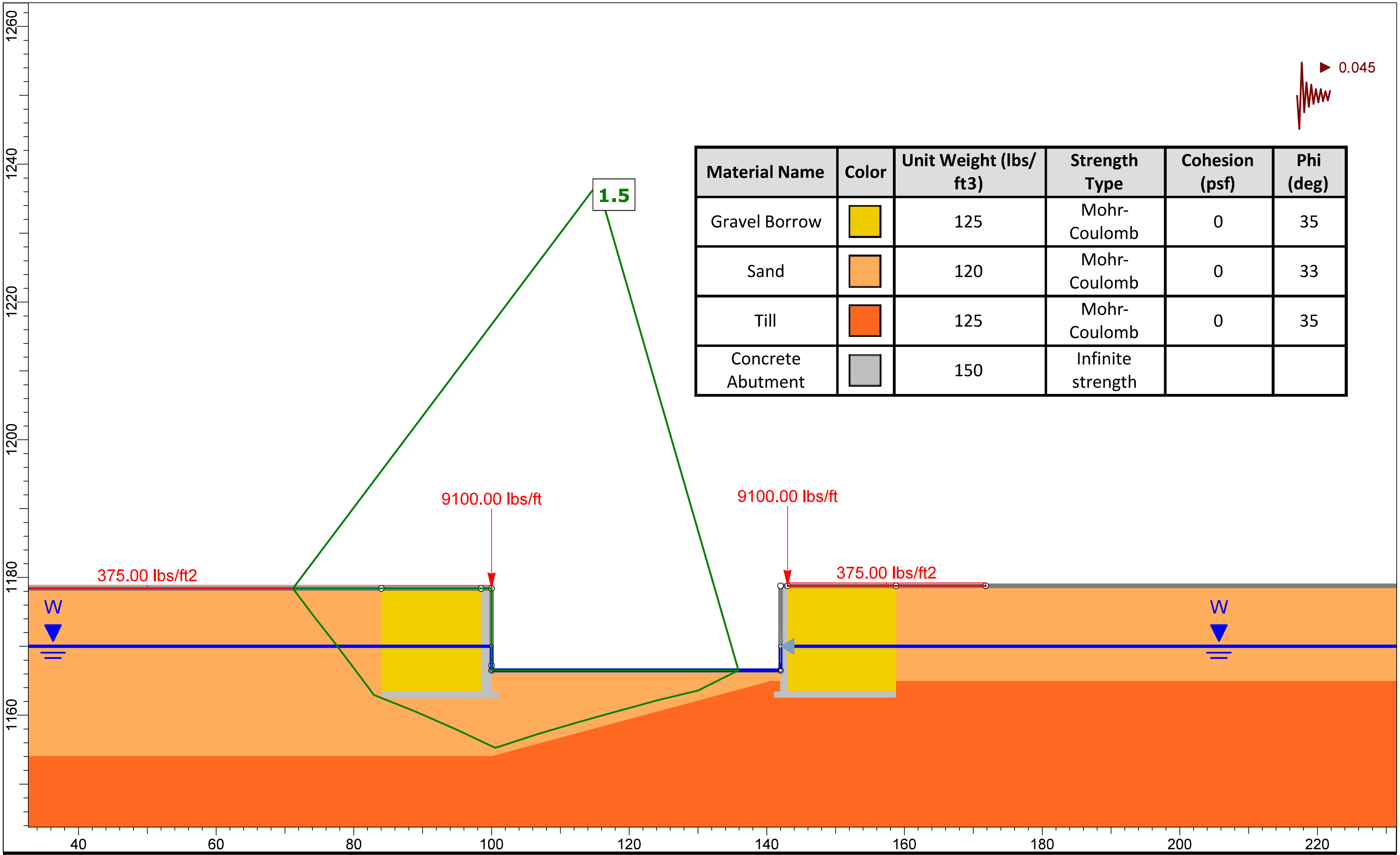


Material Name	Color	Unit Weight (lbs/ ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Gravel Borrow	🟨	125	Mohr-Coulomb	0	35
Sand	🟧	120	Mohr-Coulomb	0	33
Till	🟥	125	Mohr-Coulomb	0	35
Concrete Abutment	⬜	150	Infinite strength		

Weston & Sampson

SLIDEINTERPRET 9.013

Project	Sand Mill Road Bridge over Dry Brook, Cheshire MA		
Group	Group 1	*Scenario*	Normal High Water
Drawn By	S. Bridges	*Company*	Weston & Sampson
Date	September, 2021	*File Name*	Cheshire Bridge_.slmd



Material Name	Color	Unit Weight (lbs/ ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Gravel Borrow	🟨	125	Mohr-Coulomb	0	35
Sand	🟧	120	Mohr-Coulomb	0	33
Till	🟧	125	Mohr-Coulomb	0	35
Concrete Abutment	⬜	150	Infinite strength		

Project	Sand Mill Road Bridge over Dry Brook, Cheshire MA		
Group	Group 1	Scenario	Seismic
Drawn By	S. Bridges	Company	Weston & Sampson
Date	September, 2021	File Name	Cheshire Bridge_.slmd

SLIDEINTERPRET 9.013

Appendix F

"Important Information about this Geotechnical Engineering Report" by GBA, Inc.

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled.* No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be*, and, in general, *if you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying it. A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only.* To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.*

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration.*** Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL
BUSINESS
ASSOCIATION

Telephone: 301/565-2733
e-mail: info@geoprofessional.org www.geoprofessional.org

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DOCUMENT A00804

BRIDGE RATING REPORT

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BRIDGE RATING

Prepared For

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION

CHESHIRE

SAND MILL ROAD

OVER

DRY BROOK

BRIDGE NO. C-10-002 (03G)

STRUCTURE NO. C10002-03G-MUN-NBI

DATE OF INSPECTION: JULY 6, 2020
DATE OF RATING: JANUARY 2015
DATE OF REVISION: JULY 2021

YIHUI F. WU
STRUCTURAL
No. 48038

9/16/2021

PREPARED BY:

Michael Baker
INTERNATIONAL

MICHAEL BAKER INTERNATIONAL
125 Cambridge Park Drive, Suite 502
Cambridge, MA, 02140

BRIDGE RATING

Prepared For

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION HIGHWAY DIVISION

CHESHIRE

SAND MILL ROAD

OVER

DRY BROOK

BRIDGE NO. C-10-002 (03G)

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No. 48038

Wu
9/16/2021

PREPARED BY:

Michael Baker
INTERNATIONAL

MICHAEL BAKER INTERNATIONAL
125 Cambridge Park Drive, Suite 502
Cambridge, MA, 02140

INDEX

SUMMARY OF BRIDGE RATING

TOWN/CITY: **CHESHIRE** BRIDGE NO.: **C-10-002**

CARRIES: **SAND MILL ROAD** OVER: **DRY BROOK**

STRUCTURE NO.: **C10002-03G-MUN-NBI** BIN: **03G**

Allowable Stress Ratings for Load Posting Purposes Load Ratings in English Tons		
VEHICLE TYPE	**INVENTORY**	**OPERATING**
H20	21.4	35.6
TYPE 3	25.9	43.0
TYPE 3S2	40.4	67.4
HS20	28.6	47.5

MS18 Load Factor Ratings in Metric Tons Provided in Compliance with the December 1995 FHWA NBIS Coding Guide			
INVENTORY		**OPERATING**	
Item 66	**MS Equivalent**	**Item 64**	**MS Equivalent**
26.6	MS 14.8	44.4	MS 24.6

COMMONWEALTH OF MASSACHUSETTS
YIHUI P. WU
STRUCTURAL
No. 48038
REGISTERED PROFESSIONAL ENGINEER

Consultant P.E. Stamp

A posting recommendation has been made based on the results of this Rating Report. This recommendation is contained in the " Memorandum to the NBIS File" for this bridge, dated ____________.

State Bridge Engineer Date

BREAKDOWN OF BRIDGE RATING

TOWN/CITY:	**CHESHIRE**	BRIDGE NO.:	**C-10-002**
CARRIES:	**SAND MILL ROAD**	OVER:	**DRY BROOK**
STRUCTURE NO.:	**C10002-03G-MUN-NBI**	BIN NO.:	**03G**

BRIDGE ELEMENT [1]		INVENTORY RATING BY ALLOWABLE STRESS METHOD				OPERATING RATING BY ALLOWABLE STRESS METHOD			
		H20	TYPE 3	TYPE 3S2	HS20	H20	TYPE 3	TYPE 3S2	HS20
Beam 1	Shear Stress @ 0.0L	196.5	221.6	319.5	233.7	276.7	311.9	449.8	329.0
	Flexural Stress @ 0.45L & 0.5L	31.4	38.1	59.4	42.0	52.1	63.0	98.6	69.5
	Flexural Stress @ 30.30' As Inspected	38.5	46.3	74.0	50.5	61.4	73.9	118.1	80.6
Beams 2 & 5	Shear Stress @ 0.0L	98.1	110.6	159.5	116.7	138.2	155.8	224.6	164.3
	Flexural Stress @ 0.45L & 0.5L	**21.4**	**25.9**	**40.4**	**28.6**	**35.6**	**43.0**	**67.4**	**47.5**
Beams 3 & 4	Shear Stress @ 0.0L	98.4	111.0	160.1	117.1	138.5	156.2	225.2	164.7
	Flexural Stress @ 0.45L & 0.5L	21.8	26.4	41.3	29.2	36.0	43.5	68.2	48.1
Beam 6	Shear Stress @ 0.0L As Inspected	195.5	220.4	317.8	232.4	275.2	310.2	447.4	327.2
	Flexural Stress @ 0.45L & 0.5L As Inspected	29.8	36.2	56.5	40.0	50.0	60.4	94.6	66.7

Shaded cells are controlling ratings
Highlighted values are below statutory

Notes:
1. For this report, beams are numbered from the east consistent with the latest Routine Inspection Report.
2. Ratings for 0.45L & 0.5L are combined in the breakdown tables because they are very close in value.

BREAKDOWN OF BRIDGE RATING

TOWN/CITY: **CHESHIRE** BRIDGE NO.: **C-10-002**

CARRIES: **SAND MILL ROAD** OVER: **DRY BROOK**

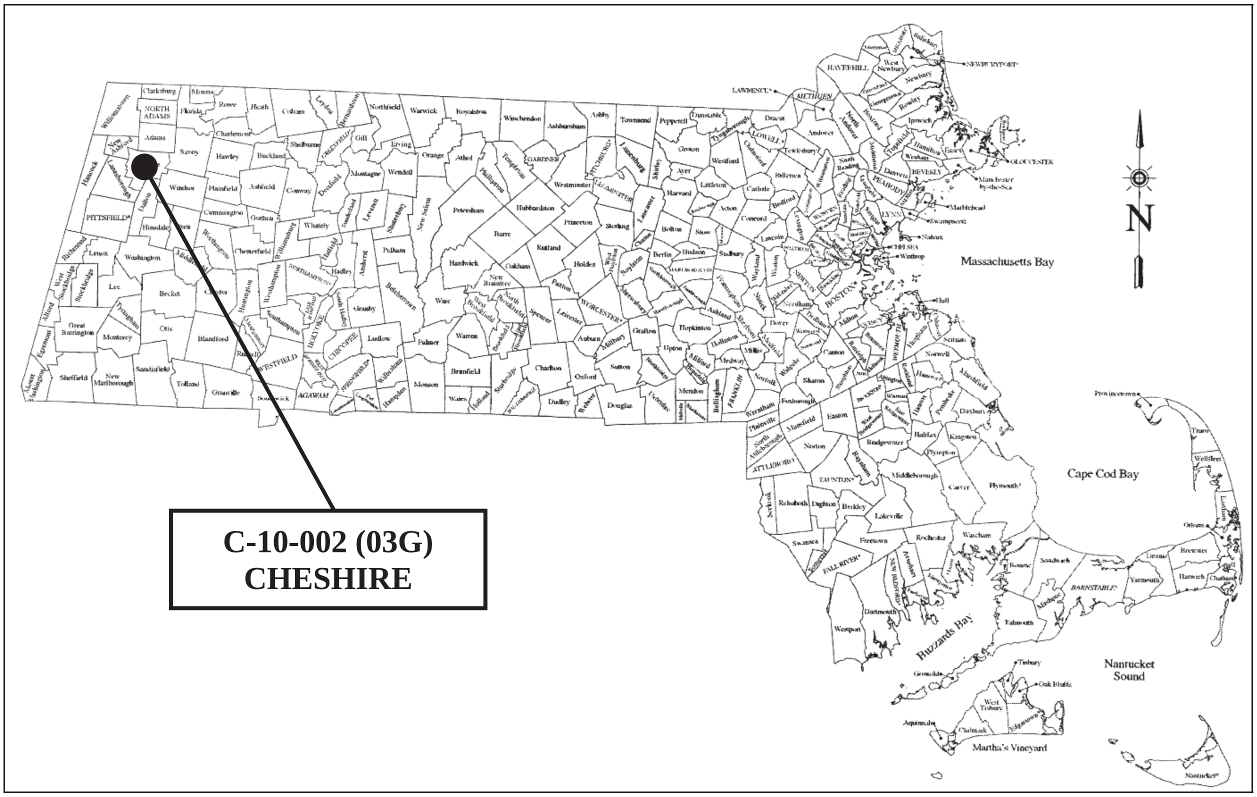
STRUCTURE NO.: **C10002-03G-MUN-NBI** BIN NO.: **03G**

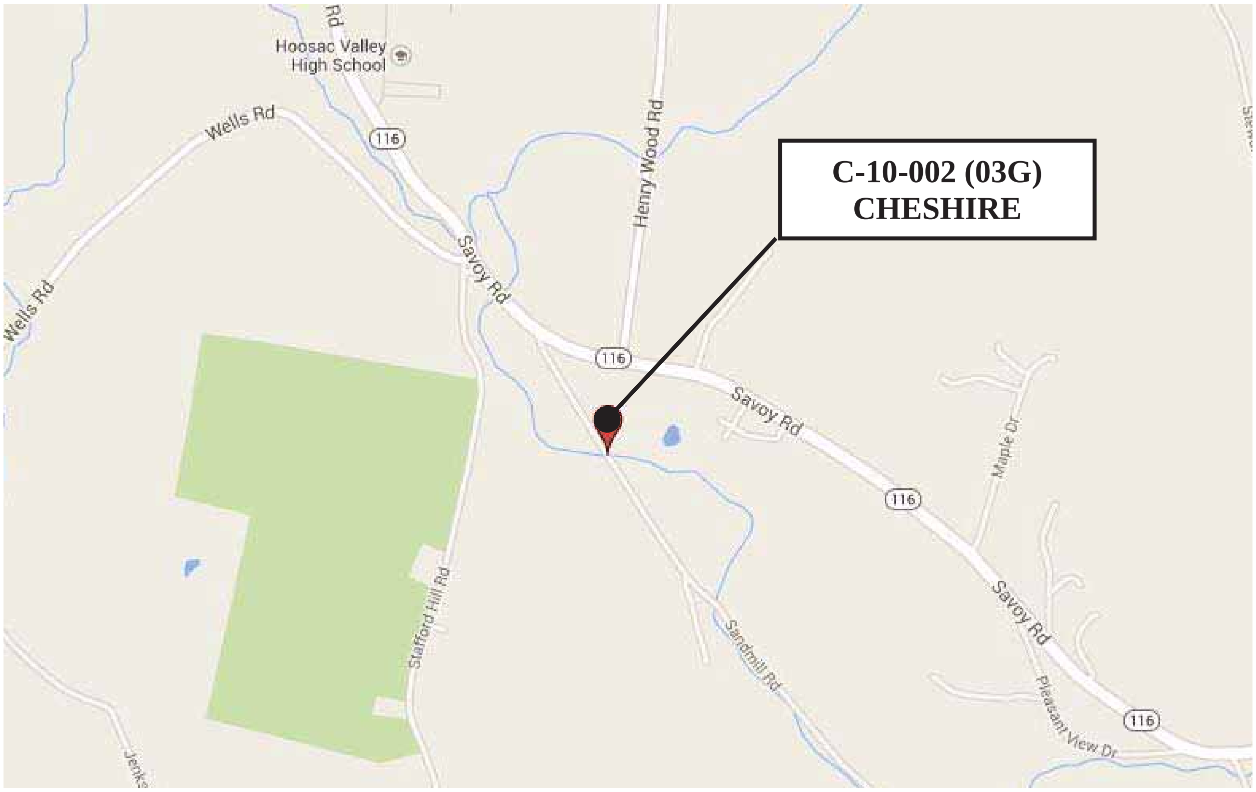
BRIDGE ELEMENT [1]		INVENTORY RATING BY LOAD FACTOR METHOD (METRIC TONS)		OPERATING RATING BY LOAD FACTOR METHOD (METRIC TONS)	
		MS18	MS (EQUIV.)	MS18	MS (EQUIV.)
Beam 1	Shear Stress @ 0.0L	175.7	MS 97.6	293.3	MS 162.9
	Flexural Stress @ 0.45L & 0.5L	38.9	MS 21.6	64.9	MS 36.1
	Flexural Stress @ 30.30' As Inspected	45.0	MS 25.0	75.1	MS 41.7
Beams 2 & 5	Shear Stress @ 0.0L	87.7	MS 48.7	146.5	MS 81.4
	Flexural Stress @ 0.45L & 0.5L	**26.6**	**MS 14.8**	**44.4**	**MS 24.6**
Beams 3 & 4	Shear Stress @ 0.0L	87.9	MS 48.9	146.9	MS 81.6
	Flexural Stress @ 0.45L & 0.5L	26.9	MS 14.9	44.9	MS 24.9
Beam 6	Shear Stress @ 0.0L As Inspected	172.8	MS 96.0	288.6	MS 160.3
	Flexural Stress @ 0.45L & 0.5L As Inspected	37.3	MS 20.7	62.3	MS 34.6

Shaded cells are controlling ratings
Highlighted values are below statutory

Notes:
1. For this report, beams are numbered from the east consistent with the latest Routine Inspection Report.
2. Ratings for 0.45L & 0.5L are combined in the breakdown tables because they are very close in value.

LOCATION MAP





DESCRIPTION OF BRIDGE

Date of Construction:	1939
Original Design Loading:	Unknown
Posted Limit:	N/A
Bridge Type:	Steel Stringer
Skew:	30^{o}
Spans:	1 simple span (43' 10-9/16")
Width of Bridge Deck:	23'-0" out to out
Roadway Width:	20'-0" curb to curb
Roadway Surface:	4" bituminous concrete
Curbs:	Concrete curbs 6" reveal (field measured), non-mountable
Sidewalk/Walkway/Median:	N/A
Bridge Railing:	W beam guardrail
Approach Railing:	W beam guardrail
Superstructure:	(6) W27 x 91 girders and (15) W16 x 36 diaphragms
Modifications to Original Superstructure:	Girders 1 & 6 were partially replaced with W27 x 94 shapes, Girder 2 was repaired with (2) web plates and (3) diaphragms were replaced with W16x40 shapes
Utilities:	None
Substructure:	Two full height reinforced concrete abutments
Modifications to Original Substructure:	Southeast wingwall repaired

BRIDGE RATING ANALYSIS ASSUMPTIONS AND CRITERIA

This load rating analysis is based on the available plans, most recent inspection report and a field verification conducted by Michael Baker Intl., Inc. The deck, superstructure and substructure were found in satisfactory condition.

The inventory and operating capacities of primary structural members are rated in accordance with the following provisions:

- AASHTO Manual for Bridge Evaluation (MBE), 2nd Edition, 2011 with 2013 interim revisions
- AASHTO Standard Specifications for Highway Bridges, 17th Edition
- Massachusetts Department of Transportation (MassDOT) LRFD Bridge Manual, 2013 Edition

The load ratings are calculated for the following standard trucks: H20, HS20, Type 3, and Type 3S2. The Load Factor Design method was used to rate all members, which are reported in English tons. Ratings were also computed for the MS18 vehicle for compliance with the requirements of December 1995 FHWA NBIS Coding Guide. Calculations were performed using the HS20 vehicle, and then converted to metric tons (MS18 equivalent) using a conversion factor of 0.9, as specified in the MassDOT Bridge Manual, Part I, Section 7.1.7.2B.

The following assumptions and methodology were used in rating the bridge superstructure:

- The structure was analyzed using AASHTOWare Bridge Rating 6.6 for the original submission. The revised rating used AASHTOWare Bridge Rating 6.8.4.3002
- The structure is a single span, simply supported steel beam superstructure supporting a reinforced concrete deck.
- The roadway width is 20' and two design lanes were used in accordance with the provisions of AASHTO 3.6.3.
- There is a 6 inch curb reveal and sidewalk widths are less than 2 feet, wheel lines were placed 2 feet from the face of curbs to determine inventory and operating level ratings for interior and exterior beams per MassDOT 7.2.4.6.
- Diaphragm weights were computed and entered manually into Bridge Rating as diaphragm (point) loads.
- Determination of dead load distribution was computed in accordance with the provisions of MassDOT LRFD Bridge Manual – Part I Section 3.5.3, using the pile cap analogy.
- Live load distribution factors were calculated per AASHTO 3.23.
- Lane loadings were not used for the H20 and HS20 vehicles since the span length is less than 200’.
- The section loss summary sheet was updated per the 2016 repair plans. The original calculations were input on the wrong side of the beam; therefore, the north and south ends have been flipped to accurately depict the loss locations.

- Repairs to the primary members were accounted for in the rating. See Appendix F for the 2016 repair plans.
- Beam 1 was replaced a W27x94 beam at the south end for 12'-6" long. Beam 2 was repaired by adding a ½" thick plate on each side of the web at the north end for 9'-6" long. Beam 6 was replaced a W27x94 beam at the south end for 10' long.
- A W27x91 beam was conservatively used in BrR for Beams 1 and 6 and a 3 plf dead load was applied to account for the new W27x94 portion. A W27x91 beam was used for Beam 2 and the dead load from (2) ½" thick plates was applied to account for the repair.
- A W16x36 diaphragm was replaced with a W16x40 diaphragm in bays 1, 2 and 5 per the 2016 repair plans.
- The bolted splice plates at Beams 1 and 6 were assumed to be in good condition and not rated per MassDOT 7.2.2.8 2020 Edition.

The allowable unit stresses used are as follows, per the bridge plans, MassDOT Load Rating Guidelines and AASHTO MBE:

Structural Steel:

- F_y = 33 ksi Inventory (MBE Tables 6B.5.2.1-1 & 2 for unknown grade built between 1936-1963)
- F_y = 60 ksi Operating (MBE Tables 6B.5.2.1-1 & 2 for unknown grade built between 1936-1963)

Concrete Reinforced Deck:

- f'_c = 3,000 psi (MassDOT 7.2.5.10)
- f_c = 1,200 psi for inventory allowable stress (MBE Table 6B.5.2.4.1-1)
- f_c = 1,900 psi for operating allowable stress (MBE Table 6B.5.2.4.1-1)

Reinforcing Steel:

- F_y = 33 ksi Intermediate Grade (MBE Table 6B.5.2.3-1)
- f_s = 18 ksi for inventory allowable stress (MBE Table 6B.5.2.3-1)
- f_s = 25 ksi for operating allowable stress (MBE Table 6B.5.2.3-1)

EVALUATION OF RATING AND RECOMMENDATIONS

The structure rates above statutory for the H20, Type 3 and Type3S2 vehicles and rates below statutory for the HS20 vehicle.

The controlling ratings of this bridge is governed by flexural stress of girders 2 and 5 at or near mid-span. The inventory and operating ratings are governed by flexural stress for all vehicles. The governing rating at the inventory level for: H20 is 21.4 tons at 0.50L; Type 3 is 25.9 tons at 0.45L; Type 3S2 is 40.4 tons at 0.50L; HS20 is 28.6 tons at 0.45L. The governing rating at the operating level for: H20 is 35.6 tons at 0.50L; Type 3 is 43.0 tons at 0.45L; Type 3S2 is 67.4 tons at 0.50L; HS20 is 47.5 tons at 0.45L.

The inventory and operating ratings for the MS18 vehicle is governed by the flexural stress of girders 2 and 5 at 0.45L, with an inventory rating of 26.6 tons and an operating rating of 44.4 tons.

The bridge is currently not load posted. Based on the analysis in this load rating report, the bridge does not require load posting. Continued maintenance of the structure is recommended.

AVAILABLE PLANS AND INSPECTION REPORTS

The following field inspection reports and plans were made available to Michael Baker International, for use in determining the live load rating of the bridge:

1. The Commonwealth of Massachusetts
   Proposed Bridge - Cheshire
   Sand Mill - Savoy Road over Stony Brook
   Bridge No. C-10-002 (03G)
   Structure No. C10002-03G-MUN-NBI
   Dated: 1938

2. Proposed Bridge Repairs
   Cheshire
   Sand Mill Road over Dry Brook
   Dated: 2016

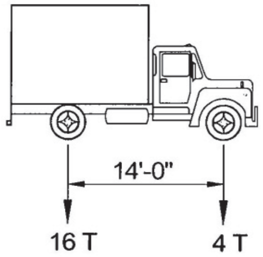
3. 2020 Routine Inspection Report
   Massachusetts Department of Transportation
   July 6, 2020

4. 2017 Special Member Inspection
   Massachusetts Department of Transportation
   July 20, 2017

LOADINGS USED FOR BRIDGE RATING

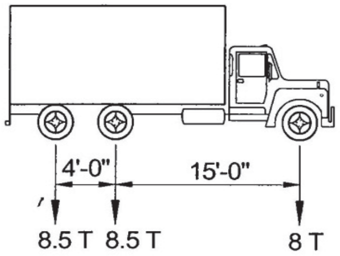
H20 VEHICLE

TOTAL WEIGHT
20 TONS



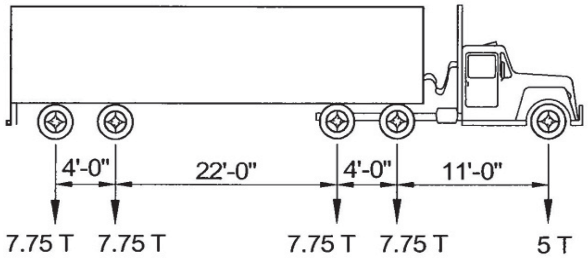
TYPE 3 VEHICLE

TOTAL WEIGHT
25 TONS



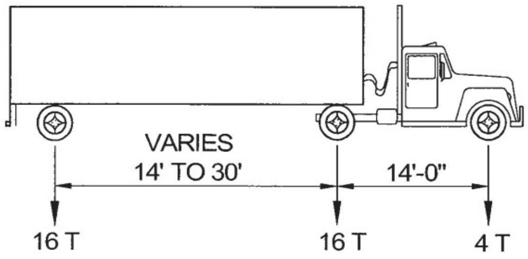
TYPE 3S2 VEHICLE

TOTAL WEIGHT
36 TONS



HS20 VEHICLE

TOTAL WEIGHT
36 TONS



APPENDIX A

INSPECTION REPORTS

Report Date: May 3, 2021

BRIDGE NO. 4

State Information

BDEPT#= C10002 Agency Br.No.

Town= Cheshire L.O.

B.I.N= 03G AASHTO= 080.0

RANK= 4011 H.I.= 79.6 % FHWA Select List= Y (6/21/2017)

Identification

(8) Structure Number		C1000203GMUNNBI
(5) Inventory Route		151000000
(2) State Highway Department District		01
(3) County Code	003 (4) Place code	13345
(6) Features Intersected		**WATER DRY BROOK**
(7) Facility Carried		**HWY SAND MILL RD**
(9) Location		.2 MI SOUTH OF SAVOY ROAD
(11) Kilometerpoint		0000.000
(12) Base Highway Network		N
(13) LRS Inventory Route & Subroute	000000000000	
(16) Latitude	42 DEG 35 MIN	09.21 SEC
(17) Longitude	73 DEG 06 MIN	36.31 SEC
(98) Border Bridge State Code	Share	%
(99) Border Bridge Structure No. #		

Structure Type and Material

(43) Structure Type Main:	Steel	Code	302
Stringer/Girder	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 -	Concrete Cast-in-Place	Code	1
(108) Wearing Surface / Protective System:			
A) Type of wearing surface -	Bituminous	Code	6
B) Type of membrane -	None	Code	0
C) Type of deck protection -	None	Code	0

Age and Service

(27) Year Built			1939
(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			000259
(30) Year of ADT	2018	(109) Truck ADT	06 %
(19) Bypass, detour length			002 KM

Geometric Data

(48) Length of maximum span			0012.6 M
(49) Structure Length			00014.6 M
(50) Curb or sidewalk:	Left 00.2 M	Right	00.2 M
(51) Bridge Roadway Width Curb to Curb			006.1 M
(52) Deck Width Out to Out			007.0 M
(32) Approach Roadway Width (w/shoulders)			005.5 M
(33) Bridge Median -	No median	Code	0
(34) Skew	30 DEG	(35) Structure Flared	N
(10) Inventory Route MIN Vert Clear			99.99 M
(47) Inventory Route Total Horiz Clear			06.1 M
(53) Min Vert Clear Over Bridge Rdwy			99.99 M
(54) Min Vert Underclear ref	N		00.00 M
(55) Min Lat Underclear RT ref	N		00.0 M
(56) Min Lat Underclear LT			00.0 M

Navigation Data

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

Classification

		Code
(112) NBIS Bridge Length		Y
(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	undetermined	

Condition

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

Load Rating and Posting

		Code
(31) Design Load -	HS 20=MS 18	5
(63) Operating Rating Method -	No rating analysis performed	5
(64) Operating Rating		44.1
(65) Inventory Rating Method -	No rating analysis performed	5
(66) Inventory Rating		32.4
(70) Bridge Posting		5
(41) Structure -	Open	A

Appraisal

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

Inspections

(90) Inspection Date 07/06/20 (91) Frequency 24 MO

(92) Critical Feature Inspection:				(93) CFI DATE
(A) Fracture Critical Detail	N	00	MO A)	00/00/00
(B) Underwater Inspection	N	00	MO B)	00/00/00
(C) Other Special Inspection	N	00	MO C)	07/20/17
(*) Other Inspection (Cribbing)	N	00	MO *)	07/01/13
(*) Closed Bridge	N	00	MO *)	07/14/16
(*) 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	27.0	34.0	49.0	49.0
Inventory	20.0	25.0	36.0	36.0

Field Posting

Status DESIGN Posting Date 01/01/17

	2 Axle	3 Axle	5 Axle	Single
Actual				
Recommended				
Missing Signs N				

Misc.

Bridge Name BRIDGE NO. 4

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
P / Y	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		

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION

PAGE 1 OF 8

2-DIST	B.I.N.	BR. DEPT. NO.
01	03G	C-10-002

STRUCTURES INSPECTION FIELD REPORT

ROUTINE INSPECTION

CITY/TOWN **CHESHIRE**	8.-STRUCTURE NO. **C10002-03G-MUN-NBI**	11-Kilo. POINT **000.000**	41-STATUS **A:OPEN**	90-ROUTINE INSP. DATE **JUL 6, 2020**
07-FACILITY CARRIED **HWY SAND MILL RD**	MEMORIAL NAME/LOCAL NAME **BRIDGE NO. 4**	27-YR BUILT **1939**	106-YR REBUILT **0000**	YR REHAB'D (NON 106) **0000**
06-FEATURES INTERSECTED **WATER DRY BROOK**	26-FUNCTIONAL CLASS **Rural Local**	DIST. BRIDGE INSPECTION ENGINEER **L. A. Briggs**		
43-STRUCTURE TYPE **302 : Steel Stringer/Girder**	22-OWNER **Town Agency**	21-MAINTAINER **Town Agency**	TEAM LEADER **D. P. Sullivan**	
107-DECK TYPE **1 : Concrete Cast-in-Place**	WEATHER **Sunny**	TEMP. (air) **27°C**	TEAM MEMBERS **R. MANCARI**	

ITEM 58 6

DECK

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

	E	W
CURB REVEAL (In millimeters)	165	127

APPROACHES

		DEF
a. Appr. Pavement Condition	6	-
b. Appr. Roadway Settlement	6	-
c. Appr. Sidewalk Settlement	N	-
d.	N	-

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

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

ITEM 59 6

SUPERSTRUCTURE

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

Year Painted	N

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

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

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

Any Fracture Critical Member: (Y/N) N

Any Cracks: (Y/N) N

ITEM 60 6

SUBSTRUCTURE

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

UNDERMINING (Y/N) If YES please explain N

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

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

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

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

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

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
CHESHIRE	**03G**	**C-10-002**	**C10002-03G-MUN-NBI**	**JUL 6, 2020**

ITEM 61 **6**

CHANNEL & CHANNEL PROTECTION

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

STREAM FLOW VELOCITY:

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

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

93b-U/W INSP. DATE: 00/00/0000

ITEM 36 ***TRAFFIC SAFETY***

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

WEIGHT POSTING ***Not Applicable*** X

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

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

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

CLEARANCE POSTING

Not X

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

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

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

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

TOTAL HOURS 6

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

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

TAPE#:

List of field tests performed:

RATING

Rating Report (Y/N): **Y**

Date: 01/01/2015

Inspection data at time of existing rating

I 58: **6** I 59: **4** I 60: **6** Date : 07/24/2014

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

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

REASON:

CONDITION RATING GUIDE

(For Items 58, 59, 60 and 61)

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

DEFICIENCY REPORTING GUIDE

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

CATEGORIES OF DEFICIENCIES:

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

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

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

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

URGENCY OF REPAIR:

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

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

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

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
CHESHIRE	03G	C-10-002	C10002-03G-MUN-NBI	JUL 6, 2020

REMARKS

BRIDGE ORIENTATION

Sand Mill Road travels north and south. Dry Brook flows from east to west. The structure is a single span bridge consisting of six rolled steel stringers supporting a cast-in-place reinforced concrete deck with an asphalt wearing surface. The beams and bays are numbered from east to west, upstream to downstream, in accordance with the 2016 Steel Repair Plans. See photos 1 & 2.

ITEM 58 - DECK

Item 58.1 - Wearing Surface

The north end of the wearing surface has transverse and mapcracking, full width.

At the south deck end, the wearing surface is patched, 1' long x 17' wide, at the interface with the approach.

Item 58.2 - Deck Condition

All bays have several transverse cracks with efflorescence and active leakage. See photo 2.

Item 58.4 - Curbs

There is sand and weeds growing at the curblines.

APPROACHES

Approaches a - Appr. Pavement Condition

The south approach has patching, 1' long x 17' wide, at the deck interface.

The north approach, at the deck end, has several cracks, up to 1/8" wide x full width of the roadway, and minor patching on the west side.

Approaches b - Appr. Roadway Settlement

Both approaches have minor settlement, up to 1/2" high.

ITEM 59 - SUPERSTRUCTURE

Item 59.4 - Girders or Beams

All beams have areas of moderate to heavy surface rusting with delaminations. See photo 2.

Item 59.9 - Bearing Devices

At the north abutment, bearings 1, and 3 - 6, have anchor bolts that are bent toward the backwall.

At the south abutment, bearings 2 - 5, have anchor bolts that are bent toward the backwall.

Item 59.10 - Diaphragms/Cross Frames

Some of the diaphragms have heavy rust with delaminations.

Item 59.14 - Paint/Coating

The paint system is failing and corrosion is spreading, except in the 2017 repaired areas. See photo 2.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
CHESHIRE	**03G**	**C-10-002**	**C10002-03G-MUN-NBI**	**JUL 6, 2020**

REMARKS

ITEM 60 - SUBSTRUCTURE

Item 60.1 - Abutments
Item 60.1.a - Pedestals
The pedestal for beam 5 on the south abutment has a diagonal crack/delamination through the northwest corner, that connects to a horizontal crack in the upper breastwall. See photo 3.

Item 60.1.b - Bridge Seats
The north seat, below beam 5, has scaling at the corner, 18" long x 3" high x 2" deep. See photos 4 & 5.

The north seat, below beam 6, has scaling at the corner, up to 12" long x 3" high x 2" deep. See photos 4 & 5.

Item 60.1.c - Backwalls
North Backwall
Bay 4 has a semicircular crack, 3' long, that is fractured through and is displaced, 1/4". This area is a older patch.

Bay 5 has a vertical hairline crack, full height, with efflorescence.

Item 60.1.d - Breastwalls
South Breastwall
Bays 2 & 3 have vertical hairline cracks, full height.

At the top, there are vertical hairline cracks, 2'+/- long under all of the beams.

Bay 5 has a hairline horizontal crack, full width, with efflorescence that connects to the delamination in pedestal 5. See photo 3.

North Breastwall
In bay 2 and under beams 1, 3, 4, 5 & 6, there are vertical hairline cracks, full height.

Under beams 2 - 4, near the top, there is a horizontal hairline crack with efflorescence, 8' long.

Under beam 6, the top of the breastwall is spalled, approximately 12" long x 4" high x 1" deep. See photos 4 & 5.

The west end has heavy mapcracking with efflorescence, 3' wide x 6' high. See photo 5.

Item 60.1.e - Wingwalls
Northeast Wingwall
There is a diagonal hairline crack with efflorescence, 3' long.

Southwest Wingwall
At the top, there is hairline mapcracking with efflorescence, full length x 2' high, and along the horizontal cold joint, full length x 1' high. There is also scaling, 12' long x up to 3" deep.

Northwest Wingwall
Near the toe, there is a diagonal hairline crack with efflorescence, full height.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
CHESHIRE	**03G**	**C-10-002**	**C10002-03G-MUN-NBI**	**JUL 6, 2020**

REMARKS

Item 60.1.e - Wingwalls (Cont'd)

At the top corner, there is heavy mapcracking with efflorescence, 10' long x 6' high, and scaling, 6' long x 3' high x up to 3" deep. See photo 5.

Item 60.1.j - Scour
The footing on the north side is exposed, full length x up to 8" high. See photo 5.

SubStructure Scour Notes
Refer to Item 60.1.j - Scour.

ITEM 61 - CHANNEL AND CHANNEL PROTECTION

Item 61.1 - Channel Scour
Refer to Item 60.1.j - Scour.

Item 61.2 - Embankment Erosion
The southwest embankment has eroded above a drainage pipe headwall, 10' diameter by 3' depth approximately 40' downstream.

TRAFFIC SAFETY

Item 36a - Bridge Railing
The railing consists of single steel W-beam panels mounted on steel posts with steel blockouts, spaced at 6'.

Item 36b - Transitions
The transitions consist of single steel W-beam panels mounted on steel posts with steel blockouts, spaced at 6'.

Item 36c - Approach Guardrail
The approach guardrail consists of single steel W-beam panels mounted on steel posts with steel blockouts, spaced at 6'.

Item 36d - Approach Guardrail Ends
There are steel terminal ends at all four corners, not swept away from traffic.

Photo Log

Photo 1 :	General topside view, looking north.
Photo 2 :	General underside view, looking north.
Photo 3 :	South breastwall. Horizontal crack with delamination through pedestal and upper breastwall in bay 5.
Photo 4 :	North breastwall has scattered map cracking, efflorescence, and scaling.
Photo 5 :	North abutment, west end. Scaling at upper breastwall/bridge seat under beams 5 & 6. Heavy cracking and efflorescence at interface with wingwall. Footing exposed.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
CHESHIRE	**03G**	**C-10-002**	**C10002-03G-MUN-NBI**	**JUL 6, 2020**

PHOTOS

Photo 1: **General topside view, looking north.**

Photo 2: **General underside view, looking north.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
CHESHIRE	**03G**	**C-10-002**	**C10002-03G-MUN-NBI**	**JUL 6, 2020**

PHOTOS

Photo 3: **South breastwall. Horizontal crack with delamination through pedestal and upper breastwall in bay 5.**

Photo 4: **North breastwall has scattered map cracking, efflorescence, and scaling.**

REM.(2)7-96

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
CHESHIRE	03G	C-10-002	C10002-03G-MUN-NBI	JUL 6, 2020

PHOTOS

Photo 5: North abutment, west end. Scaling at upper breastwall/bridge seat under beams 5 & 6. Heavy cracking and efflorescence at interface with wingwall. Footing exposed.

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION

PAGE 1 OF 9

STRUCTURES INSPECTION FIELD REPORT

INSPECTION

2-DIST 01	B.I.N. 03G	BR. DEPT. NO. C-10-002

CITY/TOWN **CHESHIRE**	8.-STRUCTURE NO. **C10002-03G-MUN-NBI**	11-Kilo. POINT **000.000**	90-ROUTINE INSP. DATE **Jul 14, 2016**	93*-SPEC. MEMB. INSP. DATE **Jul 20, 2017**
07-FACILITY CARRIED **HWY SAND MILL RD**	MEMORIAL NAME/LOCAL NAME **BRIDGE NO. 4**	27-YR BUILT **1939**	106-YR REBUILT **0000**	*YR REHAB'D (NON 106) **0000**
06-FEATURES INTERSECTED **WATER DRY BROOK**	26-FUNCTIONAL CLASS **Rural Local**	DIST. BRIDGE INSPECTION ENGINEER **L. A. Briggs**		
43-STRUCTURE TYPE **302 : Steel Stringer/Girder**	22-OWNER **Town Agency** 21-MAINTAINER **Town Agency**	TEAM LEADER **D. Stokes**		
107-DECK TYPE **1 : Concrete Cast-in-Place**	WEATHER **Sunny** TEMP. (air) **22°C**	TEAM MEMBERS **A. REHN**		

WEIGHT POSTING *Not Applicable* X

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

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

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

PLANS (Y/N): Y

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

TAPE#:

RATING

Rating Report (Y/N): Y Date: 01/01/2015

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

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

REASON: Superstructure repairs.

Inspection data at time of existing rating

I 58: 6 I 59: 4 I 60: 6 I 62: - Date : 01/01/2015

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 59.4 - Girders or Beams	N	N	See remarks in comments section.	4	6	0	0	0	-
B	Item 59.9 - Bearing Devices	N	N	See remarks in comments section.	6	6	Not Rated			-
C	Item 60.1.d - Breastwalls	N	N	See remarks in comments section.	6	7	Not Rated			-
D	Item 60.1.e - Wingwalls	N	N	See remarks in comments section.	4	6	Not Rated			-
E										

List of field tests performed:

	I-58	I-59	I-60	I-62
(Overall Previous Condition)	6	4	6	-
(Overall Current Condition)	6	7	6	-

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

CATEGORIES OF DEFICIENCIES:

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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.

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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

F.C.(1)7-96

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
CHESHIRE	**03G**	**C-10-002**	**C10002-03G-MUN-NBI**	**JUL 20, 2017**

REMARKS

BRIDGE ORIENTATION

Sandmill Road travels north and south. Dry Brook flows from east to west. The structure is a single span bridge consisting of six rolled steel stringers supporting a cast-in-place reinforced concrete deck. The beams and bays are numbered from east to west, upstream to downstream, for ease of inspection. See photos 1 & 2.

GENERAL REMARKS

This Special Inspection Report, was created to document repairs and re-evaluate ratings, based on as built repairs. Refer to sketches 1 - 3 taken from the 2015 chapter 85 repair plans.

ITEM 59 - SUPERSTRUCTURE

Item 59.4 - Girders or Beams

All of the beams have areas of minor rusting and delamination.

Beams 1 & 6, at the south ends, have been repaired with new beam section, 27" WF 91# x up to 12' long. See sketches 1 -3 and photos 3 & 4. The new section is slightly thicker in the flanges.

Beam 2, at the north end, has been plated in the web on both sides, 1/2" thick plate x 9' long x full height of the web. See sketches 1 - 3 and photo 5.

Item 59.9 - Bearing Devices

Beams 1 & 6, at the south end and beam 2 at the north end, have new bearings in place. See photo 6.

ITEM 60 - SUBSTRUCTURE

Item 60.1 - Abutments

Item 60.1.d - Breastwalls

The southeast corner of the breastwall has been repaired. See sketches 1 - 3 and photo 7.

Item 60.1.e - Wingwalls

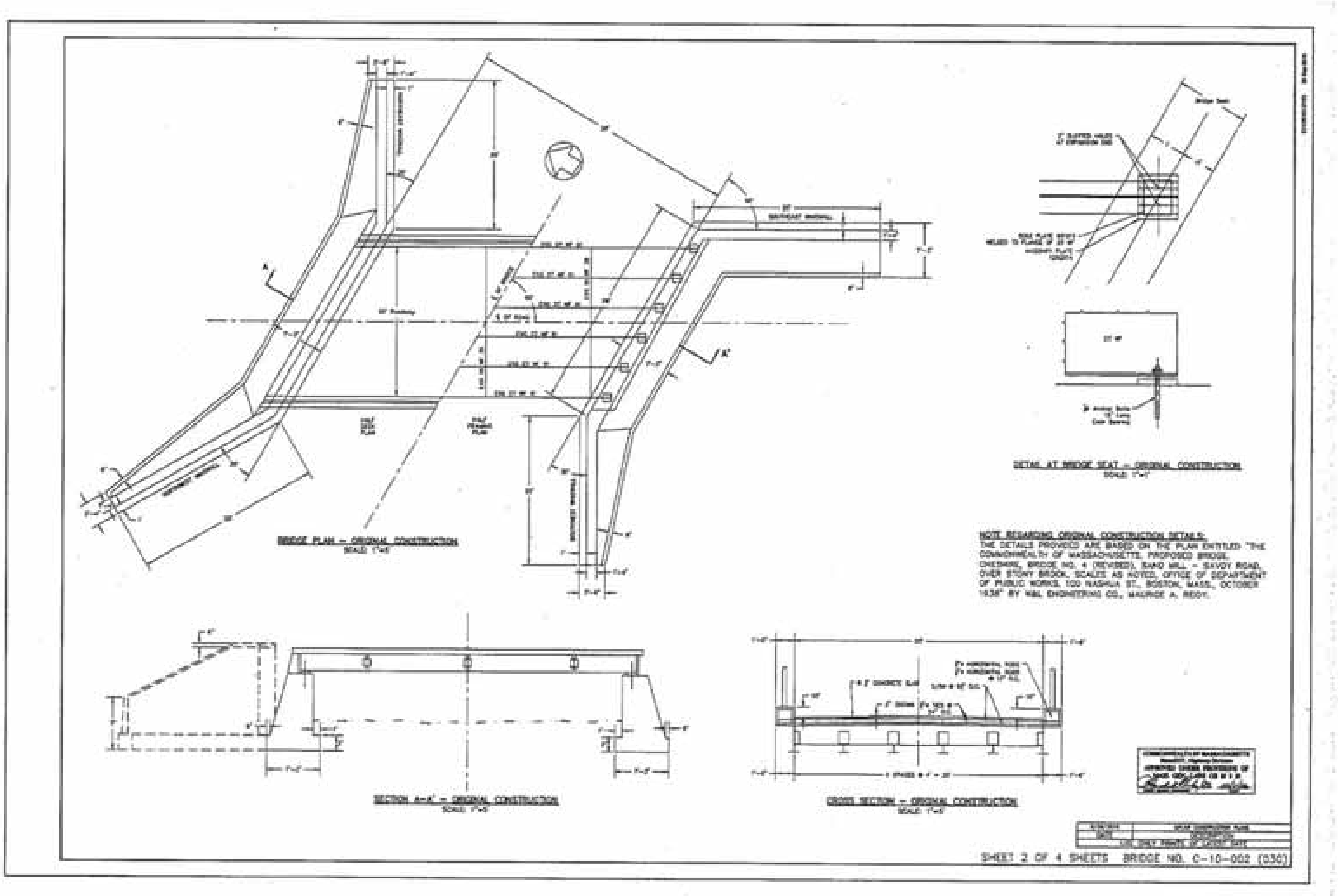
The southeast wingwall has been repaired. See sketches 1 - 3 and photos 7 & 8.

Sketch / Photo Log

Sketch 1 :	Repair plans.
Sketch 2 :	Repair plans.
Sketch 3 :	Repair plans.
Photo 1 :	General topside looking north.
Photo 2 :	General underside and beam 2, north end repair plate and diaphragms.
Photo 3 :	Beam 1, east elevation, new beam section and splice plates.
Photo 4 :	Beam 6, west elevation, new beam section and splice plates.
Photo 5 :	Beam 2, north end, web repair plating and new intermediate diaphragms.
Photo 6 :	Typical bearing repair, beam 1, south end shown.
Photo 7 :	Repair of the southeast abutment corner and wingwall.
Photo 8 :	Repair of the southeast wingwall and rail base.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
CHESHIRE	**03G**	**C-10-002**	**C10002-03G-MUN-NBI**	**JUL 20, 2017**

SKETCHES

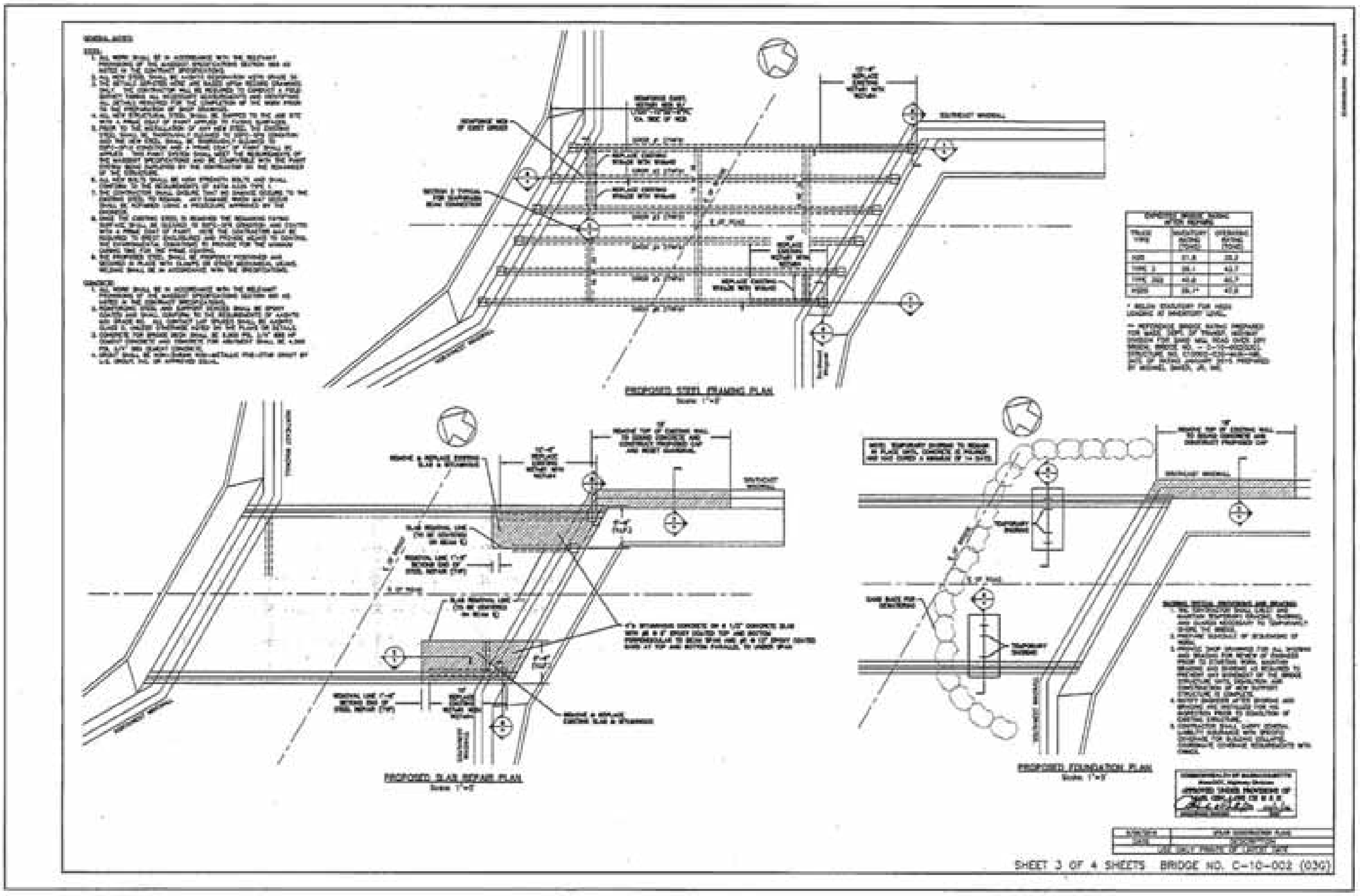


Sketch 1: **Repair plans.**

REM.(2)2-21

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
CHESHIRE	**03G**	**C-10-002**	**C10002-03G-MUN-NBI**	**JUL 20, 2017**

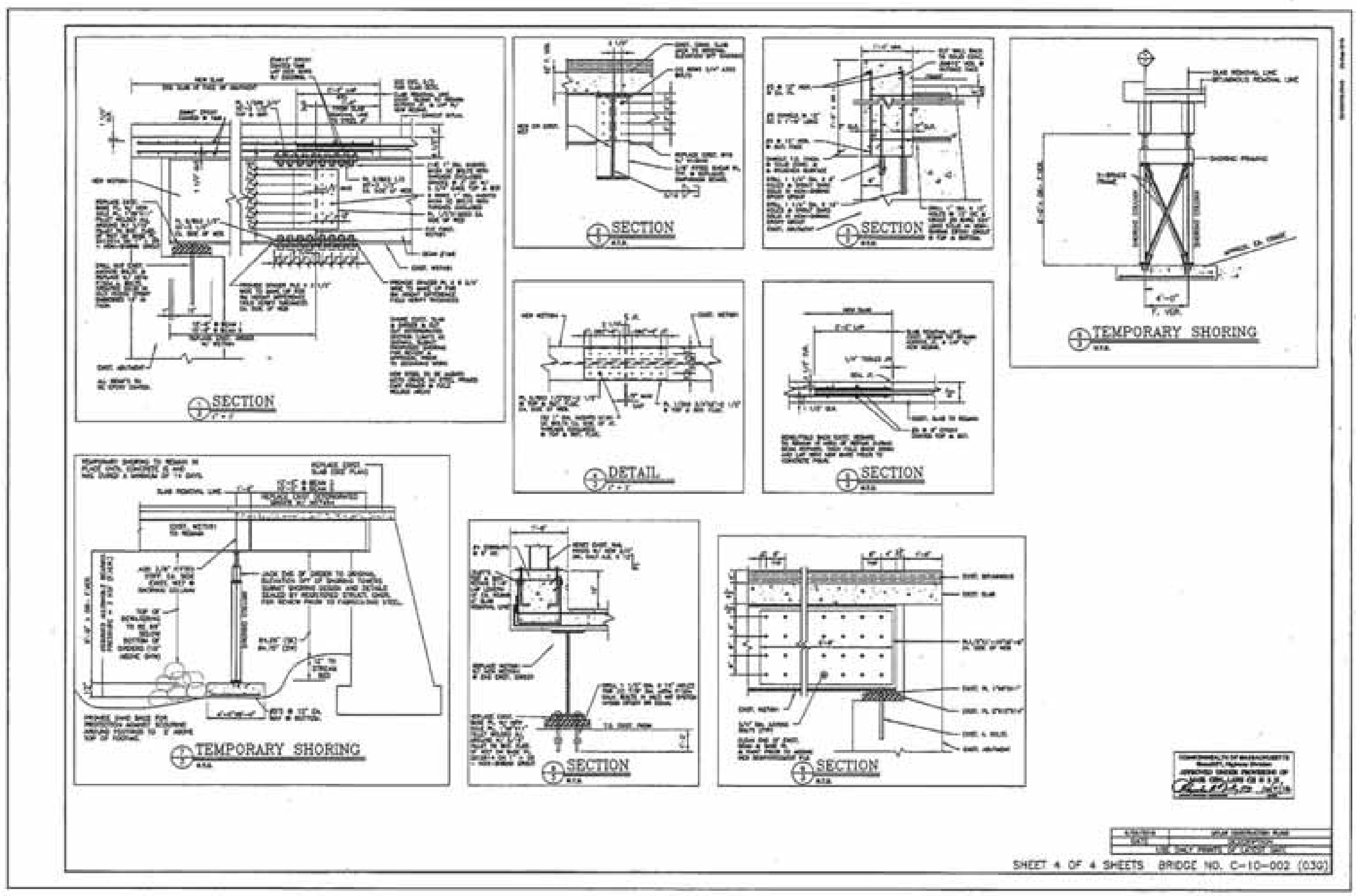
SKETCHES



Sketch 2: Repair plans.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
CHESHIRE	**03G**	**C-10-002**	**C10002-03G-MUN-NBI**	**JUL 20, 2017**

SKETCHES



Sketch 3: Repair plans.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
CHESHIRE	**03G**	**C-10-002**	**C10002-03G-MUN-NBI**	**JUL 20, 2017**

PHOTOS

Photo 1: **General topside looking north.**

Photo 2: **General underside and beam 2, north end repair plate and diaphragms.**

REM.(2)7-96

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
CHESHIRE	**03G**	**C-10-002**	**C10002-03G-MUN-NBI**	**JUL 20, 2017**

PHOTOS

Photo 3: **Beam 1, east elevation, new beam section and splice plates.**

Photo 4: **Beam 6, west elevation, new beam section and splice plates.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
CHESHIRE	**03G**	**C-10-002**	**C10002-03G-MUN-NBI**	**JUL 20, 2017**

PHOTOS

Photo 5: **Beam 2, north end, web repair plating and new intermediate diaphragms.**

Photo 6: **Typical bearing repair, beam 1, south end shown.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
CHESHIRE	03G	C-10-002	C10002-03G-MUN-NBI	JUL 20, 2017

PHOTOS

Photo 7: **Repair of the southeast abutment corner and wingwall.**

Photo 8: **Repair of the southeast wingwall and rail base.**

REM.(2)7-96

APPENDIX B

PHOTOGRAPHS

PHOTO LOG

PHOTO NO.	DESCRIPTION
1	BRIDGE FROM THE NORTH APPROACH
2	BRIDGE FROM THE SOUTH APPROACH
3	EAST ELEVATION OF STRUCTURE
4	WEST ELEVATION OF STRUCTURE
5	TYPICAL UNDERSIDE
6	TYPICAL BRIDGE RAILING
7	TYPICAL BEARING REPAIR, BEAM 1, SOUTH END SHOWN. NOTE THIS PHOTO WAS TAKEN FROM THE 2017 SPECIAL MEMBER INSPECTION REPORT.
8	BEAM 1, EAST ELEVATION, NEW BEAM SECTION AND SPLICE PLATES. NOTE THIS PHOTO WAS TAKEN FROM THE 2017 SPECIAL MEMBER INSPECTION REPORT.
9	BEAM 2, NORTH END, WEB REPAIR PLATING AND NEW INTERMEDIATE DIAPHRAGMS. NOTE THIS PHOTO WAS TAKEN FROM THE 2017 SPECIAL MEMBER INSPECTION REPORT.
10	BEAM 6, WEST ELEVATION, NEW BEAM SECTION AND SPLICE PLATES. NOTE THIS PHOTO WAS TAKEN FROM THE 2017 SPECIAL MEMBER INSPECTION REPORT.

PHOTOGRAPHS

Bridge No: **C-10-002 (03G)**
Town: **Cheshire**
Location: **Sand Mill Road over Dry Brook**

	
PHOTO 1: Bridge from the north approach.	**PHOTO 2:** Bridge from the south approach.

Prepared by:
Michael Baker INTERNATIONAL

Bridge No: **C-10-002 (03G)**
Town: **Cheshire**
Location: **Sand Mill Road over Dry Brook**

PHOTOGRAPHS

	
PHOTO 3: East elevation of structure.	**PHOTO 4:** West elevation of structure.

Prepared by:
Michael Baker
INTERNATIONAL

Bridge No: **C-10-002 (03G)**
Town: **Cheshire**
Location: **Sand Mill Road over Dry Brook**

PHOTOGRAPHS

	
PHOTO 5: Typical underside.	**PHOTO 6:** Typical bridge railing.

Prepared by:
Michael Baker
INTERNATIONAL

Bridge No: **C-10-002 (03G)**
Town: **Cheshire**
Location: **Sand Mill Road over Dry Brook**

PHOTOGRAPHS

PHOTO 7:
Typical bearing repair, beam 1, south end shown. Note this photo was taken from the 2017 Special Member Inspection Report.

PHOTO 8:
Beam 1, east elevation, new beam section and splice plates. Note this photo was taken from the 2017 Special Member Inspection Report.

Prepared by:
Michael Baker
INTERNATIONAL

Bridge No: **C-10-002 (03G)**
Town: **Cheshire**
Location: **Sand Mill Road over Dry Brook**

PHOTOGRAPHS

PHOTO 9:
Beam 2, north end, web repair plating and new intermediate diaphragms. Note this photo was taken from the 2017 Special Member Inspection Report.

PHOTO 10:
Beam 6, west elevation, new beam section and splice plates. Note this photo was taken from the 2017 Special Member Inspection Report.

Prepared by:
Michael Baker
INTERNATIONAL

APPENDIX C

COMPUTATIONS

COMPUTATIONS INDEX

CALCULATION CERTIFICATION

Certification of Calculations:

I hereby state that I have checked the methods, assumptions, load distributions, computer input files, and all calculations for this rating report for:

Bridge No. **C-10-002 (03G)**

By signing below, I confirm that I agree with all methods, assumptions, load distributions, computer input files, and calculations contained in this rating report.

7/21/2021

Eric Thornley, PE
Massachusetts Registration #55299

Date

DISTRIBUTION FACTOR AND DEAD LOAD CALCULATIONS

C4

SUMMARY OF LOADS AND DISTRIBUTION FACTORS

DC1 Point Loads

Intermediate diaphragms are manually input into BrR as DC1 point loads.

$Dia_{w16x36} := 0.151 \cdot kip$ Weight of (1) W16x36 interior diaphragm

$Dia_{w16x40} := 0.168 \cdot kip$ Weight of (1) W16x40 interior diaphragm

DC1 Uniform Loads

Loading on each beam based on the 2016 repair plans.

$DL1_{repair} := 0.006 \cdot klf$

$DL2_{repair} := 0.017 \cdot klf$

$DL6_{repair} := 0.006 \cdot klf$

Loading on each beam from the concrete curb and bridge railing.

Pile Cap (PC) Distribution	**Equal (Eq) Distribution**
$SDL1_{PC} := 0.114 \cdot klf$	$SDL1_{Eq} := 0.069 \cdot klf$
$SDL2_{PC} := 0.069 \cdot klf$	$SDL2_{Eq} := 0.069 \cdot klf$
$SDL3_{PC} := 0.069 \cdot klf$	$SDL3_{Eq} := 0.069 \cdot klf$
$SDL4_{PC} := 0.069 \cdot klf$	$SDL4_{Eq} := 0.069 \cdot klf$
$SDL5_{PC} := 0.069 \cdot klf$	$SDL5_{Eq} := 0.069 \cdot klf$
$SDL6_{PC} := 0.114 \cdot klf$	$SDL6_{Eq} := 0.069 \cdot klf$

Live Load Distribution Factors

All distribution factors are in wheel lines; Inventory and operating levels are the same.

LLDF =

"Beam"	"Lanes Loaded"	"Shear"	"Shear at Supports"	"Moment"	"Deflection"
"1 & 6"	"1 Lane"	0.5	0.5	0.5	0.333
"1 & 6"	"Multi Lane"	0.5	0.5	0.5	0.667
"2 & 5"	"1 Lane"	0.571	1	0.571	0.333
"2 & 5"	"Multi Lane"	0.727	0.5	0.727	0.667
"3 & 4"	"1 Lane"	0.571	1	0.571	0.333
"3 & 4"	"Multi Lane"	0.727	1	0.727	0.667

MASSDOT Contract No: 74666
Assignment: 4
Baker Project No: 143388
Subject: Statewide Bridge Inspection/Ratings for MASSDOT
Bridge No: C-10-002 **BIN:** 03G
Location: Sand Mill Road over Dry Brook, Cheshire MA

Baker

Computed by: TD **Date:** 10/21/2014
Checked by: JC **Date:** 12/5/2014
Computed by: KT **Date:** 5/7/2021
Checked by: MG **Date:** 5/19/2021

DEAD LOAD CALCULATIONS

MATERIAL PROPERTIES:

- Span length:

L = 43.88 ft
# of beams = 6.0

- Unit weights of materials:

Concrete = 0.150 kcf
Bituminous Concrete = 0.144 kcf
Steel = 0.490 kcf

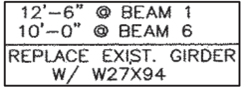
DC LOADS (STAGE 1)

BEAM SELF WEIGHT:

- The beam self weight is automatically computed in AASHTOWare Bridge Rating.
- Beam 1 was replaced with a W27x94 shape from 31.38' - 43.88'.
- Beam 6 was replaced with a W27x94 shape from 33.88' - 43.88'.
- Additional weight (due to increased beam size in repair areas) is accounted for as a uniform load over entire length.
- Weight of splice plates at intersection of W27x91 & W27x94 beam is accounted for as a uniform load over entire length.

W27x94 additional weight = 3.00 lb/ft
Length of repair at Beam 1 = 12.50 ft
Length of repair at Beam 6 = 10.00 ft

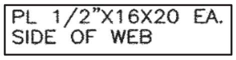
Per repair plans sheet 4 of 4


12'–6" @ BEAM 1
10'–0" @ BEAM 6
REPLACE EXIST. GIRDER
W/ W27X94

Splice Plates at Web

Plate Height = 20.00 in
Plate Thickness = 0.50 in
Plate Length = 16.00 in
Number of Plates = 2
Additional Splice Plate load = 2.171 lb/ft

Per repair Per repair plans

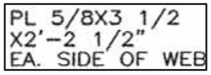

PL 1/2"X16X20 EA.
SIDE OF WEB

Includes 5% for weight of bolts

Half Splice Plates at TF & BF

Plate Width = 3.50 in
Plate Thickness = 0.63 in
Plate Length = 26.50 in
Number of Plates = 4
Additional Splice Plate load = 1.573 lb/ft

Per repair plans sheet 4 of 4

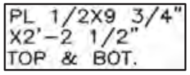

PL 5/8X3 1/2
X2'–2 1/2"
EA. SIDE OF WEB

Includes 5% for weight of bolts

Full Splice Plates at TF & BF

Plate Width = 9.75 in
Plate Thickness = 0.50 in
Plate Length = 26.50 in
Number of Plates = 2
Additional Splice Plate load = 1.753 lb/ft

Per repair plans sheet 4 of 4


PL 1/2X9 3/4"
X2'–2 1/2"
TOP & BOT.

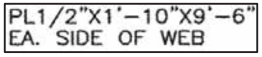
Includes 5% for weight of bolts

Additional load at Beam 1 = **6.353** lb/ft
Additional load at Beam 6 = **6.182** lb/ft

- Beam 2 was repaired with a 9.5'L x 1/2" thick plate on each side of the web. Additional weight is accounted for as a uniform load over entire length.

Plate Height = 22.00 in
Plate Thickness = 0.50 in
Plate Length = 9.50 ft
Number of Plates = 2
Additional load at Beam 2 = **17.018** lb/ft

Per repair plans sheet 4 of 4


PL1/2"X1'–10"X9'–6"
EA. SIDE OF WEB

MASSDOT Contract No: 74666
Assignment: 4
Baker Project No: 143388
Subject: Statewide Bridge Inspection/Ratings for MASSDOT
Bridge No: C-10-002 **BIN:** 03G
Location: Sand Mill Road over Dry Brook, Cheshire MA

Computed by: TD **Date:** 10/21/2014
Checked by: JC **Date:** 12/5/2014
Computed by: KT **Date:** 5/7/2021
Checked by: MG **Date:** 5/19/2021

DEAD LOAD CALCULATIONS

INTERMEDIATE DIAPHRAGM:

- The first diaphragm in bays 1 and 2 and the third diaphragm in bay 5 were replaced with W16x40 shapes.

W16x36 shape weight = 36.00 lb/ft Per repair plans sheet 4 of 4
W16x40 shape weight = 40.00 lb/ft
Length of W shape $_{\text{(All Int. Dia.)}}$ = 4.00 ft
Load $_{\text{(W16x36 Int. Dia.)}}$ = **0.151** k Includes 5% for weights of bolts & hardware
Load $_{\text{(W16x40 Int. Dia.)}}$ = **0.168** k Includes 5% for weights of bolts & hardware

REPLACE EXISTING
W16x36 WITH W16x40

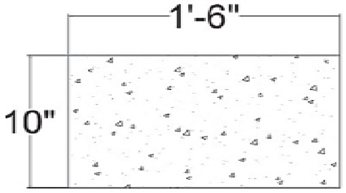
DC LOADS (STAGE 1)

6.5" REINFORCED CONCRETE DECK:

- The concrete deck self weight is automatically computed in AASHTOWare Bridge Rating.

Concrete Curbs:

Area of Concrete Curbs = 1.25 ft^2 Calculated via AutoCAD
Quantity = 2.00
DC$_{\text{curb at sidewalk}}$ = **0.375** k/ft



Bridge Railing:

- W6 x 9 Post

Nominal Weight of Post = 9.00 lb/ft Per steel manual
Height = 2.67 ft Field measured
Spacing = 6.27 ft
Load = 0.004 k/ft

- W6 x 9 Block Outs

Nominal Weight = 9.0 lb/ft
Height = 1.1 ft Field measured
Post spacing = 6.27 ft Field measured
Load = 0.002 k/ft

- Base Plate

Base Plate Width = 12.00 in Field measured
Base Plate Depth = 16.00 in Field measured
Base Plate Thickness = 0.50 in Field measured
Base Plate Spacing = 6.27 ft Per plans
Load = 0.004 k/ft

- Flexrail™ W Rail

Area = 0.018 ft^2 Per specs
Load = 0.009 k/ft

Quantity = 2.00

DC$_{\text{Total Rails}}$ = **0.039** k/ft Includes 5% for weights of bolts & hardware

MASSDOT Contract No:	74666			
Assignment:	4			
Baker Project No:	143388			
Subject:	Statewide Bridge Inspection/Ratings for MASSDOT	**Computed by:** TD	**Date:**	10/21/2014
Bridge No:	C-10-002 **BIN:** 03G	**Checked by:** JC	**Date:**	12/5/2014
Location:	Sand Mill Road over Dry Brook, Cheshire MA	**Computed by:** KT	**Date:**	5/7/2021
		Checked by: MG	**Date:**	5/19/2021

DEAD LOAD CALCULATIONS

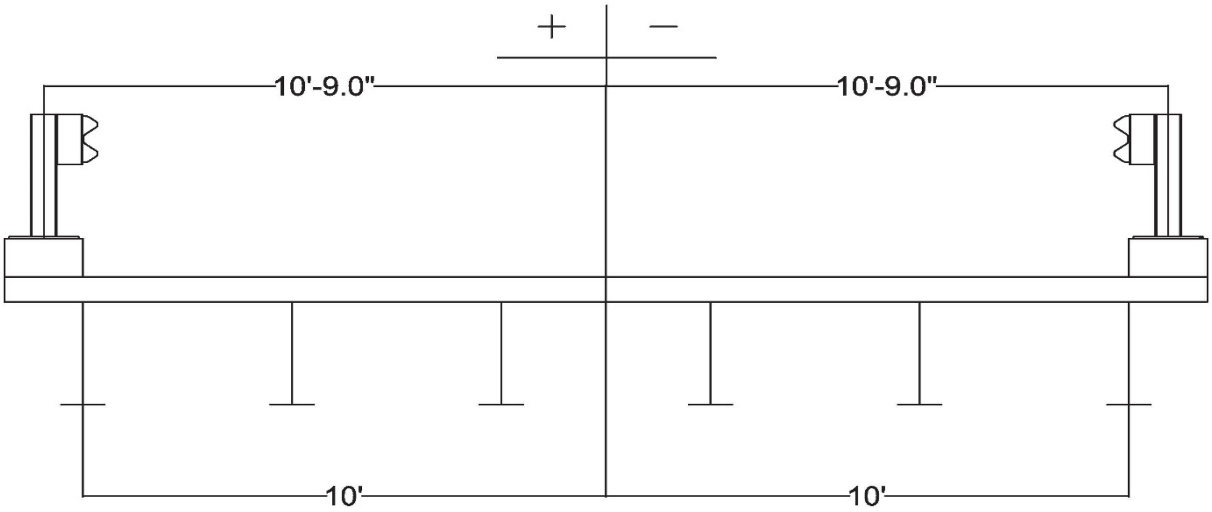
DW LOADS (STAGE 1)

4" BITUMINOUS WEARING SURFACE:

- The wearing surface self weight is automatically computed in AASHTOWare Bridge Rating and equally distributed.

Summary of Distribution of Dead Loads:

- Determination of dead load distribution was computed in accordance with the provisions of MassDOT LRFD Bridge Manual - Part I Section 3.5.3.



$$\frac{P}{A} + \frac{X_{ext} \sum e}{\sum x^2}$$

P = load of appurtenance
A = number of beams
e = eccentricity of load from C.G. of beam group
X_{ext} = distance from C.G. of beam group to exterior beam
x = distance from C.G. of beam group to each beam
x bar = distance from exterior beam to each beam

10.00 ft	Center of gravity of beam group measured from exterior beam
6	Number of beams
0.1667	P/A

Bay	Spacing (ft)
1	4.00
2	4.00
3	4.00
4	4.00
5	4.00

Girder	x Bar (ft)	X_{ext} (ft)	X_{ext}^2 (ft)
1	0.00	10.00	100.00
2	4.00	6.00	36.00
3	8.00	2.00	4.00
4	12.00	-2.00	4.00
5	16.00	-6.00	36.00
6	20.00	-10.00	100.00
		Σx^2 =	280.00

MASSDOT Contract No: 74666
Assignment: 4
Baker Project No: 143388
Subject: Statewide Bridge Inspection/Ratings for MASSDOT
Bridge No: C-10-002 **BIN:** 03G
Location: Sand Mill Road over Dry Brook, Cheshire MA

Computed by: TD **Date:** 10/21/2014
Checked by: JC **Date:** 12/5/2014
Computed by: KT **Date:** 5/7/2021
Checked by: MG **Date:** 5/19/2021

DEAD LOAD CALCULATIONS

WEST CONCRETE CURB AND RAILING

e = 10.75 ft Distance from C.G. of girder group to C.G. of the subject appurtenance
0.2068 klf Distributed load of subject appurtenance

Girder	X_{ext} (ft)	DF	Load (klf)
1	10.00	0.55	0.1139
2	6.00		0.0345
3	2.00		0.0345
4	-2.00		0.0345
5	-6.00		0.0345
6	-10.00		0.0000
		Σ =	0.2517

EAST CONCRETE CURB AND RAILING

e = -10.75 ft Distance from C.G. of girder group to C.G. of the subject appurtenance
0.2068 klf Distributed load of subject appurtenance

Girder	X_{ext} (ft)	DF	Load (klf)
1	10.00		0.0000
2	6.00		0.0345
3	2.00		0.0345
4	-2.00		0.0345
5	-6.00		0.0345
6	-10.00	0.55	0.1139
		Σ =	0.2517

Distribution of Dead Loads

$D_{1\&6}$ = **0.114** k/ft
$D_{2\text{-}5}$ = **0.069** k/ft

$D_{1\ repair}$ = **0.006** k/ft
$D_{2\ repair}$ = **0.017** k/ft
$D_{6\ repair}$ = **0.006** k/ft

$D_{dia\ W16x36}$ = **0.151** k
$D_{dia\ W16x40}$ = **0.168** k

Equal Distribution

$D_{AB\ 1\text{-}6}$ = **0.069** k/ft

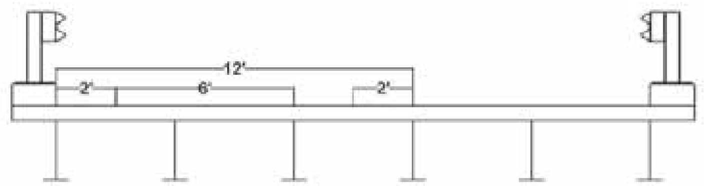
Live Load Distribution Factors

For exterior beams lever rule distribution factor is used. Ignore AASHTO Section 3.23.2.3.1.5 per 7.2.4.4B of MassDOT Bridge Manual 2020 Edition.

For interior beams the live load distribution factor for moment and shear is calculated using the AASHTO Table 3.23.1. The distribution factor for shear at supports is calculated using the lever rule (AASHTO Section 3.23.1.2).

Exterior Beams 1 & 6 - Inventory & Operating

For single & multi lane loading:



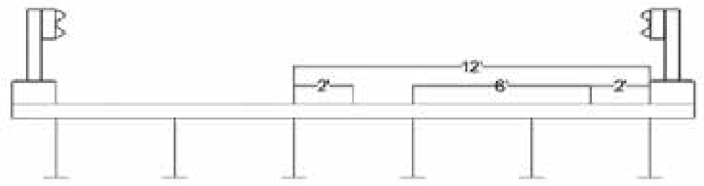
Moment and Shear

Lever Rule:

$Bm_{sp} := 4 \cdot ft$ (beam spacing)

$x_1 := 2ft + 0in = 2\,ft$ (dist. from beam to 1st wheel line)

$$\boxed{MS_{LLDF.B1} := \frac{Bm_{sp} - x_1}{Bm_{sp}} = 0.5}$$



Shear at Supports

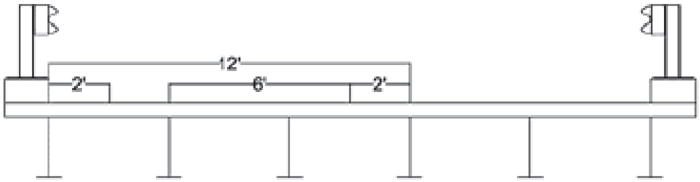
$$\boxed{SS_{LLDF.B1} := MS_{LLDF.B1} = 0.5}$$

Interior Beams 2 & 5 - Inventory & Operating

Moment and Shear

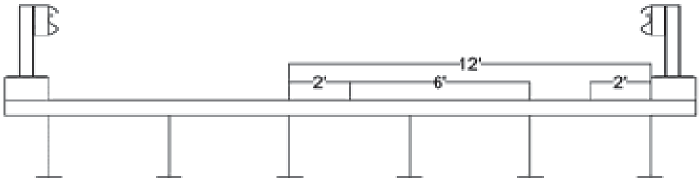
Single lane loading:

$$\boxed{MS_{LLDF.B2.s} := \frac{Bm_{sp}}{7ft} = 0.571}$$



Multi-lane loading:

$$\boxed{MS_{LLDF.B2.m} := \frac{Bm_{sp}}{5.5ft} = 0.727}$$



Shear at Supports

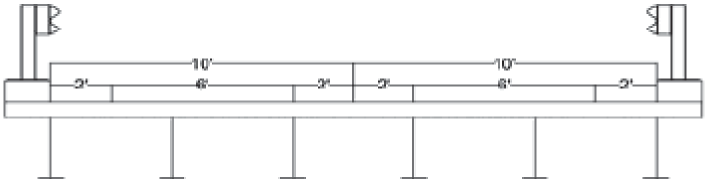
Lever Rule:

Single lane loading:

$Bm_{sp} = 4\,ft$ (beam spacing)

$x_1 := 0 \cdot ft$ (dist. from beam to 1st wheel line)

$$\boxed{SS_{LLDF.B2.s} := \frac{Bm_{sp} - x_1}{Bm_{sp}} = 1}$$



Multi lane loading:

$Bm_{sp} := 4 \cdot ft$ (beam spacing)

$x_1 := 2 \cdot ft + 0 \cdot in = 2\,ft$ (dist. from beam to 1st wheel line)

$$\boxed{SS_{LLDF.B2.m} := \frac{Bm_{sp} - x_1}{Bm_{sp}} = 0.5}$$

Interior Beams 3 & 4 - Inventory & Operating

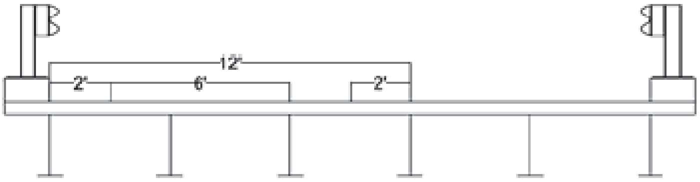
Moment and Shear

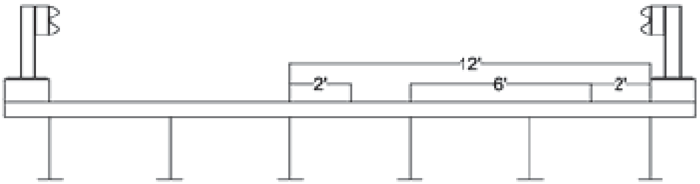
Single lane loading:

$$\boxed{MS_{LLDF.B3.s} := \frac{Bm_{sp}}{7ft} = 0.571}$$

Multi-lane loading:

$$\boxed{MS_{LLDF.B3.m} := \frac{Bm_{sp}}{5.5ft} = 0.727}$$





Shear at Supports

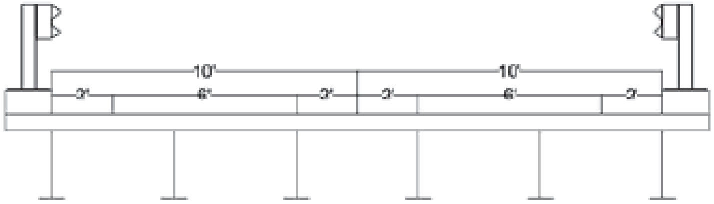
Single & multi lane loading:

Lever Rule:

$Bm_{sp} = 4\,ft$ (beam spacing)

$x_1 := 0 \cdot ft$ (dist. from beam to 1st wheel line)

$$\boxed{SS_{LLDF.B3} := \frac{Bm_{sp} - x_1}{Bm_{sp}} = 1}$$



Live Load Deflection Distribution Factors

Single Lane

$N_{lanes.s} := 1$ $N_{wheels} := 2$

$$\boxed{LLDF_{def.s} := \frac{N_{lanes.s} \cdot N_{wheels}}{6} = 0.333}$$

Multi-lane

$N_{lanes.m} := 2$

$$\boxed{LLDF_{def.m} := \frac{N_{lanes.m} \cdot N_{wheels}}{6} = 0.667}$$

SECTION LOSS SUMMARY

MASSDOT Contract No: 74666
Assignment: 4
Baker Project No: 143388
Subject: Statewide Bridge Inspection/Ratings for MASSDOT
Bridge No: C-10-002 **BIN:** 03G
Location: Sand Mill Road over Dry Brook, Cheshire MA

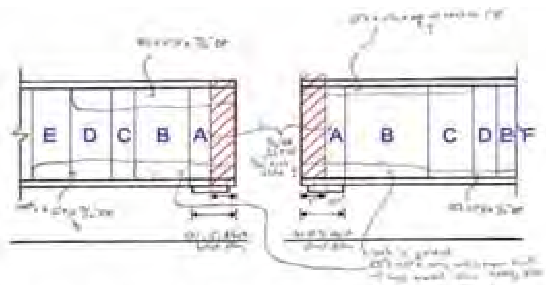
Computed by: TD **Date:** 12/15/14
Checked by: JC **Date:** 12/31/2014
Computed by: KT **Date:** 5/20/2021
Checked by: MG **Date:** 5/21/2021

SECTION LOSS SUMMARY

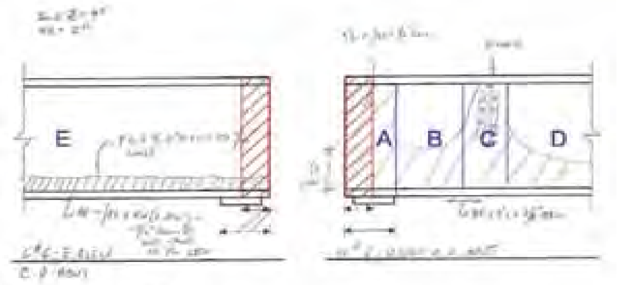
ASSUMPTIONS

- The ranges below show the actual section losses as field measured. AASHTOWare Bridge Rating limits section loss range lengths to a minimum of 0.5' long. Range lengths field measured below this limit of 0.5' were conservatively combined with adjacent ranges of higher percentage section losses or extended to 0.5' long in the AASHTOWare Bridge Rating deterioration profiles.
- The following beams have been repaired, therefore those calculations were deleted for the 2021 resubmission.
- Beam 1 was replaced from 31.38'-43.88'. Beam 2 was repaired from 0'-9.5'. Beam 6 was replaced from 33.88'-43.88'.
- The original calculations were input on the wrong side of the beam. Note that the north and south ends have been flipped to accurately depict the loss locations.

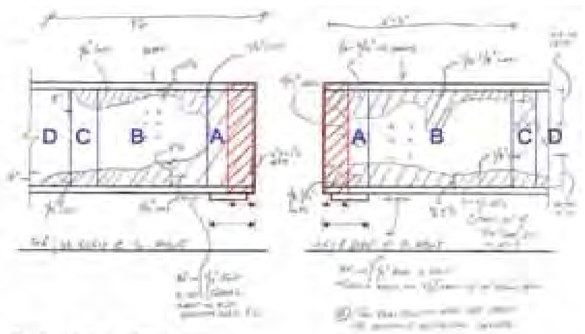
Beam	Section	As-Built Properties					As-Inspected Properties						
		Depth (in)	Web Thickness (in)	Flange Width (in)	Flange Thickness (in)	Area of web (in^2)	Start Distance (ft)	Length (ft)	End Distance (ft)	Height of Loss (in)	Depth of loss (in)	Area of loss (in^2)	Percent Loss
1	F	25.416	0.483	9.983	0.712	12.276	**30.30**	**1.08**	**31.38**	1.00	0.063	0.063	**0.51%**
6	E	25.416	0.483	9.983	0.712	12.276	**0.00**	**33.88**	**33.88**	3.00	0.063	0.188	**1.53%**
Beam	Section	Depth (in)	Web Thickness (in)	Flange Width (in)	Flange Thickness (in)	Area of flange (in^2)	Start Distance (ft)	Length (ft)	End Distance (ft)	Width of Loss (in)	Depth of loss (in)	Area of loss (in^2)	Percent Loss
6	E	25.416	0.483	9.983	0.712	7.108	**0.00**	**33.88**	**33.88**	4.99	0.025	0.122	**1.72%**



Sections are not to scale
A - 6"
B - 37"
C - 17"
D - 29"
E - 59"
F - 16"



Sections are not to scale
G2 A - 6"
G2 B - 20"
G2 C - 9"
G2 D - 64"
G6 E - 413.5"



Sections are not to scale
A - 6"
B - 68"
C - 9"
D - 36"

C14

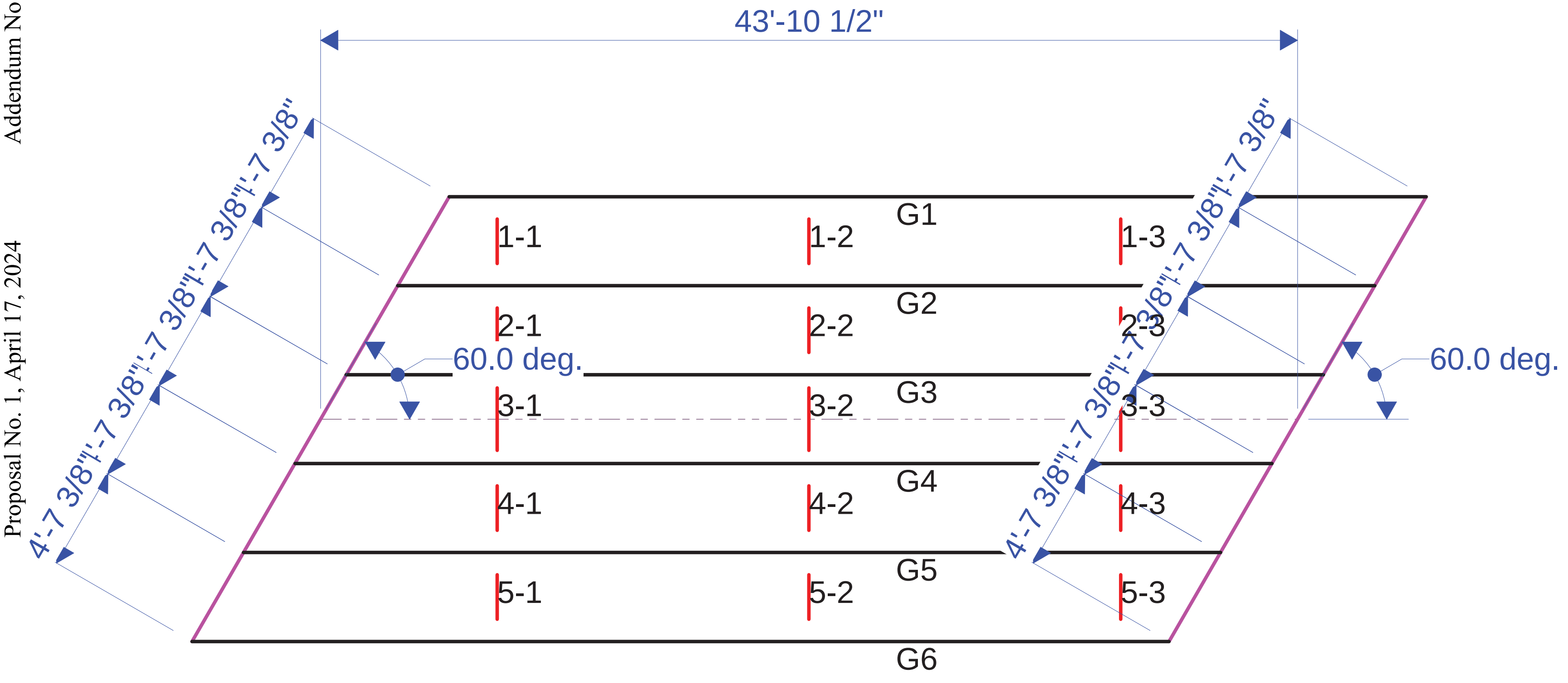
APPENDIX D

COMPUTER INPUT AND OUTPUT

COMPUTER INPUT & OUTPUT INDEX

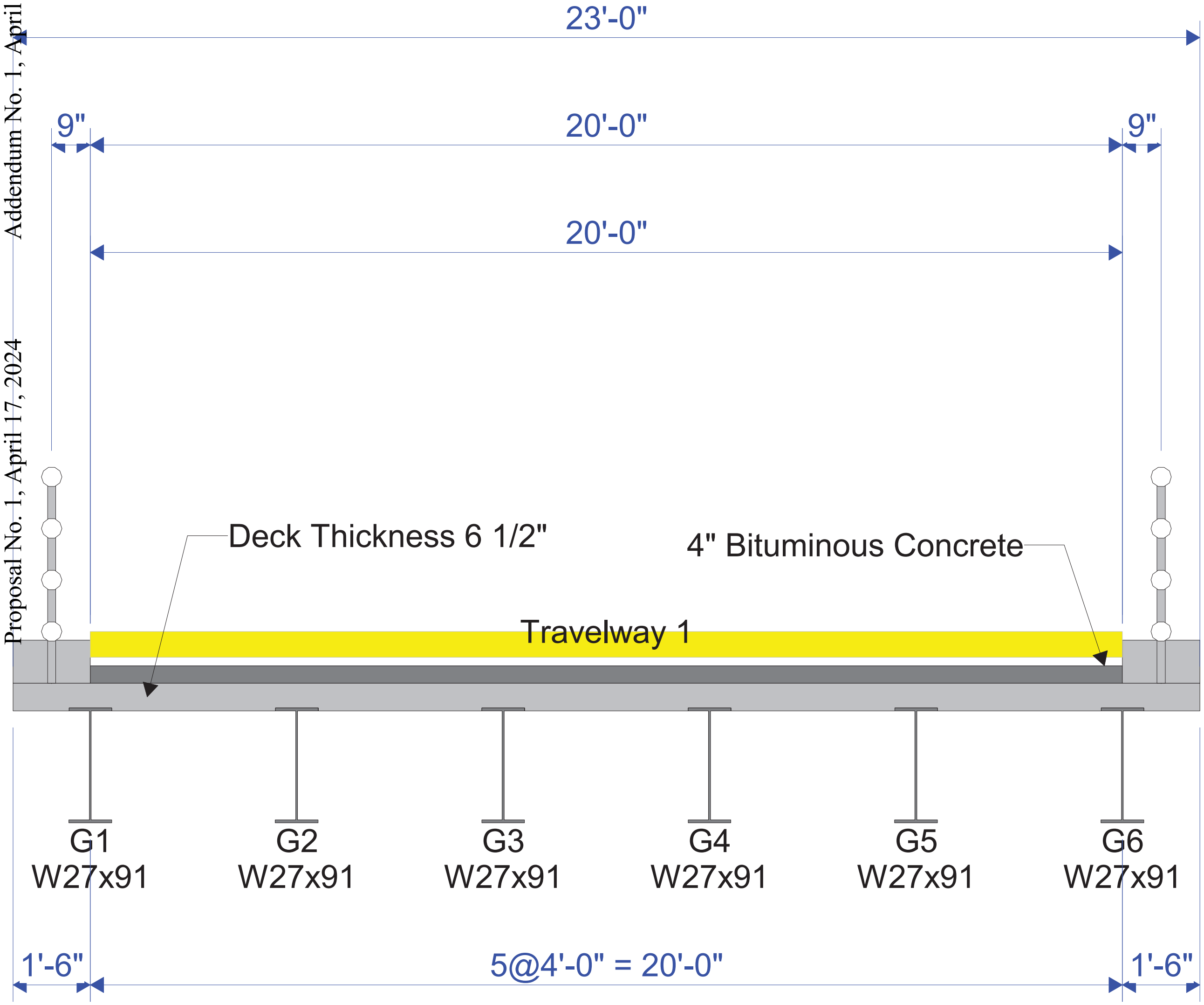
BRIDGE RATING MODEL SCHEMATICS

C-10-002 (03G)
C-10-002 - 6 Girder, Single Span System
Sand Mill Road / Dry Brook
01/08/15



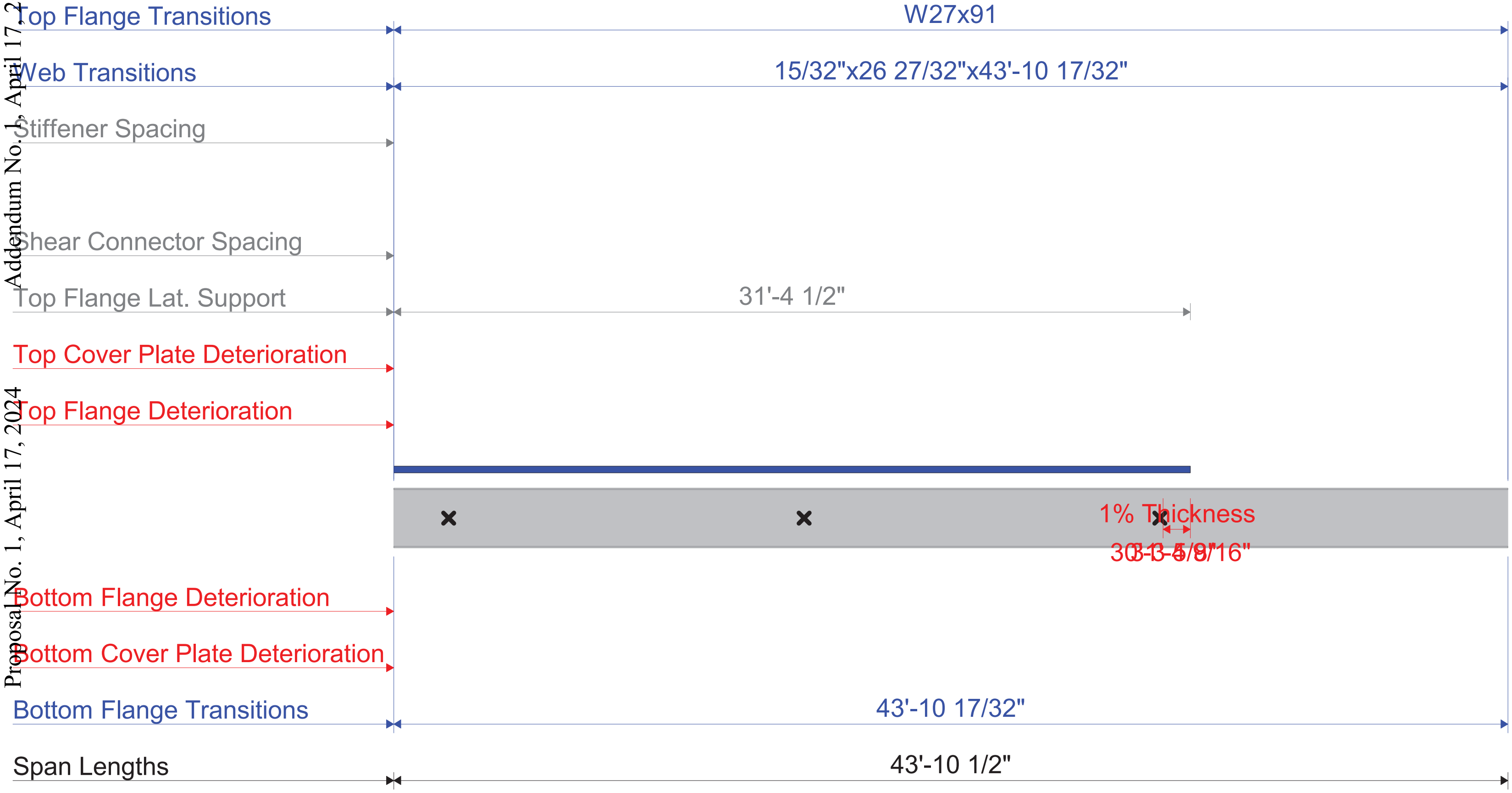
D3

C-10-002 (03G)
C-10-002 - 6 Girder, Single Span System
Sand Mill Road / Dry Brook



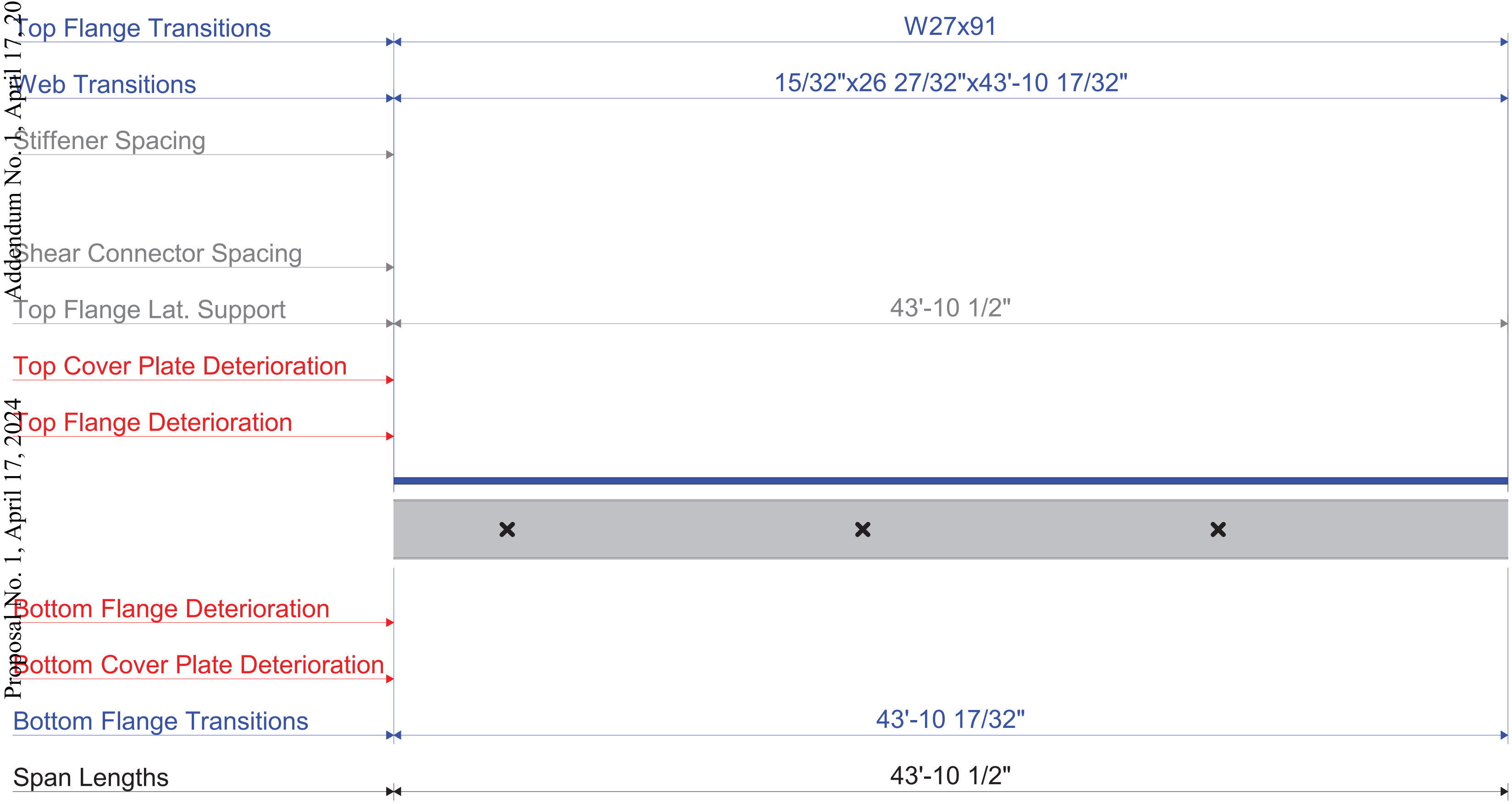
D4

C-10-002 (03G)
C-10-002 - 03G - G1
Sand Mill Road / Dry Brook
05/24/21



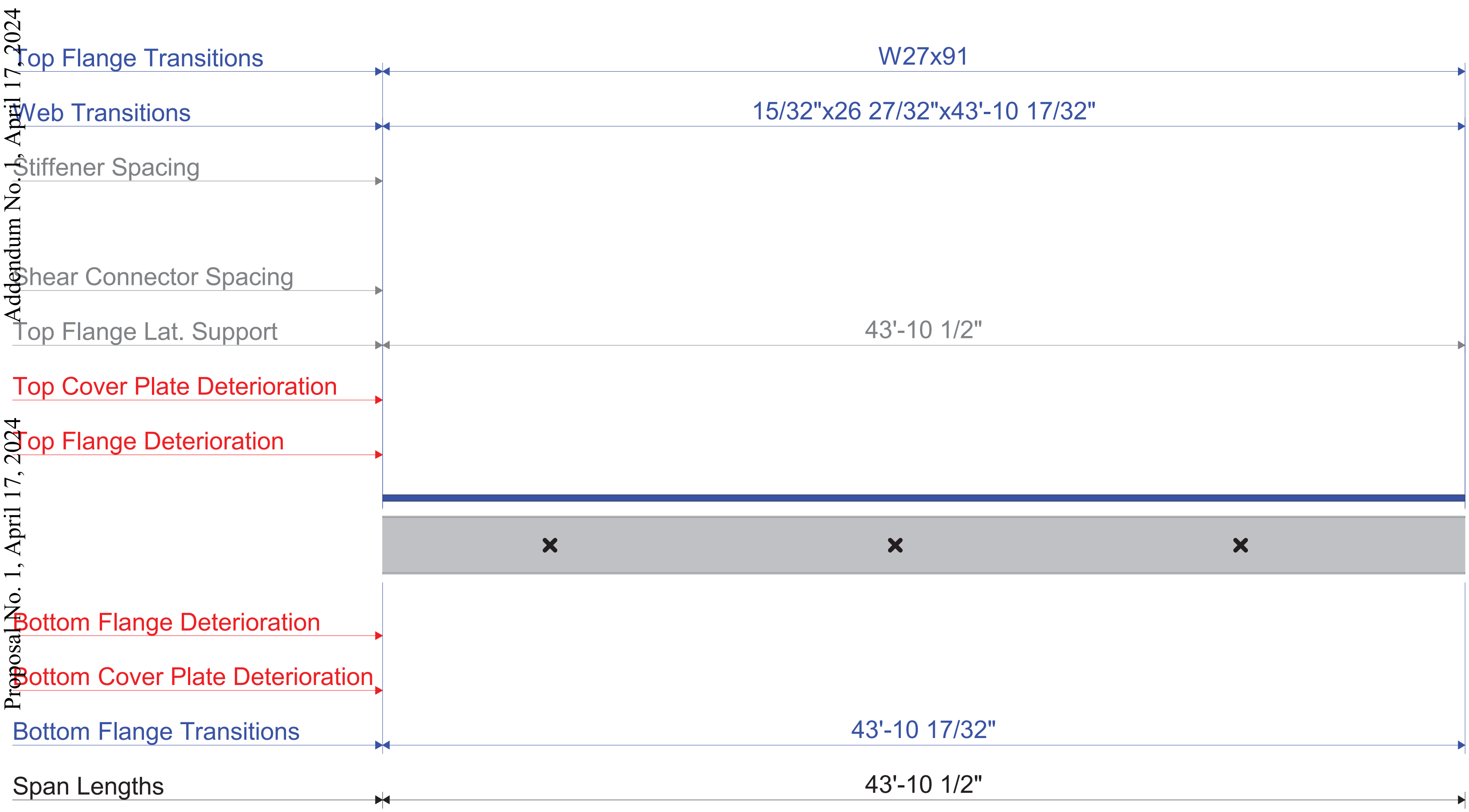
Notes:
* All flange length dimensions are horiz. (length along flange may differ).
* Transverse stiffener pairs shown in red.
* Single transverse stiffener shown in blue.
* Bearing stiffeners shown in green.
* Dimensioning starts and ends at CL bearings.
* X denotes cross frame locations.

C-10-002 (03G)
C-10-002 - 03G - G2
Sand Mill Road / Dry Brook
05/24/21



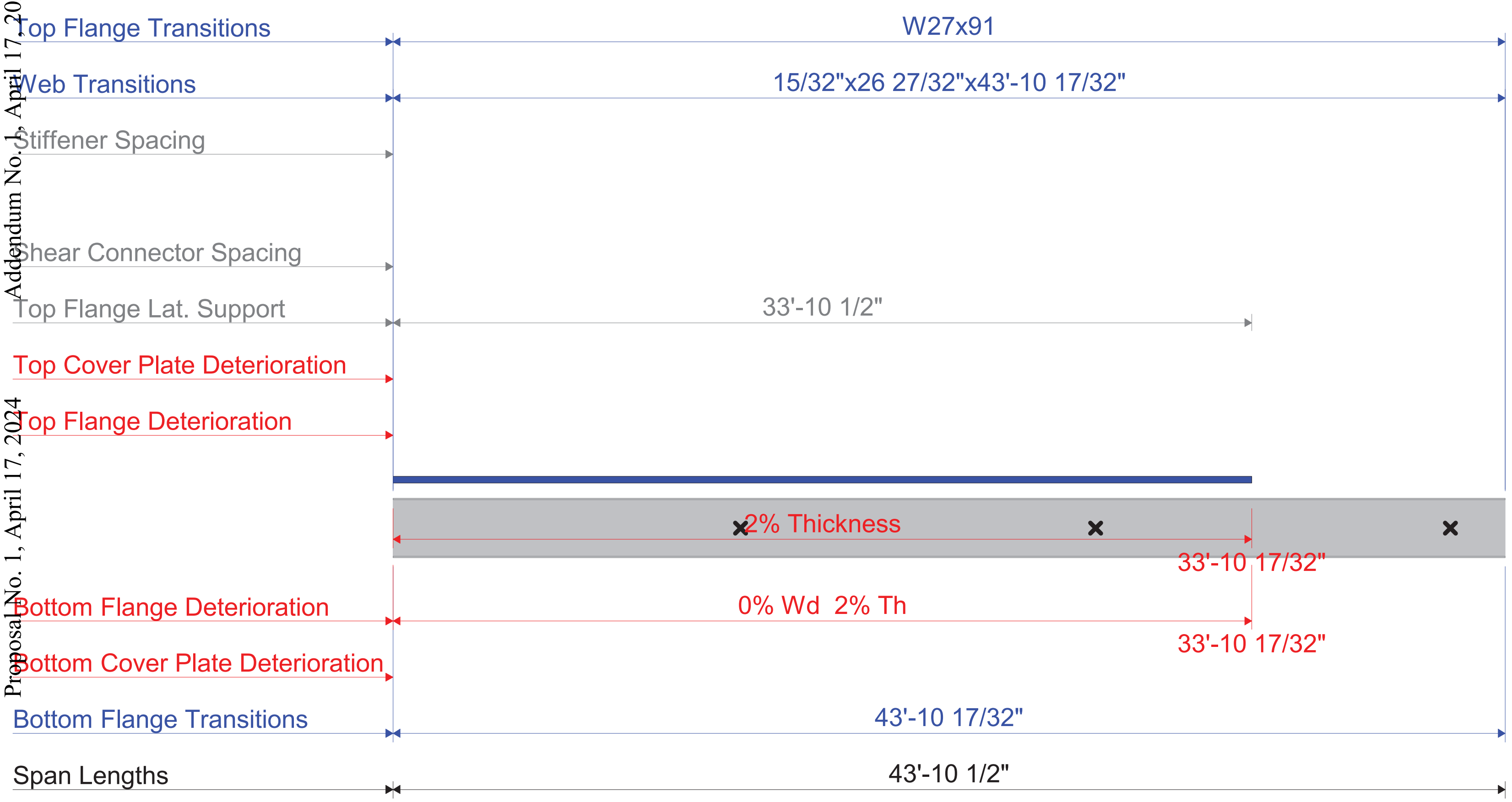
Notes:
* All flange length dimensions are horiz. (length along flange may differ).
* Transverse stiffener pairs shown in red.
* Single transverse stiffener shown in blue.
* Bearing stiffeners shown in green.
* Dimensioning starts and ends at CL bearings.
* X denotes cross frame locations.

C-10-002 (03G)
C-10-002 - 03G - G3
Sand Mill Road / Dry Brook
05/24/21



Notes:
* All flange length dimensions are horiz. (length along flange may differ).
* Transverse stiffener pairs shown in red.
* Single transverse stiffener shown in blue.
* Bearing stiffeners shown in green.
* Dimensioning starts and ends at CL bearings.
* X denotes cross frame locations.

C-10-002 (03G)
C-10-002 - 03G - G6
Sand Mill Road / Dry Brook
05/24/21



Notes:
* All flange length dimensions are horiz. (length along flange may differ).
* Transverse stiffener pairs shown in red.
* Single transverse stiffener shown in blue.
* Bearing stiffeners shown in green.
* Dimensioning starts and ends at CL bearings.
* X denotes cross frame locations.

ALLOWABLE STRESS RATING TABLES

Rating Results Summary Report

Name: C-10-002
Struct-Def: 03G

Bridge ID: C-10-002 (03G)
Member: G1

NBI: C1000203GMUNNBI
Member Alt: G1_AP

Live Load	Live Load Type	Rating Method	Rating Level	Load Rating (Ton)	Rating Factor	Location (ft)	Location Span-(%)	Limit State	Impact	Lane
1.1 - MassDOT (H20)	Axle Load	ASD	Inventory	31.38	1.569	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.1 - MassDOT (H20)	Axle Load	ASD	Operating	52.06	2.603	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.2 - MassDOT (Type 3)	Axle Load	ASD	Inventory	38.06	1.522	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.2 - MassDOT (Type 3)	Axle Load	ASD	Operating	62.95	2.518	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested
1.3 - MassDOT (Type 3S2)	Axle Load	ASD	Inventory	59.44	1.651	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.3 - MassDOT (Type 3S2)	Axle Load	ASD	Operating	98.61	2.739	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	ASD	Inventory	42.01	1.167	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	ASD	Operating	69.48	1.930	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested

Legacy AASHTO ASR Engine Version 6.8.4.3002
Analysis Preference Setting: None
Analysis Time: 05/24/2021 13:29:17
Print Time: 05/24/2021 13:29:31

Analyzed By: BrR
Page: 1/1

Rating Results Summary Report

Name: C-10-002
Struct-Def: 03G

Bridge ID: C-10-002 (03G)
Member: G1

NBI: C1000203GMUNNBI
Member Alt: G1_0L & 1L

Live Load	Live Load Type	Rating Method	Rating Level	Load Rating (Ton)	Rating Factor	Location (ft)	Location Span-(%)	Limit State	Impact	Lane
1.1 - MassDOT (H20)	Axle Load	ASD	Inventory	196.54	9.827	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested
1.1 - MassDOT (H20)	Axle Load	ASD	Operating	276.66	13.833	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested
1.2 - MassDOT (Type 3)	Axle Load	ASD	Inventory	221.56	8.862	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested
1.2 - MassDOT (Type 3)	Axle Load	ASD	Operating	311.89	12.476	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested
1.3 - MassDOT (Type 3S2)	Axle Load	ASD	Inventory	319.52	8.875	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested
1.3 - MassDOT (Type 3S2)	Axle Load	ASD	Operating	449.79	12.494	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	ASD	Inventory	233.70	6.492	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	ASD	Operating	328.99	9.139	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested

Legacy AASHTO ASR Engine Version 6.8.4.3002
Analysis Preference Setting: None
Analysis Time: 05/24/2021 13:31:02
Print Time: 05/24/2021 13:31:15

Analyzed By: BrR

Rating Results Summary Report

Name: C-10-002
Struct-Def: 03G

Bridge ID: C-10-002 (03G)
Member: G1

NBI: C1000203GMUNNBI
Member Alt: G1_0.45L/0.5L

Live Load	Live Load Type	Rating Method	Rating Level	Load Rating (Ton)	Rating Factor	Location (ft)	Location Span-(%)	Limit State	Impact	Lane
1.1 - MassDOT (H20)	Axle Load	ASD	Inventory	31.38	1.569	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.1 - MassDOT (H20)	Axle Load	ASD	Operating	52.06	2.603	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.2 - MassDOT (Type 3)	Axle Load	ASD	Inventory	38.06	1.522	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.2 - MassDOT (Type 3)	Axle Load	ASD	Operating	62.95	2.518	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested
1.3 - MassDOT (Type 3S2)	Axle Load	ASD	Inventory	59.44	1.651	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.3 - MassDOT (Type 3S2)	Axle Load	ASD	Operating	98.61	2.739	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	ASD	Inventory	42.01	1.167	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	ASD	Operating	69.48	1.930	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested

Legacy AASHTO ASR Engine Version 6.8.4.3002
Analysis Preference Setting: None
Analysis Time: 05/24/2021 14:19:39
Print Time: 05/24/2021 14:20:17

Analyzed By: BrR
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Rating Results Summary Report

Name: C-10-002
Struct-Def: 03G

Bridge ID: C-10-002 (03G)
Member: G1

NBI: C1000203GMUNNBI
Member Alt: G1_As Inspected

Live Load	Live Load Type	Rating Method	Rating Level	Load Rating (Ton)	Rating Factor	Location (ft)	Location Span-(%)	Limit State	Impact	Lane
1.1 - MassDOT (H20)	Axle Load	ASD	Inventory	38.51	1.926	30.30	1 - (69.1)	Design Flexure - Stee	As Requested	As Requested
1.1 - MassDOT (H20)	Axle Load	ASD	Operating	61.43	3.071	30.30	1 - (69.1)	Design Flexure - Stee	As Requested	As Requested
1.2 - MassDOT (Type 3)	Axle Load	ASD	Inventory	46.33	1.853	30.30	1 - (69.1)	Design Flexure - Stee	As Requested	As Requested
1.2 - MassDOT (Type 3)	Axle Load	ASD	Operating	73.90	2.956	30.30	1 - (69.1)	Design Flexure - Stee	As Requested	As Requested
1.3 - MassDOT (Type 3S2)	Axle Load	ASD	Inventory	74.01	2.056	30.30	1 - (69.1)	Design Flexure - Stee	As Requested	As Requested
1.3 - MassDOT (Type 3S2)	Axle Load	ASD	Operating	118.05	3.279	30.30	1 - (69.1)	Design Flexure - Stee	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	ASD	Inventory	50.51	1.403	30.30	1 - (69.1)	Design Flexure - Stee	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	ASD	Operating	80.57	2.238	30.30	1 - (69.1)	Design Flexure - Stee	As Requested	As Requested

Legacy AASHTO ASR Engine Version 6.8.4.3002
Analysis Preference Setting: None
Analysis Time: 05/24/2021 13:30:28
Print Time: 05/24/2021 13:30:43

Analyzed By: BrR

Rating Results Summary Report

Name: C-10-002
Struct-Def: 03G

Bridge ID: C-10-002 (03G)
Member: G2

NBI: C1000203GMUNNBI
Member Alt: G2_AP

Live Load	Live Load Type	Rating Method	Rating Level	Load Rating (Ton)	Rating Factor	Location (ft)	Location Span-(%)	Limit State	Impact	Lane
1.1 - MassDOT (H20)	Axle Load	ASD	Inventory	21.35	1.067	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.1 - MassDOT (H20)	Axle Load	ASD	Operating	35.57	1.778	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.2 - MassDOT (Type 3)	Axle Load	ASD	Inventory	25.89	1.036	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested
1.2 - MassDOT (Type 3)	Axle Load	ASD	Operating	43.00	1.720	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested
1.3 - MassDOT (Type 3S2)	Axle Load	ASD	Inventory	40.43	1.123	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.3 - MassDOT (Type 3S2)	Axle Load	ASD	Operating	67.37	1.872	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	ASD	Inventory	28.57	0.794	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	ASD	Operating	47.47	1.319	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested

Legacy AASHTO ASR Engine Version 6.8.4.3002
Analysis Preference Setting: None
Analysis Time: 05/24/2021 13:37:18
Print Time: 05/24/2021 13:37:50

Analyzed By: BrR
Page: 1/1

Rating Results Summary Report

Name: C-10-002
Struct-Def: 03G

Bridge ID: C-10-002 (03G)
Member: G2

NBI: C1000203GMUNNBI
Member Alt: G2_0L & 1L

Live Load	Live Load Type	Rating Method	Rating Level	Load Rating (Ton)	Rating Factor	Location (ft)	Location Span-(%)	Limit State	Impact	Lane
1.1 - MassDOT (H20)	Axle Load	ASD	Inventory	98.11	4.906	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested
1.1 - MassDOT (H20)	Axle Load	ASD	Operating	138.17	6.909	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested
1.2 - MassDOT (Type 3)	Axle Load	ASD	Inventory	110.60	4.424	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested
1.2 - MassDOT (Type 3)	Axle Load	ASD	Operating	155.77	6.231	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested
1.3 - MassDOT (Type 3S2)	Axle Load	ASD	Inventory	159.50	4.431	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested
1.3 - MassDOT (Type 3S2)	Axle Load	ASD	Operating	224.64	6.240	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	ASD	Inventory	116.67	3.241	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	ASD	Operating	164.31	4.564	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested

Legacy AASHTO ASR Engine Version 6.8.4.3002
Analysis Preference Setting: None
Analysis Time: 05/24/2021 13:38:49
Print Time: 05/24/2021 13:39:03

Analyzed By: BrR
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Rating Results Summary Report

Name: C-10-002
Struct-Def: 03G

Bridge ID: C-10-002 (03G)
Member: G2

NBI: C1000203GMUNNBI
Member Alt: G2_0.45L/0.5L

Live Load	Live Load Type	Rating Method	Rating Level	Load Rating (Ton)	Rating Factor	Location (ft)	Location Span-(%)	Limit State	Impact	Lane
1.1 - MassDOT (H20)	Axle Load	ASD	Inventory	21.35	1.067	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.1 - MassDOT (H20)	Axle Load	ASD	Operating	35.57	1.778	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.2 - MassDOT (Type 3)	Axle Load	ASD	Inventory	25.89	1.036	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested
1.2 - MassDOT (Type 3)	Axle Load	ASD	Operating	43.00	1.720	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested
1.3 - MassDOT (Type 3S2)	Axle Load	ASD	Inventory	40.43	1.123	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.3 - MassDOT (Type 3S2)	Axle Load	ASD	Operating	67.37	1.872	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	ASD	Inventory	28.57	0.794	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	ASD	Operating	47.47	1.319	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested

Legacy AASHTO ASR Engine Version 6.8.4.3002
Analysis Preference Setting: None
Analysis Time: 05/24/2021 14:20:37
Print Time: 05/24/2021 14:20:53

Analyzed By: BrR
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Rating Results Summary Report

Name: C-10-002
Struct-Def: 03G

Bridge ID: C-10-002 (03G)
Member: G3

NBI: C1000203GMUNNBI
Member Alt: G3_AP

Live Load	Live Load Type	Rating Method	Rating Level	Load Rating (Ton)	Rating Factor	Location (ft)	Location Span-(%)	Limit State	Impact	Lane
1.1 - MassDOT (H20)	Axle Load	ASD	Inventory	21.78	1.089	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.1 - MassDOT (H20)	Axle Load	ASD	Operating	36.01	1.800	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.2 - MassDOT (Type 3)	Axle Load	ASD	Inventory	26.42	1.057	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested
1.2 - MassDOT (Type 3)	Axle Load	ASD	Operating	43.54	1.741	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested
1.3 - MassDOT (Type 3S2)	Axle Load	ASD	Inventory	41.26	1.146	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.3 - MassDOT (Type 3S2)	Axle Load	ASD	Operating	68.20	1.894	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	ASD	Inventory	29.16	0.810	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	ASD	Operating	48.05	1.335	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested

Legacy AASHTO ASR Engine Version 6.8.4.3002
Analysis Preference Setting: None
Analysis Time: 05/24/2021 13:40:15
Print Time: 05/24/2021 13:40:34

Analyzed By: BrR

Rating Results Summary Report

Name: C-10-002
Struct-Def: 03G

Bridge ID: C-10-002 (03G)
Member: G3

NBI: C1000203GMUNNBI
Member Alt: G3_0L & 1L

Live Load	Live Load Type	Rating Method	Rating Level	Load Rating (Ton)	Rating Factor	Location (ft)	Location Span-(%)	Limit State	Impact	Lane
1.1 - MassDOT (H20)	Axle Load	ASD	Inventory	98.44	4.922	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested
1.1 - MassDOT (H20)	Axle Load	ASD	Operating	138.51	6.925	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested
1.2 - MassDOT (Type 3)	Axle Load	ASD	Inventory	110.98	4.439	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested
1.2 - MassDOT (Type 3)	Axle Load	ASD	Operating	156.15	6.246	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested
1.3 - MassDOT (Type 3S2)	Axle Load	ASD	Inventory	160.05	4.446	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested
1.3 - MassDOT (Type 3S2)	Axle Load	ASD	Operating	225.18	6.255	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	ASD	Inventory	117.06	3.252	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	ASD	Operating	164.70	4.575	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested

Legacy AASHTO ASR Engine Version 6.8.4.3002
Analysis Preference Setting: None
Analysis Time: 05/24/2021 13:42:06
Print Time: 05/24/2021 13:42:16

Analyzed By: BrR

Rating Results Summary Report

Name: C-10-002
Struct-Def: 03G

Bridge ID: C-10-002 (03G)
Member: G3

NBI: C1000203GMUNNBI
Member Alt: G3_0.45L/0.5L

Live Load	Live Load Type	Rating Method	Rating Level	Load Rating (Ton)	Rating Factor	Location (ft)	Location Span-(%)	Limit State	Impact	Lane
1.1 - MassDOT (H20)	Axle Load	ASD	Inventory	21.78	1.089	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.1 - MassDOT (H20)	Axle Load	ASD	Operating	36.01	1.800	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.2 - MassDOT (Type 3)	Axle Load	ASD	Inventory	26.42	1.057	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested
1.2 - MassDOT (Type 3)	Axle Load	ASD	Operating	43.54	1.741	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested
1.3 - MassDOT (Type 3S2)	Axle Load	ASD	Inventory	41.26	1.146	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.3 - MassDOT (Type 3S2)	Axle Load	ASD	Operating	68.20	1.894	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	ASD	Inventory	29.16	0.810	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	ASD	Operating	48.05	1.335	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested

Legacy AASHTO ASR Engine Version 6.8.4.3002
Analysis Preference Setting: None
Analysis Time: 05/24/2021 14:21:05
Print Time: 05/24/2021 14:21:24

Analyzed By: BrR
Page: 1/1

Rating Results Summary Report

Name: C-10-002
Struct-Def: 03G

Bridge ID: C-10-002 (03G)
Member: G6

NBI: C1000203GMUNNBI
Member Alt: G6_As Inspected_AP

Live Load	Live Load Type	Rating Method	Rating Level	Load Rating (Ton)	Rating Factor	Location (ft)	Location Span-(%)	Limit State	Impact	Lane
1.1 - MassDOT (H20)	Axle Load	ASD	Inventory	29.83	1.492	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.1 - MassDOT (H20)	Axle Load	ASD	Operating	49.95	2.497	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.2 - MassDOT (Type 3)	Axle Load	ASD	Inventory	36.18	1.447	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.2 - MassDOT (Type 3)	Axle Load	ASD	Operating	60.58	2.423	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.3 - MassDOT (Type 3S2)	Axle Load	ASD	Inventory	56.50	1.570	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.3 - MassDOT (Type 3S2)	Axle Load	ASD	Operating	94.61	2.628	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	ASD	Inventory	40.32	1.120	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	ASD	Operating	67.50	1.875	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested

Legacy AASHTO ASR Engine Version 6.8.4.3002
Analysis Preference Setting: None
Analysis Time: 05/25/2021 15:04:01
Print Time: 05/25/2021 15:04:37

D20

Analyzed By: BrR
Page: 1/1

Rating Results Summary Report

Name: C-10-002
Struct-Def: 03G

Bridge ID: C-10-002 (03G)
Member: G6

NBI: C1000203GMUNNBI
Member Alt: G6_As Inspected_0L

Live Load	Live Load Type	Rating Method	Rating Level	Load Rating (Ton)	Rating Factor	Location (ft)	Location Span-(%)	Limit State	Impact	Lane
1.1 - MassDOT (H20)	Axle Load	ASD	Inventory	195.47	9.774	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested
1.1 - MassDOT (H20)	Axle Load	ASD	Operating	275.17	13.759	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested
1.2 - MassDOT (Type 3)	Axle Load	ASD	Inventory	220.36	8.815	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested
1.2 - MassDOT (Type 3)	Axle Load	ASD	Operating	310.21	12.409	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested
1.3 - MassDOT (Type 3S2)	Axle Load	ASD	Inventory	317.79	8.827	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested
1.3 - MassDOT (Type 3S2)	Axle Load	ASD	Operating	447.36	12.427	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	ASD	Inventory	232.44	6.457	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	ASD	Operating	327.22	9.089	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested

Legacy AASHTO ASR Engine Version 6.8.4.3002
Analysis Preference Setting: None
Analysis Time: 05/24/2021 13:55:22
Print Time: 05/24/2021 13:55:35

Analyzed By: BrR

Rating Results Summary Report

Name: C-10-002
Struct-Def: 03G

Bridge ID: C-10-002 (03G)
Member: G6

NBI: C1000203GMUNNBI
Member Alt: G6_As Inspected_0.45L/0.5L

Live Load	Live Load Type	Rating Method	Rating Level	Load Rating (Ton)	Rating Factor	Location (ft)	Location Span-(%)	Limit State	Impact	Lane
1.1 - MassDOT (H20)	Axle Load	ASD	Inventory	29.83	1.492	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.1 - MassDOT (H20)	Axle Load	ASD	Operating	49.95	2.497	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.2 - MassDOT (Type 3)	Axle Load	ASD	Inventory	36.18	1.447	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.2 - MassDOT (Type 3)	Axle Load	ASD	Operating	60.42	2.417	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested
1.3 - MassDOT (Type 3S2)	Axle Load	ASD	Inventory	56.50	1.570	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.3 - MassDOT (Type 3S2)	Axle Load	ASD	Operating	94.61	2.628	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	ASD	Inventory	39.96	1.110	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	ASD	Operating	66.69	1.852	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested

Legacy AASHTO ASR Engine Version 6.8.4.3002
Analysis Preference Setting: None
Analysis Time: 05/24/2021 14:41:36
Print Time: 05/24/2021 14:42:40

Analyzed By: BrR

LOAD FACTOR RATING TABLES

Rating Results Summary Report

Name: C-10-002
Struct-Def: 03G

Bridge ID: C-10-002 (03G)
Member: G1

NBI: C1000203GMUNNBI
Member Alt: G1_AP

Live Load	Live Load Type	Rating Method	Rating Level	Load Rating (Ton)	Rating Factor	Location (ft)	Location Span-(%)	Limit State	Impact	Lane
1.4 - MassDOT (HS20)	Axle Load	LFD	Inventory	43.19	1.200	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	LFD	Operating	72.12	2.003	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested

Legacy AASHTO LFR Engine Version 6.8.4.3002
Analysis Preference Setting: None
Analysis Time: 05/24/2021 14:55:27
Print Time: 05/24/2021 14:55:46

Analyzed By: BrR
Page: 1/1

Rating Results Summary Report

Name: C-10-002
Struct-Def: 03G

Bridge ID: C-10-002 (03G)
Member: G1

NBI: C1000203GMUNNBI
Member Alt: G1_0L & 1L

Live Load	Live Load Type	Rating Method	Rating Level	Load Rating (Ton)	Rating Factor	Location (ft)	Location Span-(%)	Limit State	Impact	Lane
1.4 - MassDOT (HS20)	Axle Load	LFD	Inventory	195.17	5.421	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	LFD	Operating	325.93	9.054	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested

Legacy AASHTO LFR Engine Version 6.8.4.3002
Analysis Preference Setting: None
Analysis Time: 05/24/2021 14:58:36
Print Time: 05/24/2021 14:59:27

Analyzed By: BrR

Rating Results Summary Report

Name: C-10-002
Struct-Def: 03G

Bridge ID: C-10-002 (03G)
Member: G1

NBI: C1000203GMUNNBI
Member Alt: G1_0.45L/0.5L

Live Load	Live Load Type	Rating Method	Rating Level	Load Rating (Ton)	Rating Factor	Location (ft)	Location Span-(%)	Limit State	Impact	Lane
1.4 - MassDOT (HS20)	Axle Load	LFD	Inventory	43.19	1.200	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	LFD	Operating	72.12	2.003	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested

Legacy AASHTO LFR Engine Version 6.8.4.3002
Analysis Preference Setting: None
Analysis Time: 05/24/2021 14:59:39
Print Time: 05/24/2021 14:59:50

Analyzed By: BrR
Page: 1/1

Rating Results Summary Report

Name: C-10-002
Struct-Def: 03G

Bridge ID: C-10-002 (03G)
Member: G1

NBI: C1000203GMUNNBI
Member Alt: G1_As Inspected

Live Load	Live Load Type	Rating Method	Rating Level	Load Rating (Ton)	Rating Factor	Location (ft)	Location Span-(%)	Limit State	Impact	Lane
1.4 - MassDOT (HS20)	Axle Load	LFD	Inventory	49.98	1.388	30.30	1 - (69.1)	Design Flexure - Stee	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	LFD	Operating	83.46	2.318	30.30	1 - (69.1)	Design Flexure - Stee	As Requested	As Requested

Legacy AASHTO LFR Engine Version 6.8.4.3002
Analysis Preference Setting: None
Analysis Time: 05/24/2021 14:58:06
Print Time: 05/24/2021 14:58:21

Analyzed By: BrR

Rating Results Summary Report

Name: C-10-002
Struct-Def: 03G

Bridge ID: C-10-002 (03G)
Member: G2

NBI: C1000203GMUNNBI
Member Alt: G2_AP

Live Load	Live Load Type	Rating Method	Rating Level	Load Rating (Ton)	Rating Factor	Location (ft)	Location Span-(%)	Limit State	Impact	Lane
1.4 - MassDOT (HS20)	Axle Load	LFD	Inventory	29.51	0.820	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	LFD	Operating	49.28	1.369	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested

Legacy AASHTO LFR Engine Version 6.8.4.3002
Analysis Preference Setting: None
Analysis Time: 05/24/2021 14:56:39
Print Time: 05/24/2021 14:56:53

Analyzed By: BrR

Rating Results Summary Report

Name: C-10-002
Struct-Def: 03G

Bridge ID: C-10-002 (03G)
Member: G2

NBI: C1000203GMUNNBI
Member Alt: G2_0L & 1L

Live Load	Live Load Type	Rating Method	Rating Level	Load Rating (Ton)	Rating Factor	Location (ft)	Location Span-(%)	Limit State	Impact	Lane
1.4 - MassDOT (HS20)	Axle Load	LFD	Inventory	97.47	2.708	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	LFD	Operating	162.78	4.522	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested

Legacy AASHTO LFR Engine Version 6.8.4.3002
Analysis Preference Setting: None
Analysis Time: 05/24/2021 15:00:03
Print Time: 05/24/2021 15:00:16

Analyzed By: BrR

Rating Results Summary Report

Name: C-10-002
Struct-Def: 03G

Bridge ID: C-10-002 (03G)
Member: G2

NBI: C1000203GMUNNBI
Member Alt: G2_0.45L/0.5L

Live Load	Live Load Type	Rating Method	Rating Level	Load Rating (Ton)	Rating Factor	Location (ft)	Location Span-(%)	Limit State	Impact	Lane
1.4 - MassDOT (HS20)	Axle Load	LFD	Inventory	29.51	0.820	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	LFD	Operating	49.28	1.369	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested

Legacy AASHTO LFR Engine Version 6.8.4.3002
Analysis Preference Setting: None
Analysis Time: 05/24/2021 15:00:27
Print Time: 05/24/2021 15:00:52

Analyzed By: BrR
Page: 1/1

Rating Results Summary Report

Name: C-10-002
Struct-Def: 03G

Bridge ID: C-10-002 (03G)
Member: G3

NBI: C1000203GMUNNBI
Member Alt: G3_AP

Live Load	Live Load Type	Rating Method	Rating Level	Load Rating (Ton)	Rating Factor	Location (ft)	Location Span-(%)	Limit State	Impact	Lane
1.4 - MassDOT (HS20)	Axle Load	LFD	Inventory	29.86	0.830	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	LFD	Operating	49.87	1.385	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested

Legacy AASHTO LFR Engine Version 6.8.4.3002
Analysis Preference Setting: None
Analysis Time: 05/24/2021 14:57:08
Print Time: 05/24/2021 14:57:26

Analyzed By: BrR

Rating Results Summary Report

Name: C-10-002
Struct-Def: 03G

Bridge ID: C-10-002 (03G)
Member: G3

NBI: C1000203GMUNNBI
Member Alt: G3_0L & 1L

Live Load	Live Load Type	Rating Method	Rating Level	Load Rating (Ton)	Rating Factor	Location (ft)	Location Span-(%)	Limit State	Impact	Lane
1.4 - MassDOT (HS20)	Axle Load	LFD	Inventory	97.71	2.714	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	LFD	Operating	163.18	4.533	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested

Legacy AASHTO LFR Engine Version 6.8.4.3002
Analysis Preference Setting: None
Analysis Time: 05/24/2021 15:01:07
Print Time: 05/24/2021 15:01:20

Analyzed By: BrR

Rating Results Summary Report

Name: C-10-002
Struct-Def: 03G

Bridge ID: C-10-002 (03G)
Member: G3

NBI: C1000203GMUNNBI
Member Alt: G3_0.45L/0.5L

Live Load	Live Load Type	Rating Method	Rating Level	Load Rating (Ton)	Rating Factor	Location (ft)	Location Span-(%)	Limit State	Impact	Lane
1.4 - MassDOT (HS20)	Axle Load	LFD	Inventory	29.86	0.830	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	LFD	Operating	49.87	1.385	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested

Legacy AASHTO LFR Engine Version 6.8.4.3002
Analysis Preference Setting: None
Analysis Time: 05/24/2021 15:01:30
Print Time: 05/24/2021 15:01:44

Analyzed By: BrR

Rating Results Summary Report

Name: C-10-002
Struct-Def: 03G

Bridge ID: C-10-002 (03G)
Member: G6

NBI: C1000203GMUNNBI
Member Alt: G6_As Inspected_AP

Live Load	Live Load Type	Rating Method	Rating Level	Load Rating (Ton)	Rating Factor	Location (ft)	Location Span-(%)	Limit State	Impact	Lane
1.4 - MassDOT (HS20)	Axle Load	LFD	Inventory	41.99	1.166	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	LFD	Operating	70.12	1.948	21.94	1 - (50.0)	Design Flexure - Stee	As Requested	As Requested

Legacy AASHTO LFR Engine Version 6.8.4.3002
Analysis Preference Setting: None
Analysis Time: 05/25/2021 15:07:18
Print Time: 05/25/2021 15:07:52

Analyzed By: BrR

Rating Results Summary Report

Name: C-10-002
Struct-Def: 03G

Bridge ID: C-10-002 (03G)
Member: G6

NBI: C1000203GMUNNBI
Member Alt: G6_As Inspected_0L

Live Load	Live Load Type	Rating Method	Rating Level	Load Rating (Ton)	Rating Factor	Location (ft)	Location Span-(%)	Limit State	Impact	Lane
1.4 - MassDOT (HS20)	Axle Load	LFD	Inventory	192.01	5.334	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	LFD	Operating	320.65	8.907	0.00	1 - (0.0)	Design Shear - Steel	As Requested	As Requested

Legacy AASHTO LFR Engine Version 6.8.4.3002
Analysis Preference Setting: None
Analysis Time: 05/24/2021 15:01:58
Print Time: 05/24/2021 15:02:09

Analyzed By: BrR

Rating Results Summary Report

Name: C-10-002
Struct-Def: 03G

Bridge ID: C-10-002 (03G)
Member: G6

NBI: C1000203GMUNNBI
Member Alt: G6_As Inspected_0.45L/0.5L

Live Load	Live Load Type	Rating Method	Rating Level	Load Rating (Ton)	Rating Factor	Location (ft)	Location Span-(%)	Limit State	Impact	Lane
1.4 - MassDOT (HS20)	Axle Load	LFD	Inventory	41.47	1.152	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested
1.4 - MassDOT (HS20)	Axle Load	LFD	Operating	69.26	1.924	19.75	1 - (45.0)	Design Flexure - Stee	As Requested	As Requested

Legacy AASHTO LFR Engine Version 6.8.4.3002
Analysis Preference Setting: None
Analysis Time: 05/24/2021 15:02:22
Print Time: 05/24/2021 15:02:35

Analyzed By: BrR

APPENDIX E

OLD RATING REPORT FOR REFERENCE

BRIDGE RATING

Prepared For

THE DEPARTMENT OF PUBLIC WORKS
COMMONWEALTH OF MASSACHUSETTS

CHESHIRE, MASSACHUSETTS
SAND ROAD OVER DRY BROOK
C-10-2
TWN-105-001-100

JAMES
C.
DONEGAN
No. 29064

Date of Inspection: March 24, 1982
Date of Rating: September 28, 1982

SCHOENFELD ASSOCIATES, INC.
210 South Street
Boston, Massachusetts 02111

BRIDGE RATING

Prepared For

THE DEPARTMENT OF PUBLIC WORKS
COMMONWEALTH OF MASSACHUSETTS

CHESHIRE, MASSACHUSETTS
SAND ROAD OVER DRY BROOK
C-10-2
TWN-105-001-100

JAMES
C.
DONEGAN
No. 29044

Date of Inspection: March 24, 1982
Date of Rating: September 28, 1982

SCHOENFELD ASSOCIATES, INC.
210 South Street
Boston, Massachusetts 02111

INDEX

APPENDICES

Date of Inspection: March 24, 1982
Date of Rating: September 28, 1982

Massachusetts Bridge Ratings
SUMMARY SHEET

Town/City	Location	Bridge No.	Maintenance No.
Cheshire	Sand Road Over Dry Brook	C-10-2	TWN-105-001-100

	Rating Vehicle		
	H-20	Type-3	Type-3S2
Inventory Rating	18.1	22.1	34.5
Operating Rating	26.4	37.6	58.8

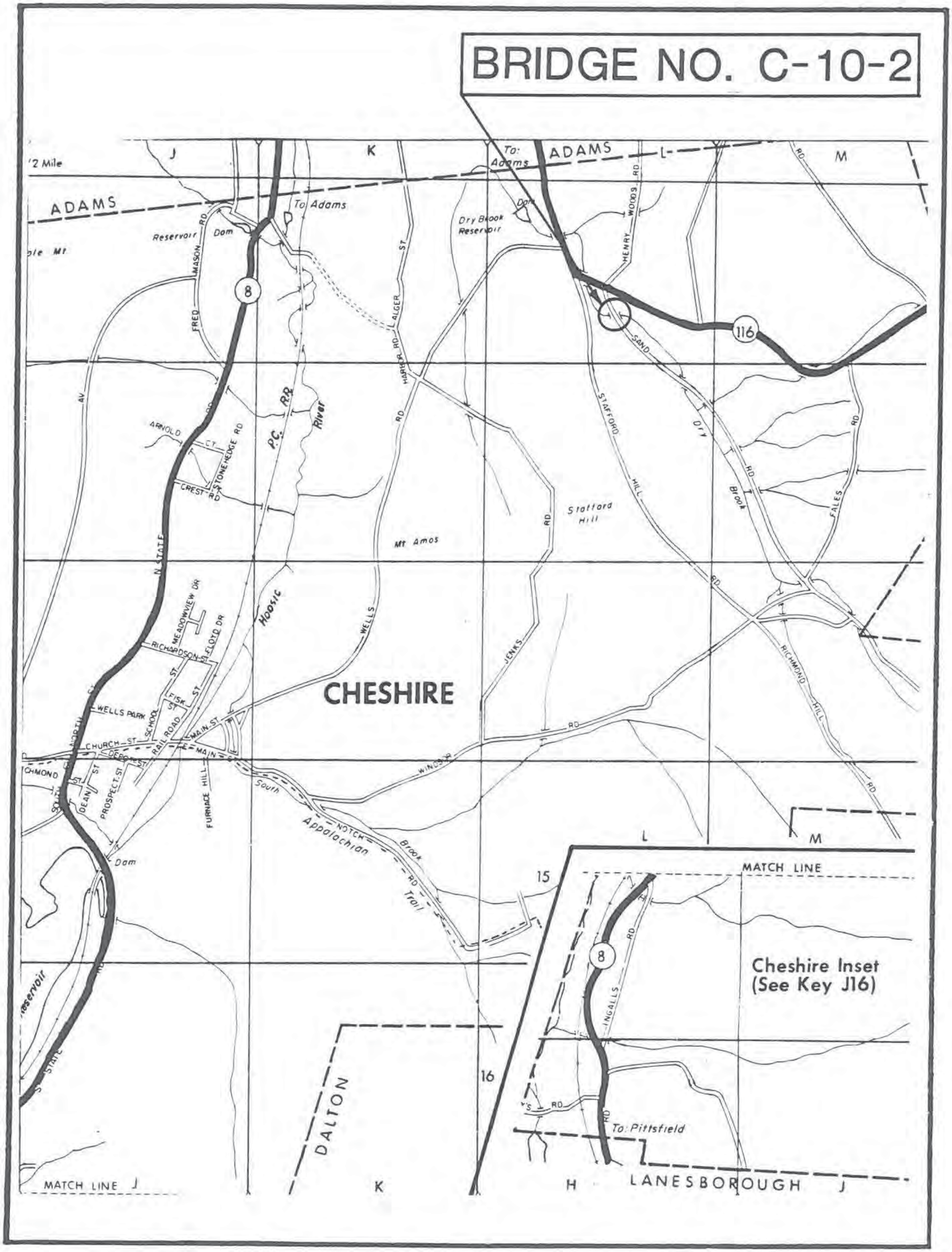
JAMES C. DONEGAN No. 29064

Breakdown of Bridge Ratings

Town/City	Location	Bridge No.	Maintenance No.
Cheshire	Sand Road Over Dry Brook	C-10-2	TWN-105-001-100

Bridge Component	Inventory Rating (tons)			Operating Rating (tons)		
	H - 20	Type 3	Type 3S2	H - 20	Type 3	Type 3S2
Reinforced Conc. Deck	18.7	36.8	57.8	26.4	51.9	81.5
Int. Steel Stringers	18.1	22.1	34.5	30.8	37.6	58.8
Ext. Steel Stringers	25.6	31.3	48.8	44.2	53.8	77.5

comments:



Location Map

DESCRIPTION OF BRIDGE

CHESHIRE C-10-2

SAND ROAD OVER DRY BROOK

The Cheshire Bridge is a single span structure constructed in 1939. The span length is 43 feet, 10-1/2 inches. The clear distance curb to curb is 20 feet. The overall width of the span is 23 feet.

The deck consists of a 6-1/2 inch thick reinforced concrete slab with a bituminous concrete wearing surface of approximately 3 inches. The reinforcing steel is 5/8 inch diameter bars spaced at 6-1/2 inches on center, top and bottom. The clear cover of concrete is assumed to be 2 inches to the top and 1-1/2 inches to the bottom.

The bridge has six longitudinal stringers of rolled steel spaced at 4 feet on center. All stringers are 27 WF 91 shapes.

The construction plans for this bridge were available and consist of one sheet entitled "Proposed Bridge, Cheshire, Bridge No. 4 (Revised), Sand Mill-Savoy Road Over Stony Brook."

RATING ANALYSIS ASSUMPTIONS AND CRITERIA

CHESHIRE C-10-2

SAND ROAD OVER DRY BROOK

The Cheshire Bridge was constructed in 1939. In accordance with Massachusetts Department of Public Works Guidelines and Applicable AASHTO Publications: "Manual for Maintenance Inspection of Bridges, 1978" and "Standard Specifications for Highway Bridges, 12th Edition, 1977" the following material strengths were used in performing the analysis:

Concrete

f'c = 3,000 psi

fc = 1,200 psi (inventory)

fc = 1,650 psi (operating)

Reinforcing Steel

fs = 18,000 psi (inventory)

fs = 25,000 psi (operating)

n = 10

Structural Steel

fy = 33,000 psi

fb = 18,150 psi (inventory)

fb = 24,750 psi (operating)

Concrete Deck Slab

The deck of the Cheshire Bridge is a 6-1/2 inch thick concrete slab. There is a wearing surface of 3 inches of bituminous concrete pavement. The reinforcing steel is 5/8 inch diameter bars placed 6-1/2 inches on center, top and bottom.

A visual inspection of the deck slab was performed by personnel of Schoenfeld Associates, Inc. It was determined that the slab currently retains 90% of the design capacity for resisting stresses induced by loads. This was considered during calculations and is reflected in the ratings.

Steel Stringers

The six steel stringers are rolled 24 WF 91 sections. All stringers are spaced 4 feet on center. Field inspections conducted by personnel of Schoenfeld Associates, Inc. determined the stringers to currently retain 90% of their section effectiveness.

Substructure

The abutments and wingwalls of the Cheshire Bridge are reinforced concrete gravity structures. Inspection by personnel of Schoenfeld Associates, Inc. revealed a major crack in the southeast wingwall. There is some spalling and efflorescence on the northeast wingwall. No structural analysis of the substructure was performed.

EVALUATION OF RATING AND RECOMMENDATIONS

CHESHIRE C-10-2

SAND ROAD OVER DRY BROOK

The Cheshire Bridge rating is governed by the moment capacity of the longitudinal steel stringers. The inventory rating and operating rating for an H-20 truck are 18.1 tons and 26.4 tons respectively. The inventory rating and operating rating for a Type 3 truck are 22.1 tons and 37.6 tons respectively. The inventory rating and operating rating for a Type 3S2 truck are 34.5 tons and 58.8 tons respectively.

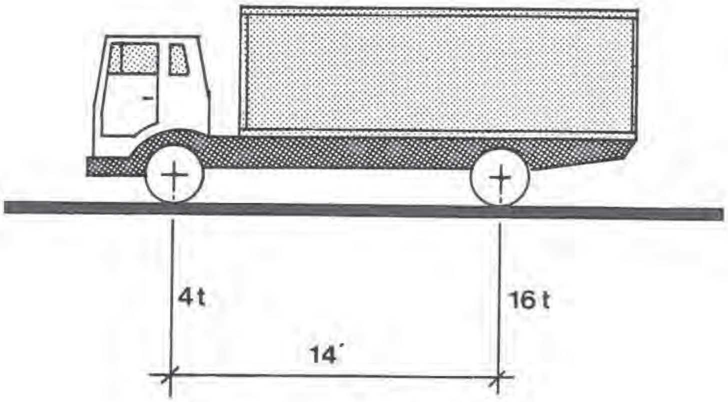
It is recommended by Schoenfeld Associates, Inc. that the stringers of this bridge be sandblasted and painted to prevent any further corrosion. It is further recommended that the defects in the wingwalls be repaired.

It is also recommended that this bridge be closed to all traffic exceeding the following limits; 18 tons for an H-20 loading; 22 tons for a Type 3 loading and 34 tons for a Type 3S2 loading.

To increase the load carrying capacity of this bridge to approximately 20 tons, it is recommended additional stringers be added to raise the rating of the concrete deck for an H-20 truck to 20 tons, and the load carrying capacity of the existing stringers be increased by the addition of a steel plate welded to the bottom flange.

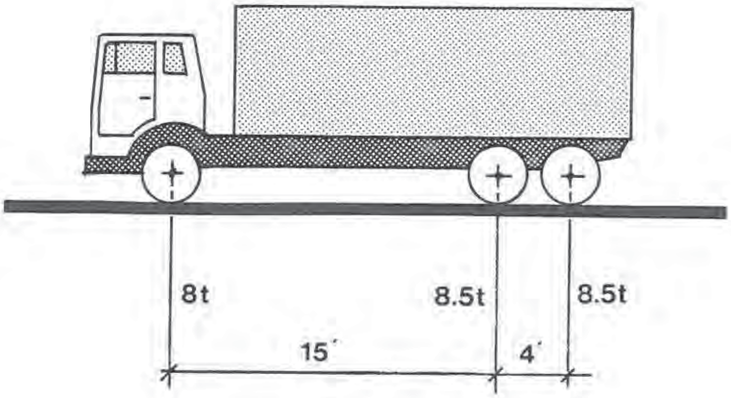
Massachusetts Bridge Ratings

TRUCK LOADINGS



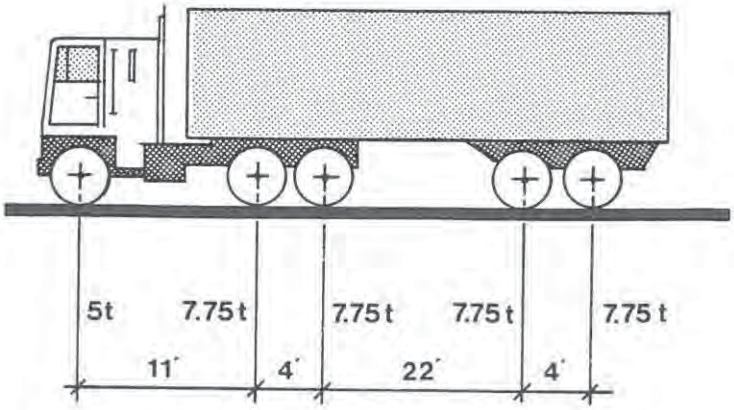
**Total Weight
20 Tons**

H-20



**Total Weight
25 Tons**

Type 3



**Total Weight
36 Tons**

Type 3S2

SCHOENFELD ASSOCIATES INC.

Date of Inspection: March 24, 1982

appendix A

Massachusetts Department of Public Works Field Inspection Report

MASSACHUSETTS DEPARTMENT OF PUBLIC WORKS

STRUCTURE INVENTORY AND APPRAISAL

BRIDGE NO. C-10-2 BRIDGE MNT. NO. TWN 105 001100 PAGE 1

ITEM NO. | CARD CONTROL NUMBER | CARD COL.

IDENTIFICATION

CODE

1 State MA
2 Highway District 01
3 County BERKSHIRE 4 City/Town CHESHIRE
5 Inventory Route 151 000 000 Principal ☒ Other ☐
6 Features Intersected DRY BROOK
7 Facility Carried by Structure SAND ROAD
8 Structure No. of
9
10 Vertical Clearance NO RESTRICTION
11 Milepoint 1.87
12 Road Section No. NONE
13 Defense Bridge Letter NONE
14 Defense Milepoint NONE
15 Defense Section Length NONE
16 Latitude 42° 35.1'
17 Longitude 73° 06.7'
18 Physical Vulnerability
19 Bypass Detour Length 2.2 MILES
20 Toll Bridge On Toll Road ☐ On Free Road ☒
21 Custodian TOWN OF CHESHIRE
22 Owner TOWN OF CHESHIRE
23 F.A.P. No.

CLASSIFICATION

24 Fed. Aid System
LOCAL RURAL ROAD
25 Administrative
LOCAL JURISDICTION
26 Functional
LOCAL

	BY	DATE
Transfer of Data		
Maintenance Inspection		MARCH 24, 1982
Condition Analysis	–	SEPT. 28 1982
Appraisal		
Cost Estimate		
General Review		

STRUCTURAL DATA

27 Year Built 1939
28 Lanes on Str. 2 Under 0
29 ADT on Str. 200 30 Year 82
31 Design Load H-15 CODE
32 Appr. Rdwy Width w/Sh'ld 24 FT.
33 Br. Median ☒ None ☐ Open ☐ Closed
34 Skew 30° °
35 Structure Flared ☐ Yes ☒ No
36 NO FEATURE MEETS ACCEPT. STDS
37
38 Navigation Control ☐ Yes ☒ No
39 Vertical N/A ft.
40 Horizontal N/A ft.
41 OPEN TO TRAFFIC. NO LOAD/SPEED REST.
42 Type Service HWY/WATER CODE

STEEL CODE
43 Structure Type-Main STRINGER
44 Approach N/A
45 No of Spans-Main ONE
46 Approach NONE
47 Horizontal Clearance 20 FT.
48 Max. Span Length 43.8 ft.
49 Structure Length 47.0 ft.
50 Sidewalk Rt. ft. 0 Lt. 0 ft.
51 Br. Roadway (curb-curb) 20 ft.
52 Deck Width (out-out) 23 ft.
53 Vert Clearance over Deck NO REST. ft.
54 Under Clearance-Vertical N/A ft.
55 Lateral-Right N/A ft.
56 Left N.A. ft.
57 Wearing Surface ASPHALTIC CONC.

BRIDGE NO. C-10-2 BRIDGE MNT. NO. TWN 105001100 PAGE 2

CONDITION	MATERIAL	CONDITION ANALYSIS	RATING (9-0)	ITEM NO.	CARD CONTROL NUMBER	CARD COL.
58 Deck	CONCRETE		3			
59 Superstructure	STEEL		3			
60 Substructure	CONCRETE		4			
61 Channel & Channel Protection			7			
62 Culvert & Retaining Walls			N			
63 Estimated Remaining Life	8 YEARS	65 Approach Alignment	7			
64 Operating Rating	1 26.9T	66 Inventory Rating 1	18.1			
	4 37.6T	4	22.1			
	5 58.8T	5	34.5			

APPRAISAL	DEFICIENCIES	RATING (9-0)
67 Structural Condition		4
68 Deck Geometry		7
69 Underclearances-Vert. & Lateral		N
70 Safe Load Capacity		4
71 Waterway Adequacy		7
72 Approach Roadway Alignment		7

PROPOSED IMPROVEMENTS

73 Year Needed Completed Describe (Item 75)

74 Type of Service

75 Type of Work

76 Improvement Length ft.

77 Design Loading CODE

78 Roadway Width ft.

79 Number of Lanes 82 Prop Rdwy Imprv – Year

80 ADT 81 Year 83 – Type

COST OF IMPROVEMENTS

84 $, ,000.

REMARKS

JAMES C. DONEGAN No. 29084

James C. Donegan

MASSACHUSETTS DEPARTMENT OF PUBLIC WORKS

STRUCTURES INSPECTION FIELD REPORT

CITY-TOWN CHESHIRE	DIST. 01	BRIDGE PLAN NO. C-10-2	BRIDGE KEY NO. TWN105001100

COUNTY BERKSHIRE	STRUCTURE TYPE STEEL STRINGER

FEDERAL AID SYSTEM LOCAL RURAL ROAD	ITEM 07 INVENTORY ROUTE SAND ROAD	ITEM 06 FACILITY UNDER DRY BROOK

YEAR BUILT 1939	YEAR REBUILT —	OWNER TOWN	INSPECTOR HOWARD SHAEVITZ, PE	DATE INSP. MARCH 24, 1982

DECK

1. Wearing Surface	7
2. Deck - Condition	3
3. Curbs	8
4. Median	N
5. Sidewalks	N
6. Parapet	N
7. Railing	4
8. Drains	N
9. Lighting Standards	N
10. Utilities	N
11. Deck Joints	N
12. Approach Slab Settlement	N

ITEM 58 3

CONDITION RATING INFLUENCED BY CAPACITY YES ☒ NO ☐

SUPERSTRUCTURE

1. Bearing Devices	8
2. Stringers	3
3. Diaphragms	7
4. Girders or Beams	N
5. Floor Beams	N
6. Trusses - General	N
- Portals	N
- Bracing	N
7. Rivets or Bolts	7
8. Welds - Cracks	N
9. Concrete Cracking	8
10. Collision Damage	4
11. Load Deflection	7
12. Member Alignment	8
13. Load Vibration	7
14. Paint - Epoxy	N
15. Year Painted	00

ITEM 59 3

YES ☒ NO ☐

SUBSTRUCTURE

1. Abutments -- Wings	4
-- Backwall	4
-- Brestwall	N
-- Footings	N
-- Piles	N
-- Erosion	8
-- Settlement	N
2. Piers or Bents -- Caps	N
-- Column	N
-- Web	N
-- Footing	N
-- Piles	N
-- Scour	N
-- Settlement	N
3. Pile Bents	N
4. Concrete Cracks or Spalls	4
5. Debris on Seats	8
6. Collision Damage	8
7. Adequacy - Hydraulically	8

ITEM 60 4

YES ☐ NO ☒

64 OPERATING RATING

	H	3	3S2
(Tons)	26.4	37.6	58.8

66 INVENTORY RATING

	H	3	3S2
(Tons)	18.1	22.1	34.5

POSTED LOADING

	H	3	3S2
(A) Posted Loading (Tons)			

	H
(B) Single Loading (Tons)	

SIGNS

1. Legibility	
2. Visibility	
3. Missing (Y-yes N-no)	
(A) At Bridge	
(B) Advance	

JAMES C. DONEGAN No. 29064

NOTE: Condition Ratings are to be obtained from appropriate pages from latest copy of the FHWA "Recording & Coding Guide for the Structure Inventory and Appraisal of the Nations Bridges", and the "Massachusetts Coding Guide for Inventory, Inspection, and Appraisal of Bridges".

HMD-040 REV. 3/10/82

36 TRAFFIC SAFETY FEATURES

	ITEM 36	CONDITION
1. Bridge Railing	0	4
2. Transitions	0	-
3. Approach Guardrail	0	-
4. Approach Guardrail Terminal	0	-

CHANNEL & CHANNEL PROTECTION

1. Channel Scour	8
2. Embankment Erosion	8
3. Fender System	N
4. Spur Dikes & Jetties	N
5. Rip Rap	7
6. Effectiveness	8
7. Debris	8
8. Vegetation	7
ITEM 61	7

REMARKS — SKETCHES — PHOTOGRAPHS

TRUSS TYPE (Item 43A) ☐

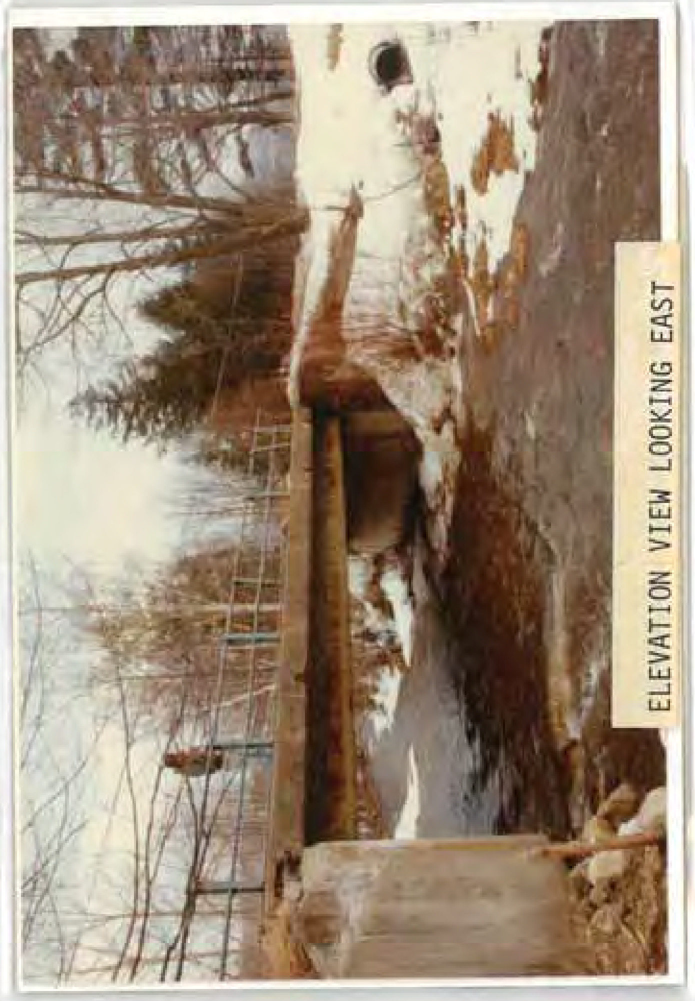
DEPTH OF WATER 1.0 FT.

SEMI CIRCULAR CRACK IN RIGHT ABUTMENT ABOVE SEAT.

CRACKED ABUTMENT UPSTREAM LEFT SIDE.

appendix B

Photographs of Structure



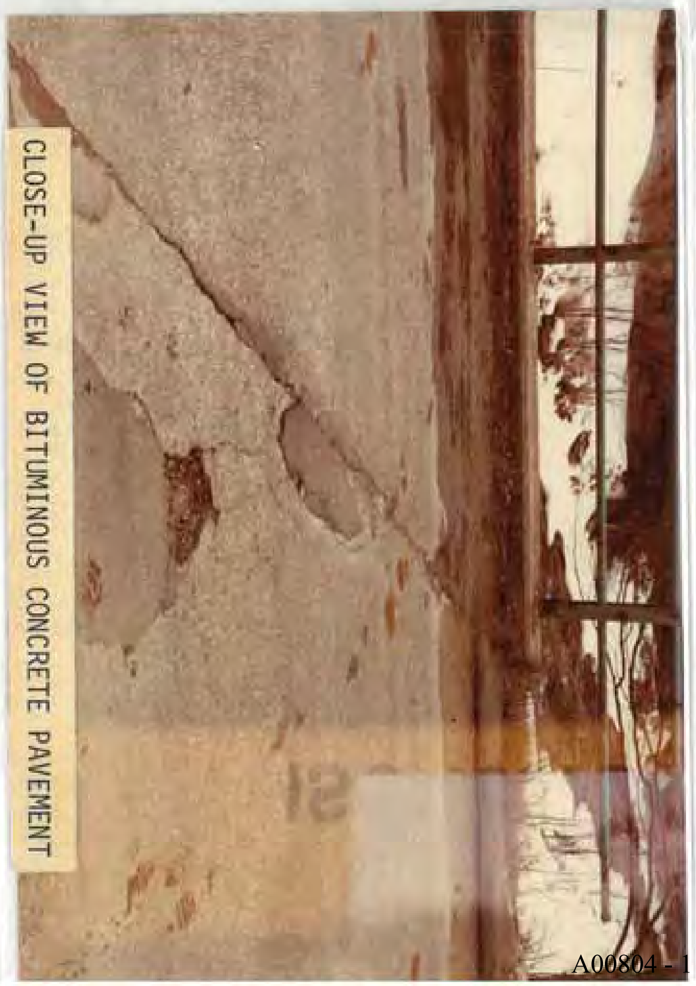
ELEVATION VIEW LOOKING EAST

ROADWAY PROFILE LOOKING SOUTH

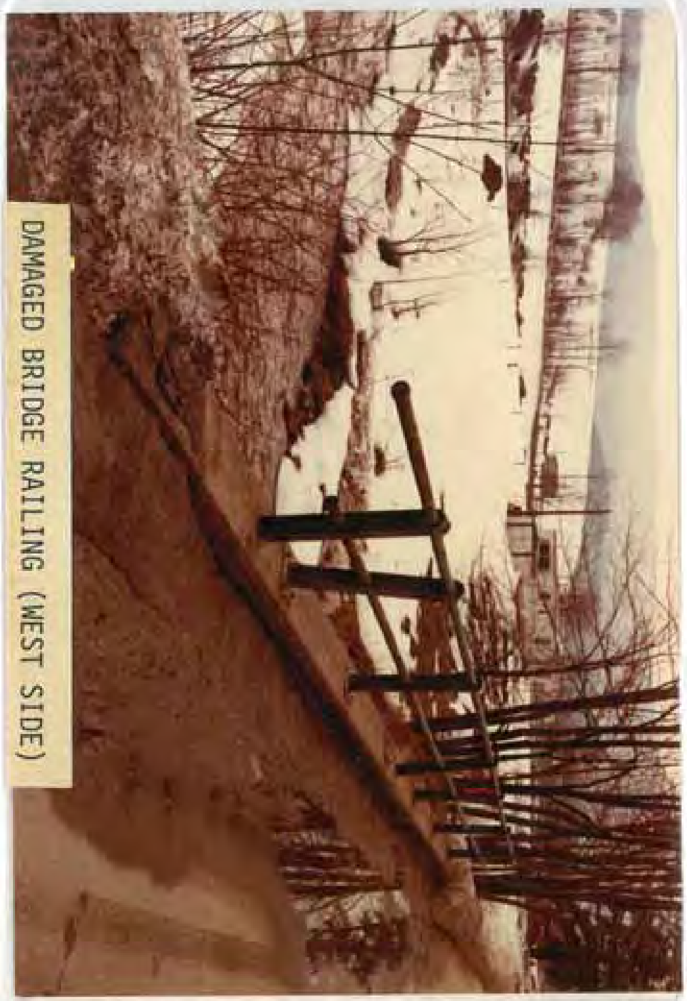
ROADWAY PROFILE LOOKING NORTH

ELEVATION VIEW LOOKING WEST

C-10-2

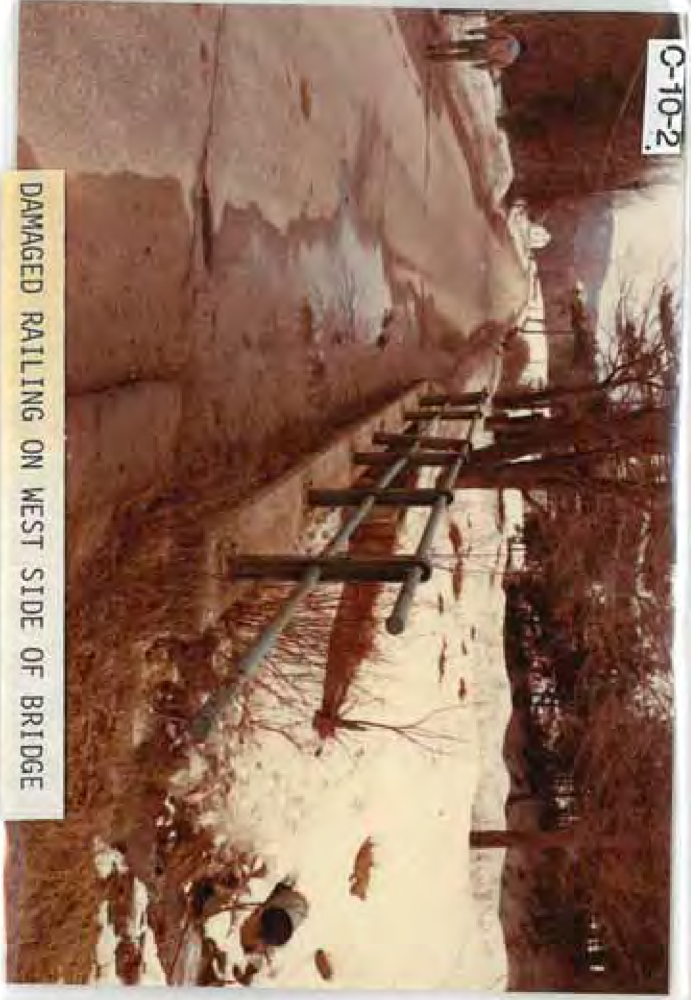


CLOSE-UP VIEW OF BITUMINOUS CONCRETE PAVEMENT



DAMAGED BRIDGE RAILING (WEST SIDE)

VIEW OF BRIDGE RAILING AND CURB (EAST SIDE)



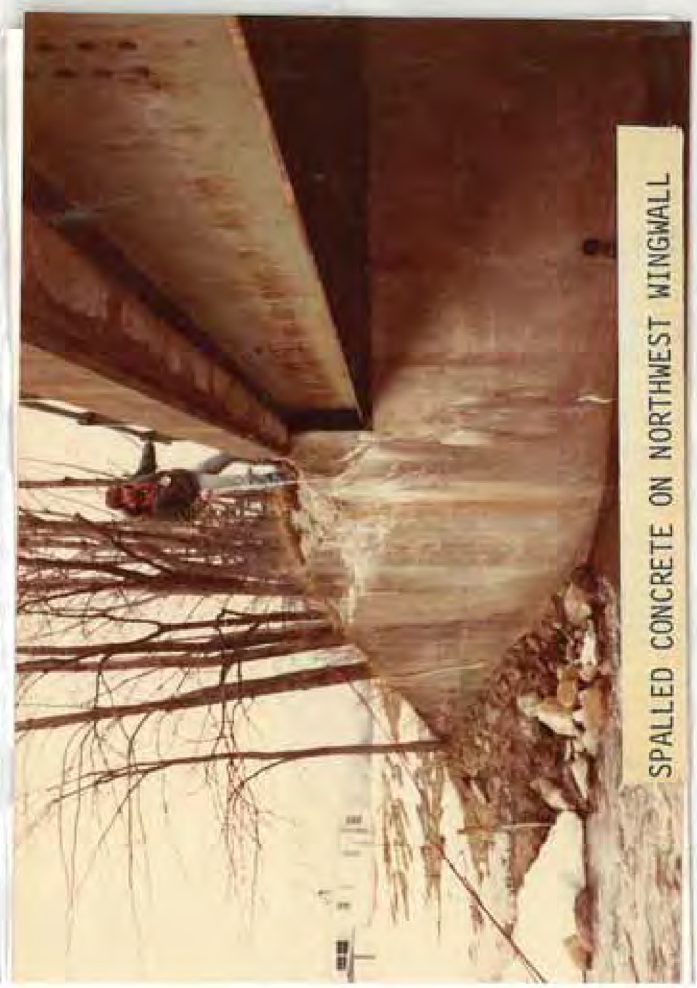
DAMAGED RAILING ON WEST SIDE OF BRIDGE

C-10-2

C-10-2

CRACKED BITUMINOUS CONCRETE WEARING SURFACE

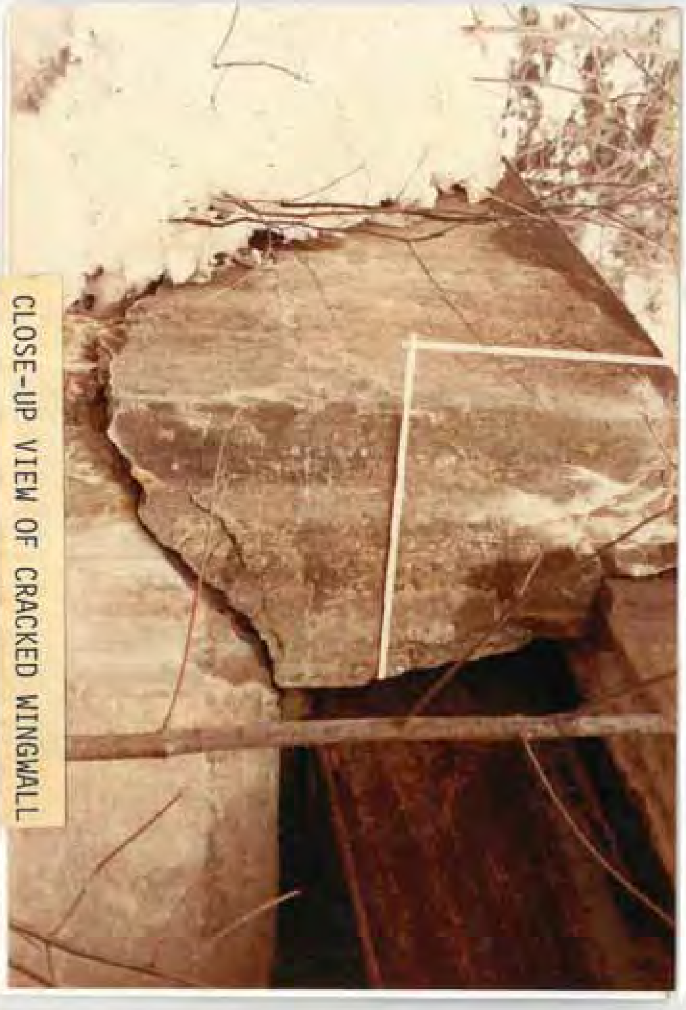
DAMAGED BRIDGE RAILING (WEST SIDE)



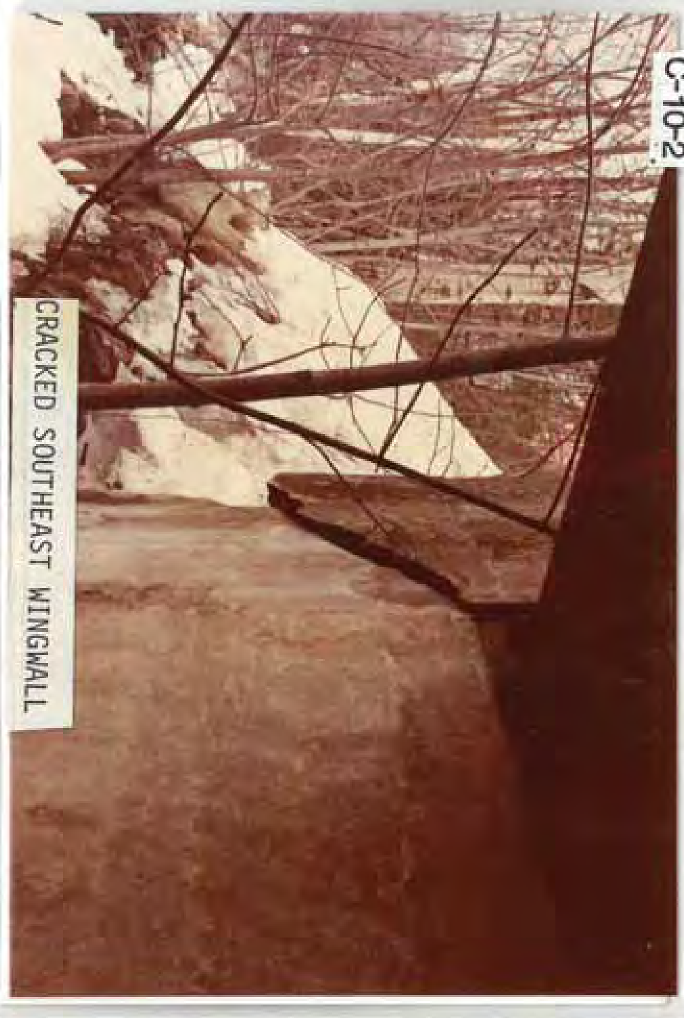
SPALLED CONCRETE ON NORTHWEST WINGWALL

NORTH ABUTMENT

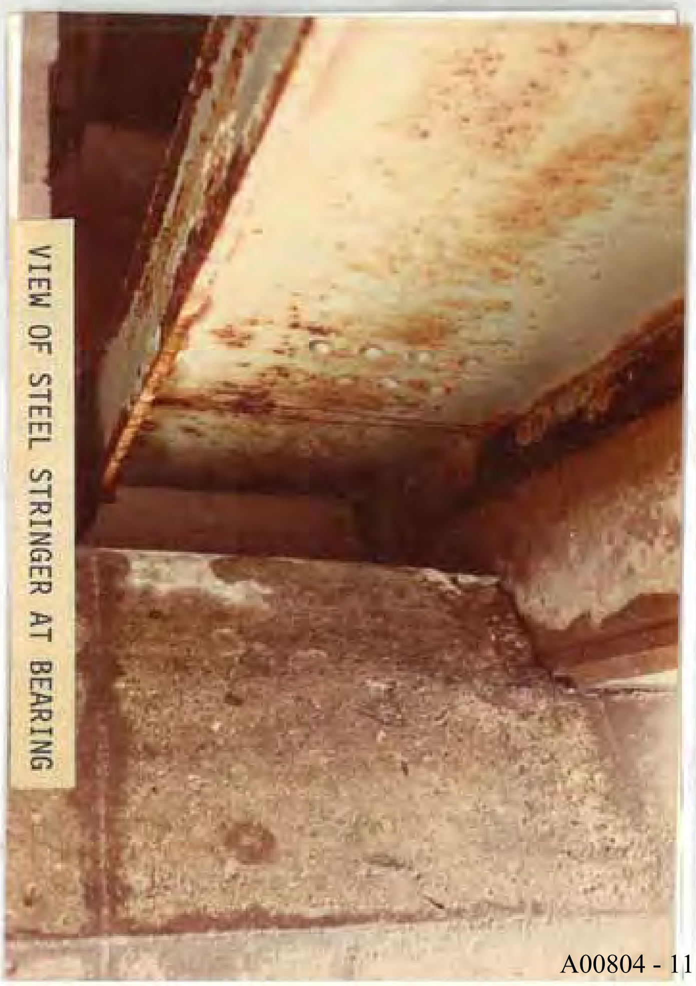
C-10-2



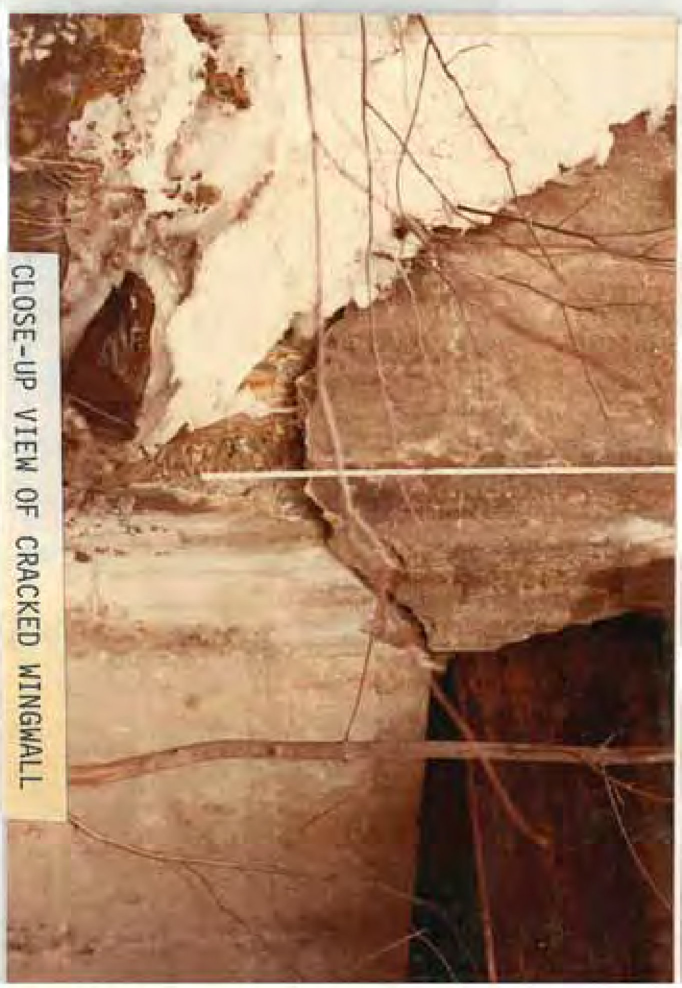
CLOSE-UP VIEW OF CRACKED WINGWALL



CRACKED SOUTHEAST WINGWALL



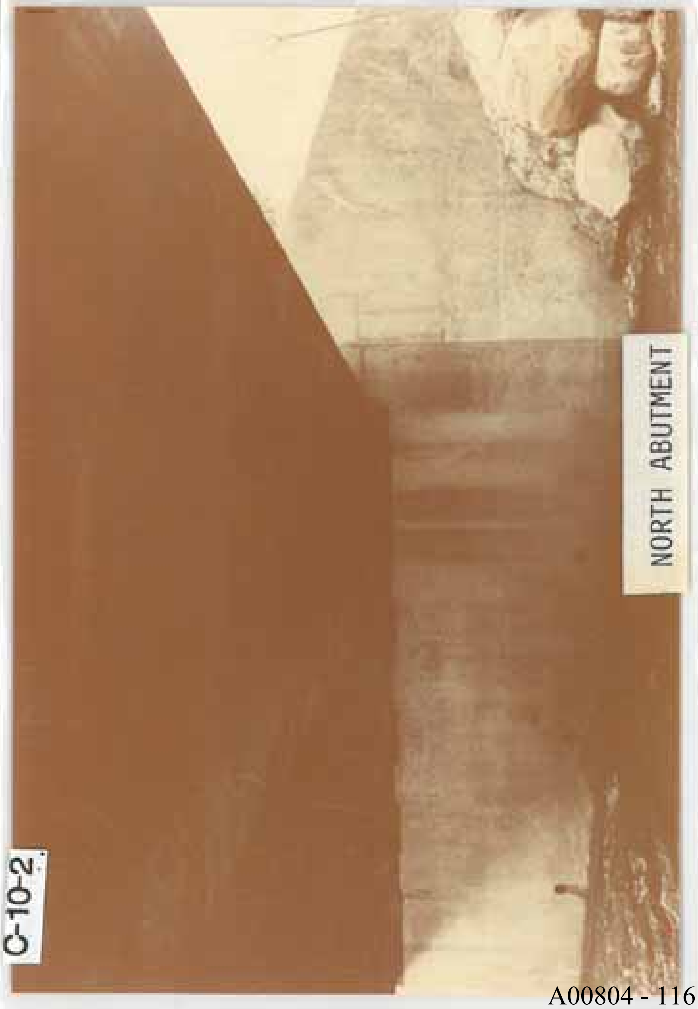
VIEW OF STEEL STRINGER AT BEARING



CLOSE-UP VIEW OF CRACKED WINGWALL

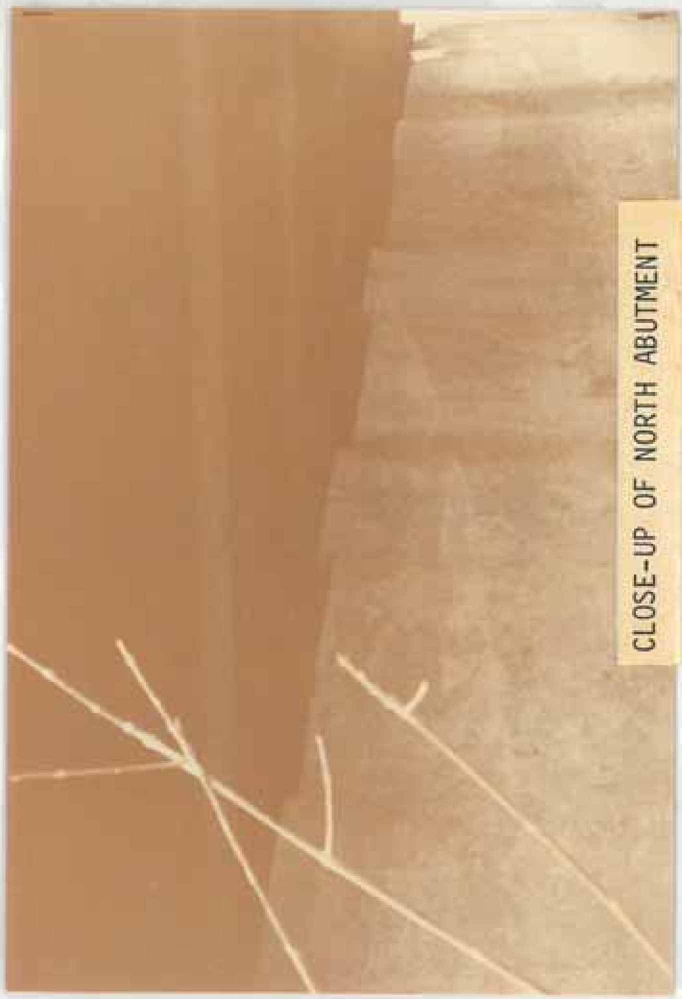
GENERAL UNDERVIEW OF BRIDGE

CLOSE-UP VIEW OF NORTH ABUTMENT



NORTH ABUTMENT

C-10-2



CLOSE-UP OF NORTH ABUTMENT

appendix C

Analysis & Check Computations

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JOB CHESHIRE C-10-2 82-0252
SHEET NO. INDEX OF
CALCULATED BY J.A. DATE 9-28-82
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SCALE

CHESHIRE, MASSACHUSETTS

SAND ROAD OVER DRY BROOK

BRIDGE NO. C-10-2

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JOB CHESHIRE C-10-2 82-025
SHEET NO. ONE OF
CALCULATED BY J.A. DATE 9-28-82
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BRIDGE NO. : C-10-2

LOCATION : SAND ROAD OVER DRY BROOK
CHESHIRE , MASSACHUSETTS

YEAR BUILT : 1939

PLANS : SUPPLIED BY MASS. DPW - ONE SHEET

ALLOWABLE STRESSES :

CONCRETE : f'_c = 3000 PSI
f_c(INV) = 1200 PSI
f_c(OPER) = 1650 PSI

REINFORCING STEEL: f_s(INV) = 18,000 PSI
f_s(OPER) = 25,000 PSI
n = 10

STRUCTURAL STEEL: f_y = 33,000 PSI
f_b(INV) = 18,150 PSI
f_b(OPER) = 24,750 PSI

REFERENCES: AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, 12TH EDITION (AASHTO - SSHB)

AASHTO MANUAL FOR MAINTENANCE INSPECTION OF BRIDGES (AASHTO - MMIB)

JOB CHESHIRE C-10-2 82-0252
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REINFORCED CONCRETE DECK (90% EFFECTIVE)

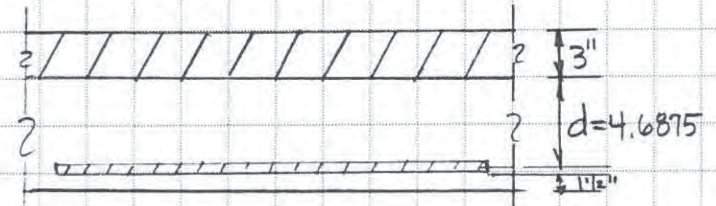
WEARING SURFACE: 3" BITUMINOUS (ASSUMED)

SLAB THICKNESS : 6½" = t

REINFORCING STEEL: 5/8"⌀ @ 6½" O.C. TOP & BOTTOM

$\frac{12}{6.5}(.31 \text{IN}^2) = .57 \text{IN}^2/\text{FT}$ TOP AND BOTTOM

FOR ANAYSIS, TAKE A TYPICAL SECTION ONE FOOT WIDE. CLEAR COVER OF CONCRETE IS 2" TOP, 1½" BOTTOM (ASSUMED). NEGLECT COMPRESSION STEEL.



$b = 12"$; $d = 4.6875"$

$A_S = .57 \text{IN}^2$, $\rho = \frac{A_s}{bd} = .010133$

$k = \sqrt{2n\rho + (n\rho)^2} - (n\rho)$

$= \sqrt{20(.0101333) + (.101333)^2} - (.101333)$

$= \sqrt{.2129} - (.101333) = \underline{\underline{.3601}}$

$j = 1 - k/3$

$= 1 - \frac{.3601}{1} = \underline{\underline{.8799}}$

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JOB CHESHIRE C-10-2 82-0252
SHEET NO. 3 OF
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MOMENT CAPACITY : (NEGLECT TOP MAT OF STEEL)

INVENTORY: $COMP = \frac{1}{2} f_c\, kd\, b = \frac{1}{2}(1200)(.3601)(4.6875)(12)$

$= \underline{12,150.\ lb.}$

$TENSION = A_s f_s = (.57)(18,000)$

$= \underline{10,260\ lb.}$

$M_{CAP} = Tjd(.90) = \frac{(10.26^K)(.8799)(4.6875)(.90)}{12}$

$= \underline{3.17^{K\text{-}FT}}$

OPERATING: $\frac{25}{18}(3.17^{K\text{-}FT}) = \underline{4.40^{K\text{-}FT}}$

DEAD LOAD MOMENT

CONCRETE DECK: $\frac{(6\frac{1}{2})(12)}{144} \times 150 = 81.25\ lb/FT.$

BITUMINOUS PAVEMENT: $\frac{(3)(12)}{144} \times 144 = 36.0\ lb/FT.$

$W_{DL} = 117.25\ lb/FT.$

EFFECTIVE SPAN LENGTH (AASHTO-MMIB-§ 5.3.3)

S = EDGE TO EDGE DISTANCE BETWEEN STRINGER FLANGES + 1/2 (FLANGE WIDTH) = 43"

= 3.584'

$M_{DL} = \frac{1}{10} W_{DL}(S)^2 = \frac{1}{10}(.11725^{K/FT})(3.584FT)^2$

$= \underline{.1506^{K\text{-}FT}}$

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JOB CHESHIRE C-10-2 82-0252
SHEET NO. 4 OF
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ALLOWABLE LIVE LOAD MOMENT

IMPACT FACTOR, $I = \frac{50}{3.584+125} = .388 > 0.3 \therefore$ USE 0.3
(AASHTO-SSHB-§1.2.12)

INVENTORY: $\frac{1}{1.3}(3.17-.1506) = \underline{\underline{2.32^{K\text{-}FT}}}$

OPERATING: $\frac{1}{1.3}(4.40-.1506) = \underline{\underline{3.26^{K\text{-}FT}}}$

APPLIED LIVE LOAD MOMENTS

SPAN = 3.584 FT. ; 5 CONTINUOUS SPANS

H-20: $E = .6S+2.5 = .6(3.584)+2.5 = 4.65$

$M = \pm .2(P/E)S = .2(16^K/4.65)3.584 = \underline{2.46^{K\text{-}FT}}$

TYPE 3 : $E = .36S+2.58 = .36(3.584)+2.58 = 3.87$

$M = \pm .2(P/E)S = .2(8.5/3.87)3.584 = \underline{1.57^{K\text{-}FT}}$

TYPE 3S2: $E = 3.87$

$M = \pm .2(P/E)S = .2(7.75/3.87)3.584 = \underline{1.44^{K\text{-}FT}}$

REINFORCED CONCRETE DECK - RATING

	INVENTORY	OPERATING
H-20:	$\left(\frac{2.32}{2.46}\right)20^T = 18.8^T$	$\left(\frac{3.26}{2.46}\right)20^T = 26.5^T$
TYPE 3:	$\left(\frac{2.32}{1.57}\right)25^T = 36.9^T$	$\left(\frac{3.26}{1.57}\right)25^T = 51.9^T$
TYPE 3S2:	$\left(\frac{2.32}{1.44}\right)36^T = 58.0^T$	$\left(\frac{3.26}{1.44}\right)36^T = 81.5^T$

JOB CHESHIRE C-10-2 82-0252
SHEET NO. 5 OF
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INTERIOR STEEL STRINGERS (90% EFFECTIVE)

SPAN LENGTH (AASHTO - SSHB - § 1.5.23 f)

L = 43.88 FT.
DISTANCE BETWEEN CENTERS OF BEARING

MOMENT CAPACITY

27 WF 91 ; $S_x = 233.2 \text{ IN}^3$

$$M_{CAP(INV)} = (.90) f_{b(INV)} S_x = \frac{(.90)(18.15^{KSI})(233.2)}{12} = \underline{\underline{317.4^{K-FT.}}}$$

$$M_{CAP(OPER)} = \left(\frac{24.75}{18.15}\right) 317.4^{K-FT} = \underline{\underline{432.8^{K-FT}}}$$

DEAD LOAD MOMENT

$$W_{DL} = (117.25)(4.0) + 91^{lb/FT} + \underset{(CURBS)}{62.5^{lb/FT}} = 622.5^{lb/FT}$$

$$M_{DL} = 1/8\, W_{DL} L^2 + \left(\begin{matrix}\text{MOMENT DUE}\\ \text{TO DIAPHRAGM}\end{matrix}\right) =$$

$$M_{DL} = 1/8(.6225)(43.88)^2 + \frac{(.144)(43.88)}{8}(4) =$$

$$M_{DL} = 149.8^{K-FT} + 3.16^{K-FT} = \underline{\underline{152.96^{K-FT}}}$$

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JOB CHESHIRE C-10-2 82-0252
SHEET NO. 6 OF
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SCALE

ALLOWABLE LIVE LOAD MOMENT

IMPACT FACTOR ; $I = \frac{50}{43.88 + 125} = .294 < 0.3$ ∴ USE 0.294

(AASHTO-SSHB-§1.2.12)

INVENTORY : $M_{LL} = \frac{1}{1.296}(317.4 - 152.96) = \underline{\underline{126.8^{K\text{-}FT}}}$

OPERATING : $M_{LL} = \frac{1}{1.296}(432.8 - 152.96) = \underline{\underline{215.9^{K\text{-}FT}}}$

APPLIED LIVE LOAD MOMENT

DISTRIBUTION FACTOR (AASHTO-SSHB-TABLE 1.3.1 b)

$\frac{S}{5.5} = \frac{4}{5.5} = .727$

MOMENTS FROM AASHTO-MMIB-PLATE 2

$M_{H\text{-}20} = .727\left(\frac{20}{15}\right)(144.3^{K\text{-}FT}) = 139.8^{K\text{-}FT}$

$M_{TYPE\,3} = .727(197.25^{K\text{-}FT}) = 143.4^{K\text{-}FT}$

$M_{TYPE\,3S2} = .727(181.9^{K\text{-}FT}) = 132.2^{K\text{-}FT}$

JOB CHESHIRE C-10-2 82-0252
SHEET NO. 7 OF
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STEEL STRINGERS - RATING

	INVENTORY	OPERATING
H-20:	$\left(\frac{126.8}{139.8}\right)20^T = 18.1^T$	$\left(\frac{215.9}{139.8}\right)20^T = 30.8^T$
TYPE 3:	$\left(\frac{126.8}{143.4}\right)25^T = 22.1^T$	$\left(\frac{215.9}{143.4}\right)25^T = 37.6^T$
TYPE 3S2:	$\left(\frac{126.8}{132.2}\right)36^T = 34.5^T$	$\left(\frac{215.9}{132.2}\right)36^T = 58.8^T$

Breakdown of Bridge Ratings

Town/City	Location	Bridge No.	Maintenance No.
CHESHIRE	SAND ROAD OVER DRY BROOK	C-10-2	TWN-105-001-100

Bridge Component	Inventory Rating (tons)			Operating Rating (tons)		
	H-20	Type 3	Type 3S2	H-20	Type 3	Type 3S2
CONCRETE DECK	18.8	36.9	58.0	26.5	51.9	81.5
STEEL STRINGERS	18.1	22.1	34.5	30.8	37.6	58.8

comments:

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JOB CHESHIRE, C-10-2 #82-0252
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CHESHIRE, MASSACHUSETTS

SAND ROAD
OVER
DRY BROOK

BRIDGE NO. C-10-2

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JOB CHESHIRE, C-10-2 #82-0252
SHEET NO. 1 OF 11
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BRIDGE NO. : C-10-2 (TWN 105-001-100)

LOCATION : SAND ROAD OVER DRY BROOK,
CHESHIRE, MASSACHUSETTS

YEAR BUILT : 1939

PLANS : SUPPLIED BY MDPW - ONE (1) SHEET

ALLOWABLE STRESSES

CONCRETE : $f'_c = 3{,}000$ PSI $n = 10$
$f_{c(INV)} = 1{,}200$ PSI
$f_{c(OPER)} = 1{,}650$ PSI

REINFORCEMENT : $f_{s(INV)} = 18{,}000$ PSI
$f_{s(OPER)} = 25{,}000$ PSI

STRUCTURAL STEEL : $F_y = 33{,}000$ PSI
$F_{b(INV)} = 18{,}150$ PSI
$F_{b(OPER)} = 24{,}750$ PSI

REFERENCES: AASHTO, "MANUAL FOR MAINTENANCE INSPECTION OF BRIDGES, 1978." (MMIB)

AASHTO, "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, 12th Ed. 1977" (SSHB)

AISC, "STEEL CONSTRUCTION MANUAL"

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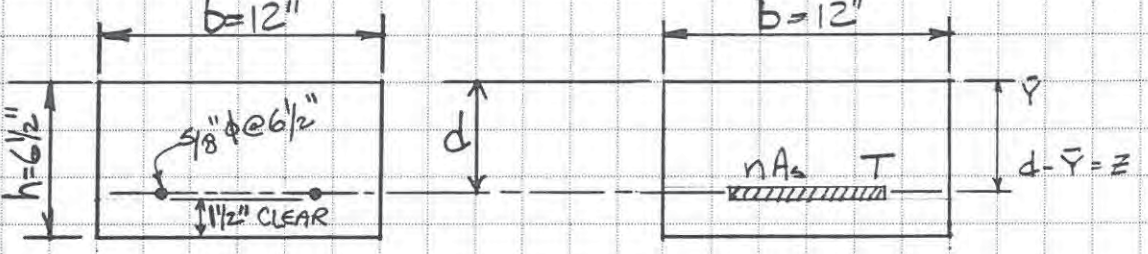
I REINFORCED CONCRETE DECK (90% EFFECTIVE)

SLAB THICKNESS: 6 1/2"
REINFORCEMENT: 5/8" BARS @ 6 1/2" T & B ⊥ ℄ STRINGERS
1/2" BARS @ 24" T & B LONGITUDINALLY
COVER: 1 1/2" BOTTOM, 2" TOP (ASSUMED)

FOR ANALYSIS, TAKE A ONE (1) FOOT WIDE SECTION, ONE (1) FOOT LONG AND IGNORE TOP STEEL MAT



$$d = h-(\text{COVER}+\phi/2) = 6\tfrac{1}{2}'' - (1\tfrac{1}{2}'' + \tfrac{5/8''}{2}) = 4.688''$$

$$\text{AREA STEEL} = \pi r^2 \times \frac{\text{SECTION LENGTH}}{\text{BAR SPACING}} = \pi(5/16)^2 \times \frac{12''}{6.5''} = 0.566^{\square}$$

$$nA_s = 10(0.566^{\square}) = 5.66^{\square}$$

DETERMINE NEUTRAL AXIS (EQUATING 1st MOMENTS OF C & T AREAS ABOUT NA)

$$(12\bar{Y})(\bar{Y}/2) = nA_s(d-\bar{Y})$$
$$6\bar{Y}^2 = 5.66(4.688-\bar{Y}) = 26.534 - 5.66\bar{Y}$$
$$6\bar{Y}^2 + 5.66\bar{Y} - 26.534 = 0$$
$$\bar{Y}^2 + 0.943\bar{Y} - 4.422 = 0$$

$$\bar{Y} = \frac{-0.943 \pm \sqrt{(0.943)^2 - 4(1)(-4.422)}}{2(1)} = 1.6836'' \text{ @ } -2.6266''$$

USE $\bar{Y} = 1.684''$

JOB CHESHIRE, C-10-2 #82-0252
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CHECK C & T STRESSES AND FORCES IN CONCRETE

$f_T = f_s / n = 18{,}000^{PSI} / 10 = 1{,}800^{PSI}$

$f_C = f_T(\bar{Y}/E) = (1{,}800^{PSI})(1.684'' / 3.004'') = 1{,}009.05^{PSI}$

$1{,}009^{PSI} < 1{,}200^{PSI}$ ∴ OK - STEEL YIELDS FIRST

$C = \frac{1}{2} f_c b \bar{Y} = \frac{1}{2}(1{,}009^{PSI})(12'')(1.684'') = 10{,}195^{\#} = 10.2^{K}$

$T = f_s A_s = (18{,}000^{PSI})(0.566^{\square''}) = 10{,}188^{\#} = 10.2^{K}$

$C = T$ ∴ $\bar{Y}$ IS OK

1. DETERMINE MOMENT CAPACITY : M_{CAP}

MOMENT ARM : $M.A. = d - \bar{Y}/3 = 4.688'' - 1.684''/3 = 4.13''$

$\underline{M_{CAP(INV)}} = [C \text{ or } T](M.A.)(1/12 \tfrac{ft}{in}) \times 90\% = (10.2^{k})(4.13'')(\tfrac{1}{12})(0.90) = \underline{\underline{3.159^{Ft\text{-}KIPS}}}$

$\underline{M_{CAP(OPER)}} = (f_{S(OPER)} / f_{S(INV)}) M_{CAP(INV)} = (25^{k} / 18^{k})(3.159^{'\text{-}k}) = \underline{\underline{4.388^{Ft\text{-}KIPS}}}$

2. DETERMINE DEAD LOAD MOMENT : M_{DL}

BITUMINOUS PAVEMENT : USE 144 pcf (MMIB, A31)

$\dfrac{3'' \times 12''}{144 \,\square''/\square'} \times 144 \text{ pcf} = 36 \text{ plf}$

CONCRETE DECK SLAB : USE 150 pcf (MMIB, A31)

$\dfrac{6\tfrac{1}{2}'' \times 12''}{144 \,\square''/\square'} \times 150 \text{ pcf} = 81.25 \text{ plf}$

TOTAL $W_{DL} = 117.25$ plf $= 0.117$ klf

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2. MDL - CONTINUED

EFFECTIVE SPAN LENGTH (MMIB, §5.33, P.33)

S ≡ STRINGER SPACING − 1/2 STRINGER FLANGE WIDTH

6 STRINGERS: 27WF91, $b_f = 10''$

SPACING = 4'-0" = 48"

$S = 48'' - 10/2 = 43'' = 3.583'$

$M_{DL} = 1/10\, W_{DL} \cdot S^2 = 1/10(0.117^{KSF})(3.583')^2 = 0.15023$

$\underline{\underline{M_{DL} = 0.150^{FT\text{-}KIPS}}}$

3. DETERMINE ALLOWABLE LIVE LOAD MOMENT: $M_{LL(ALL)}$

$$M_{LL(ALL)} = \frac{M_{CAP} - M_{DL}}{1 + I}$$

WHERE IMPACT FACTOR: I = 0.30 (SEE SSHB §1.2.12, P.23)

INVENTORY: $M_{LL(ALL)} = \dfrac{3.159^{FT\text{-}K} - 0.15^{FT\text{-}K}}{1.30} = \underline{2.31^{FT\text{-}KIPS}}$

OPERATING: $M_{LL(ALL)} = \dfrac{4.388^{FT\text{-}K} - 0.15^{FT\text{-}K}}{1.30} = \underline{3.26^{FT\text{-}KIPS}}$

4. DETERMINE APPLIED LIVE LOAD MOMENT: $M_{LL(APP)}$

EFFECTIVE SPAN: S = 43" = 3.583' (5 CONTINUOUS SPANS)

SINGLE AXLE - H-20

DISTRIBUTION OF WHEEL LOADS: $E = 0.6S + 2.5 = 0.6(3.583') + 2.5 = 4.65'$

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4. $M_{LL(APP)}$ — CONTINUED

H-20 - CONTINUOUS SPAN: $M = \pm 0.2(P/E)S = 0.2(16^{k}/4.65)(3.583')$

$M_{LL(APP)} = 2.47^{\text{FT-KIPS}}$

TANDEM AXLES - TYPE 3

DISTRIBUTION OF WHEEL LOADS: $E = 0.36S + 2.58 = 0.36(3.583') + 2.58 = 3.87'$

CONTINUOUS SPAN: $M = \pm 0.2(P/E)S = 0.2(8.5^{k}/3.87')(3.583')$

$M_{LL(APP)} = 1.57^{\text{Ft-KIPS}}$

TYPE 3S2

DISTRIBUTION OF WHEEL LOADS: $E = 0.36S + 2.58 = 3.87'$

CONTINUOUS SPAN: $M = \pm 0.2(P/E)S = 0.2(7.75^{k}/3.87')(3.583')$

$M_{LL(APP)} = 1.44^{\text{Ft-KIPS}}$

CONCRETE DECK

RATING

$\text{RATING} = M_{LL(ALL)} / M_{LL(APP)} \times \text{VEHICLE WEIGHT (TONS)}$

	INVENTORY	OPERATING
H-20 :	$(2.31/2.47)20^{T} = 18.7^{\text{TONS}}$	$(3.26/2.47)20^{T} = 26.4^{\text{TONS}}$
TYPE 3 :	$(2.31/1.57)25^{T} = 36.8^{\text{TONS}}$	$(3.26/1.57)25^{T} = 51.9$ TONS
TYPE 3S2 :	$(2.31/1.44)36^{T} = 57.8^{\text{TONS}}$	$(3.26/1.44)36^{T} = 81.5$ TONS

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II. STEEL STRINGERS (90% EFFECTIVE)

6 STRINGERS: 27 WF 91, $S_x = 233.2\ in^3$
SPACING = 4'-0"
SPAN LENGTH $= (1' + 36' + 1') / \sin 60° = 43.879'$ (C to C BEARINGS)

1. DETERMINE MOMENT CAPACITY: MCAP

$$\underline{M_{CAP(INV)}} = F_{b(INV)} S_x \times 90\% = \frac{(18.15^{KSI})(233.2^{in^3})(0.90)}{12^{"/ft}} = \underline{\underline{317.444^{Ft\text{-}KIPS}}}$$

$$\underline{M_{CAP(OPER)}} = F_{b(OPER)} S_x \times 90\% = \frac{(24.75^{KSI})(233.2^{in^3})(0.90)}{12^{"/ft}} = \underline{\underline{432.878^{Ft\text{-}KIPS}}}$$

2. DETERMINE DEAD LOAD MOMENT: MDL

A. FOR INTERIOR STRINGERS (4)

BITUMINOUS PAVEMENT + CONCRETE SLAB: $W_{DL} = 117.25\ plf/ft$
$(117.25\ plf/ft)(4.0^{LF}) = 469.0\ plf$

STRINGER: 27 WF 91 = 91.0 plf

DIAPHRAGMS: 3 - 16 WF 36
$(36\ plf)(4.0^{ft}/_{DIA})(3^{DIA}) / 43.879^{LF}/_{STR}$ = 9.8 plf

TOTAL $W_{DL} = 569.8\ plf = 0.570^{klf}$

$$M_{DL} = 1/8\ W_{DL} \cdot L^2 = 1/8\,(0.57^{klf})(43.879^{LF})^2 = 137.1824$$

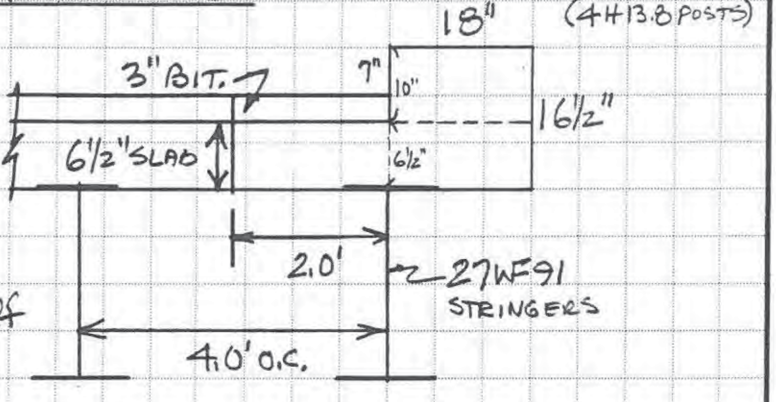
$$\underline{\underline{M_{DL} = 137.182^{Ft\text{-}KIPS}}}\ \text{(INTERIOR)}$$

SCHOENFELD ASSOCIATES, INC.
Consulting Engineers
210 South Street
BOSTON, MASSACHUSETTS 02111
(617) 423-5541

JOB CHESHIRE, C-10-2 #83-0252
SHEET NO. 7 OF 11
CALCULATED BY TWS DATE 10/8/82
CHECKED BY DATE
SCALE

2. MDL - CONTINUED

B. FOR EXTERIOR STRINGERS



BITUMINOUS PAVEMENT

$\frac{3'' \times 24''}{144^{\square}/\square} \times 144\,pcf = 72\,plf$

CONCRETE DECK SLAB

$\frac{6\frac{1}{2}'' \times 42''}{144^{\square}/\square} \times 150\,pcf = 284.4\,plf$

CONCRETE COPING: $\frac{18'' \times 10''}{144^{\square}/\square} \times 150\,pcf = 187.5\,plf$

RAILING POSTS: 4H13.8 $(13.8\,plf \times 3.167'/_{POST} \times 5^{POSTS}) / 43.879^{LF}/_{STR} = 4.98\,plf$

RAILINGS: 2-2" EXTRA STRONG PIPES: $2 \times 5.02\,plf = 10.04\,plf$

"DECK" SUBTOTAL = 558.92 plf = 0.559 Klf

STRINGER: 27WF91 = 91 plf

DIAPHRAGMS: 3-16WF36 $(36\,plf)(2.0^{LF}/_{DIA})(3^{DIA}) / 43.879^{LF}/_{STR} = 4.9\,plf$

STEEL SUBTOTAL = 95.9 plf = 0.096^{klf}

TOTAL $W_{DL} = 0.655^{klf}$

$M_{DL} = \frac{1}{8} W_{DL} \cdot L^2 = \frac{1}{8}(0.655^{klf})(43.879')^2 = 157.6394$

$M_{DL} = 157.639^{Ft\text{-}KIPS}$ (EXTERIOR)

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JOB CHESHIRE, G-10-2 #82-0252
SHEET NO. 8 OF 11
CALCULATED BY TWS DATE 10/8/82
CHECKED BY DATE
SCALE

3. DETERMINE ALLOWABLE LIVE LOAD MOMENT: MLL(ALL)

$$M_{LL(ALL)} = \frac{M_{CAP} - M_{DL}}{1+I}$$

WHERE IMPACT FACTOR: $I = 50/(L+125) = 50/(43.879+125)$
(SSHB, §1.2.12, P.23) $= 0.296 < 0.30 (MAX) \therefore$ USE

A. for INTERIOR STRINGERS

INVENTORY: $M_{LL(ALL)} = \frac{317.444^{Ft\text{-}k} - 137.182^{Ft\text{-}k}}{1.296} = \underline{139.09^{Ft\text{-}KIPS}}$

OPERATING: $M_{LL(ALL)} = \frac{432.878^{Ft\text{-}k} - 137.182^{Ft\text{-}k}}{1.296} = \underline{228.16^{Ft\text{-}KIPS}}$

B. for EXTERIOR STRINGERS

INVENTORY: $M_{LL(ALL)} = \frac{317.444^{Ft\text{-}k} - 157.639^{Ft\text{-}k}}{1.296} = \underline{123.31^{Ft\text{-}KIPS}}$

OPERATING: $M_{LL(ALL)} = \frac{432.878^{Ft\text{-}k} - 157.639^{Ft\text{-}k}}{1.296} = \underline{212.38^{Ft\text{-}KIPS}}$

4. DETERMINE APPLIED LIVE LOAD MOMENT: MLL(APP)

A. for INTERIOR STRINGERS

DISTRIBUTION FACTOR: $DF = S/5.5 = 4.0/5.5 = 0.73$ (SSHB §1.3.1B, P.37 for 2 LANE DESIGN)
LIVE LOAD MOMENTS OBTAINED FROM MMIB, PLATE 2, P.46

H-20 : $M_{LL(APP)} = (H\text{-}15)(\frac{20}{15}) \times D.F. = (144.25^{Ft\text{-}k})(\frac{20}{15})(0.73) = \underline{140.40^{Ft\text{-}KIPS}}$

TYPE 3 : $M_{LL(APP)} = (197.24^{Ft\text{-}k})(0.73) = \underline{143.98^{Ft\text{-}KIPS}}$

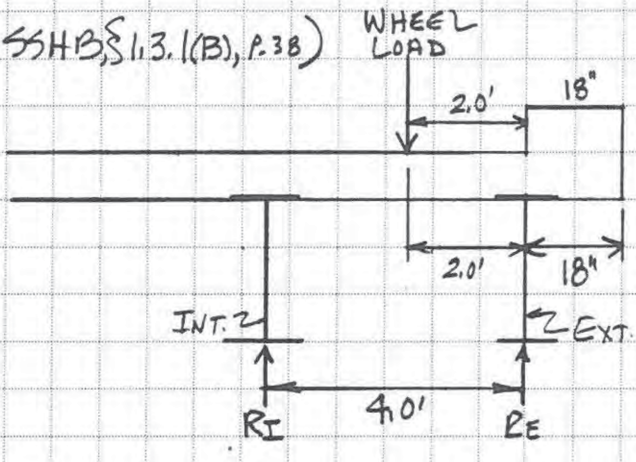
TYPE 3S2 : $M_{LL(APP)} = (181.88^{Ft\text{-}k})(0.73) = \underline{132.77^{Ft\text{-}KIPS}}$

JOB CHESHIRE, C-10-2 #82-0252
SHEET NO. 9 OF 11
CALCULATED BY TWS DATE 10/8/82
CHECKED BY DATE
SCALE

4. $M_{LL(APP)}$ – CONTINUED

B. For EXTERIOR STRINGERS

(SEE SSHB, §1.3.1(B), P.38)



$\Sigma M_I = 0$

$4R_E - 2WL = 0$

$4R_E = 2WL$

$R_E = 0.5WL$

DISTRIBUTION FACTOR: D.F. = $R_E/WL = 0.5^{WL}/WL = 0.50$

H-20: $M_{LL(APP)} = (144.25^{Ft\text{-}k})(\frac{20}{15})(0.50) = 96.17^{Ft\text{-}KIPS}$

TYPE 3: $M_{LL(APP)} = (197.24^{Ft\text{-}k})(0.5) = 98.62^{Ft\text{-}KIPS}$

TYPE 3S2: $M_{LL(APP)} = (181.88^{Ft\text{-}k})(0.5) = 90.94^{Ft\text{-}KIPS}$

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JOB CHESHIRE, C-10-2 #82-0252
SHEET NO. 10 OF 11
CALCULATED BY TWS DATE 10/8/82
CHECKED BY DATE
SCALE

STEEL STRINGERS

RATING

$$\text{RATING} = \frac{\text{MLL(ALL)}}{\text{MLL(APP)}} \times \text{VEHICLE WEIGHT (TONS)}$$

A. for INTERIOR STRINGERS

H-20 :	$(139.09/140.40)20^T = 19.8^{TONS}$	$(228.16/140.40)20^T = 32.5^{TONS}$
TYPE 3 :	$(139.09/143.98)25^T = 24.2^{TONS}$	$(228.16/143.98)25^T = 39.6^{TONS}$
TYPE 3S2:	$(139.09/132.77)36^T = 37.7^{TONS}$	$(228.16/132.77)36^T = 61.9^{TONS}$

B. for EXTERIOR STRINGERS

H-20 :	$(123.31/96.17)20T = 25.6^{TONS}$	$(212.38/96.17)20^T = 44.2^{TONS}$
TYPE 3 :	$(123.31/98.62)25^T = 31.3^{TONS}$	$(212.38/98.62)25^T = 53.8^{TONS}$
TYPE 3S2:	$(123.31/90.94)36^T = 48.8^{TONS}$	$(212.38/98.62)36^T = 77.5^{TONS}$

PRODUCT 204-1 NEBS Inc., Groton, Mass. 01471.

Breakdown of Bridge Ratings

SHEET 11 of 11

Town/City	Location	Bridge No.	Maintenance No.
CHESHIRE	SAND ROAD OVER DRY BROOK	C-10-2	TWN-105-001-100

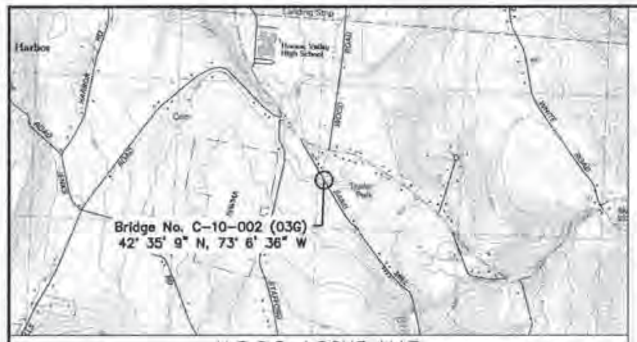
Bridge Component	Inventory Rating (tons)			Operating Rating (tons)		
	H - 20	Type 3	Type 3S2	H - 20	Type 3	Type 3S2
REINFORCED CONCRETE DECK	18.7	36.8	57.8	26.4	51.9	81.5
INTERIOR STEEL STRINGERS	19.8	24.2	37.7	32.5	39.6	61.9
EXTERIOR STEEL STRINGERS	25.6	31.3	48.8	44.2	53.8	77.5

comments:

APPENDIX F

MISCELLANEOUS

MISCELLANEOUS INDEX



U.S.G.S. LOCUS MAP
SCALE: 1"=2000'±

SITEWORK CONSTRUCTION NOTES

A. PROTECTION OF WETLANDS, WATER QUALITY, AND STORMWATER MANAGEMENT

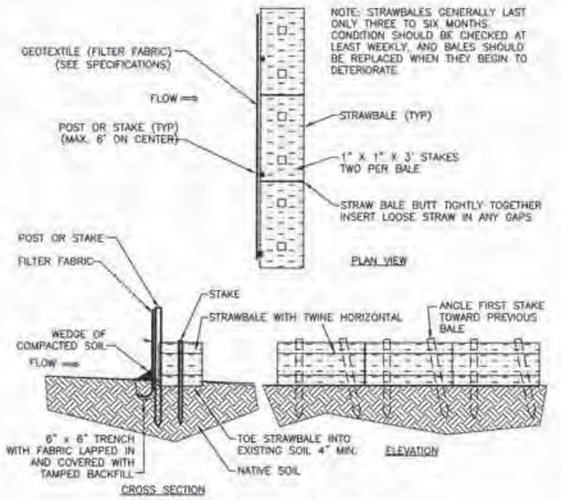
1. WORK PROPOSED ON THIS PLAN INCLUDES AREAS WHICH ARE SUBJECT TO REGULATION UNDER THE MASS. WETLANDS PROTECTION ACT (WPA), FEDERAL CLEAN WATERS ACT (CWA), NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) AND/OR OTHER STATUTES AND REGULATIONS PERTAINING TO WETLANDS, WATER QUALITY, AND STORMWATER MANAGEMENT.
2. CONTRACTOR SHALL PERFORM ALL PROPOSED WORK IN COMPLIANCE WITH THE APPROVED WETLANDS PERMIT (ORDER OF CONDITIONS OR DETERMINATION OF APPLICABILITY AS APPLICABLE).
3. CONTRACTOR SHALL INSTALL, MONITOR, MAINTAIN AND REPLACE, WHENEVER NECESSARY, ALL EROSION AND SEDIMENTATION CONTROL MEASURES REQUIRED TO CONTROL STORMWATER RUNOFF, EROSION AND SEDIMENTATION FROM THE WORK, AND TO PREVENT SEDIMENTS FROM ALTERING ANY WETLANDS OR WATERCOURSES. REFER TO PLANS, SPECIFICATIONS AND PERMITS FOR MINIMUM REQUIREMENTS. CONTRACTOR SHALL INSTALL ADDITIONAL MEASURES WHEREVER NECESSARY TO CONTROL SITE RUNOFF.
4. CONTRACTOR SHALL DISPOSE OF ANY UNSUITABLE OR EXCESS EARTH MATERIALS EXCAVATED FROM THE SITE ("SPOIL MATERIAL") IN ACCORDANCE WITH ALL APPLICABLE LAWS AND REGULATIONS. UNLESS AN ON-SITE SPOIL AREA IS SPECIFIED, CONTRACTOR SHALL DISPOSE OF EXCESS CLEAN EARTH MATERIAL OFF-SITE IN AN UPLAND AREA OUTSIDE ANY WETLAND BUFFER ZONES OR RESOURCE AREAS.
5. CONTRACTOR SHALL DISPOSE OF ANY DEMOLITION DEBRIS, CONSTRUCTION DEBRIS, WOOD WASTES, CONTAMINATED SOILS, HAZARDOUS MATERIALS AND OTHER SPECIAL WASTES IN STRICT ACCORDANCE WITH APPLICABLE LAWS AND REGULATIONS.

B. WORK LIMITS

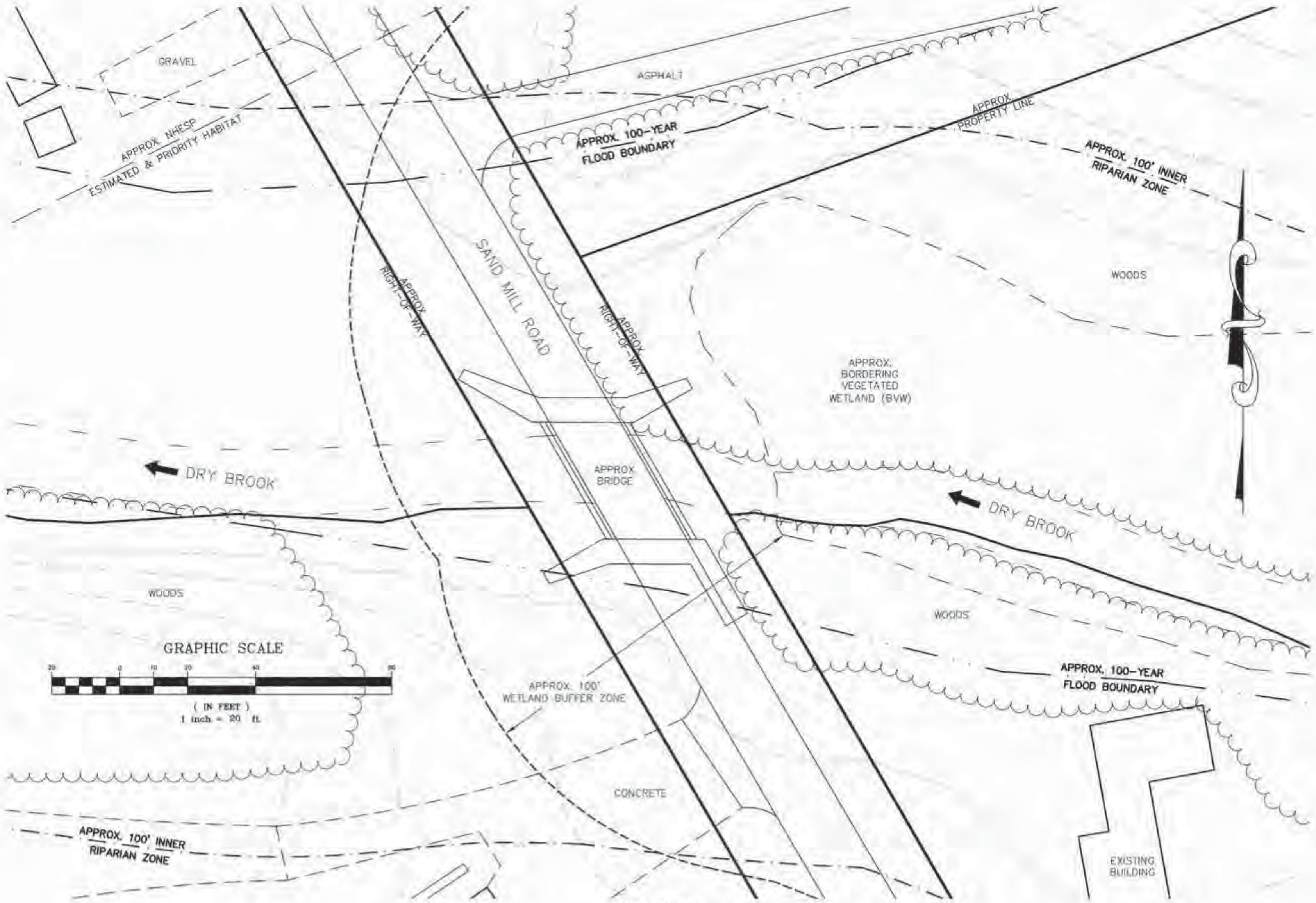
1. CONTRACTOR SHALL CONFINE ACTIVITIES TO THE WORK LIMITS SHOWN ON THE PLANS OR DIRECTED IN THE FIELD.
2. UNLESS OTHERWISE INDICATED, CONTRACTOR SHALL PROTECT ALL TREES, STRUCTURES, AND UTILITIES AGAINST DAMAGE, AND SHALL REPAIR OR REPLACE DAMAGED AREAS AT CONTRACTOR'S EXPENSE.
3. IN ORDER TO AVOID DAMAGING TREE ROOTS BY COMPACTING THE SOIL, CONTRACTOR SHALL NOT ALLOW EQUIPMENT OR VEHICLES TO OPERATE UNDER TREE CANOPIES EXCEPT WHERE NECESSARY TO CARRY OUT THE WORK.

C. SOIL CONDITIONS

1. REFER TO SPECIFICATIONS FOR SOILS INFORMATION. ANY REFERENCE ON THE PLANS TO LEDGE OR BEDROCK ARE FOR INFORMATION ONLY AND SHALL NOT BE RELIED UPON AS REPRESENTING LIMITS, QUANTITIES, PRESENCE OR ABSENCE OF ROCK REQUIRING EXCAVATION.



SILT FENCE & STRAW BALE DETAIL
N.T.S.



KEY PLAN
SCALE: 1"=20'

CONSTRUCTION-PHASE MEASURES FOR CONTROL OF SEDIMENT AND EROSION AND PROTECTION OF WETLANDS

1. DO NOT DISTURB EXISTING VEGETATED AREAS FAR IN ADVANCE OF CONSTRUCTION. LIMIT DISTURBANCE ONLY TO THE EXTENT AND DURATION REQUIRED FOR IMMINENT CONSTRUCTION ACTIVITIES. RETAIN AND PROTECT NATURAL VEGETATION AND VEGETATIVE FILTER STRIPS WHEREVER POSSIBLE.
2. TEMPORARY VEGETATION OR A HEAVY MAT OF WOOD CHIPS SHALL BE ESTABLISHED ON ALL EARTH STOCKPILES OR STRIPPED AREAS WHICH WILL BE BARE FOR MORE THAN TWO MONTHS AND LESS THAN 12 MONTHS. SUCH VEGETATION SHALL CONSIST OF A COMMERCIAL CONSERVATION SEED MIXTURE WITH A HIGH PERCENTAGE OF ANNUAL RYE GRASS. PERMANENT HERBACEOUS COVER SHALL BE ESTABLISHED ON AREAS WHICH WOULD BE BARE MORE THAN 12 MONTHS.
3. A HEAVY MAT OF STRAW MULCH, WOOD CHIPS, EROSION CONTROL NETTING, MESH OR BLANKET MATTING SHALL BE USED ON DISTURBED AREAS IF VEGETATION CANNOT BE ESTABLISHED DUE TO SEASON OR ON-GOING CONSTRUCTION PROCESS, OR IF OTHERWISE REQUIRED.
4. SILT FENCE OR CAREFULLY POSITIONED STAKED STRAW BALES SHALL BE INSTALLED ALONG THE DOWNHILL EDGE OF DISTURBED EARTHWORK AREAS WHERE REQUIRED TO CONTROL EROSION AND SEDIMENTATION.
5. WATER COURSES, INCLUDING INTERMITTENT DRAINAGE SWALES, SHALL BE PROTECTED FROM SILTATION BY SILT FENCE BARRIERS OR CAREFULLY POSITIONED STAKED STRAW BALE CHECK DAMS.
6. SEDIMENT TRAPS SHALL BE CONSTRUCTED DOWNHILL OF DISTURBED AREAS AND UPSTREAM OF WATERCOURSES AND/OR WETLANDS. TRAPPED SEDIMENTS SHALL BE REMOVED FROM THE BASINS DURING THE CONSTRUCTION PERIOD BEFORE THEY BECOME 50% FULL TO PREVENT SEDIMENT FROM BEING TRANSPORTED DOWNHILL. DISPOSE OF SEDIMENTS IN ON-SITE UPLAND DISPOSAL AREAS, PROPERLY GRADED, SEEDED AND MULCHED.
7. PERMANENT DRAINAGE CONTROL STRUCTURES SHALL BE INSTALLED AS EARLY AS POSSIBLE IN THE CONSTRUCTION PROCESS. DRAINS SHALL BE PROVIDED WITH DRAIN INLET SEDIMENT FILTERS AND/OR TRAPS.
8. DO NOT FUEL CONSTRUCTION EQUIPMENT OR STORE FUEL OR OTHER POTENTIAL CONTAMINANTS WITHIN 100 FEET OF WATER COURSES OR WETLANDS.
9. STRICTLY ADHERE TO ALL GENERAL AND SPECIAL CONDITIONS OF ANY WETLANDS PROTECTION ACT PERMITS, INCLUDING PLANS, DETAILS, CONSTRUCTION SEQUENCING OUTLINE, AND OTHER APPLICABLE REQUIREMENTS.

SPECIAL EROSION AND SEDIMENTATION CONTROL CONSTRUCTION PHASE NOTE

CONTRACTOR SHALL INSPECT AND MAINTAIN EROSION AND SEDIMENTATION CONTROLS DAILY AND SUBMIT DAILY REPORTS ON A WEEKLY BASIS TO THE CONSERVATION COMMISSION, TOWN, AND ENGINEER. DAILY REPORTS SHALL INCLUDE, AT A MINIMUM, DATE AND TIME OF REVIEW, REVIEWER NAME AND COMPANY, RECENT PRECIPITATION EVENTS, ACTIONS PERFORMED (IF ANY), AND ANY OTHER COMMENTS. PHOTOGRAPHS OF THE EROSION CONTROLS SHALL ALSO BE PROVIDED ON A WEEKLY BASIS.

E2420D03.DWG 26-Sep-2016

SHEET INDEX	
1	GENERAL NOTES, LOCUS PLAN, & KEY PLAN
2	EXISTING CONDITIONS BRIDGE DETAILS
3	PROPOSED BRIDGE DETAILS
4	BRIDGE REPAIR DETAILS

LEGEND

- APPROX. EDGE OF ASPHALT
- APPROX. EDGE OF GRAVEL
- APPROX. EDGE OF WOODS
- APPROX. WETLAND BOUNDARY
- APPROX. WETLAND BUFFER ZONE
- APPROX. RIPARIAN ZONE
- APPROX. NHESP HABITAT
- APPROX. FLOODPLAIN
- APPROX. 5' CONTOUR LINE
- APPROX. 25' CONTOUR LINE
- APPROX. RIGHT-OF-WAY LINE
- APPROX. PROPERTY LINE
- APPROX. EXISTING BUILDING

GENERAL NOTES ABOUT COMPILED SITE PLAN BASE MAP:

THE SITE PLAN BASE MAP IS COMPILED FROM AVAILABLE SOURCES AND IS NOT THE RESULT OF A RECENT FIELD SURVEY.

COMPILED INFORMATION INCLUDES MASSGIS (OFFICE OF GEOGRAPHIC AND ENVIRONMENTAL INFORMATION, COMMONWEALTH OF MASSACHUSETTS OFFICE OF ENVIRONMENTAL AFFAIRS) AERIAL PHOTOS, FEMA FLOOD MAPS, NHESP HABITAT MAPS AND OTHER PUBLISHED SOURCES. PROPERTY LINES ARE COMPILED FROM ASSESSORS MAPPING. UTILITIES ARE FROM AVAILABLE PLANS, RECORDS AND DIRECT OBSERVATION.

ALL COMPILED INFORMATION IS APPROXIMATE ONLY AND IS SUBJECT TO FIELD VERIFICATION AND CHANGE.

UNLESS OTHERWISE NOTED, THE LOCATIONS AND INFORMATION ABOUT UNDERGROUND PIPES, UTILITIES OR OTHER STRUCTURES ARE COMPILED FROM AVAILABLE RECORD DATA AND VISIBLE FIELD EVIDENCE AND ARE NOT REPRESENTED AS BEING EXACT OR COMPLETE. PRIOR TO BEGINNING EXCAVATION, THE EXCAVATOR SHALL GIVE ADEQUATE ADVANCE NOTICE TO THE DIG SAFE CENTER, THE MUNICIPAL AND/OR STATE PUBLIC WORKS DEPARTMENT, AND PRIVATE UTILITY COMPANIES, TO ALLOW FOR FIELD LOCATION OF FACILITIES IN THE VICINITY.

IF CONTRACTOR OBSERVES ANY FIELD CONDITIONS WHICH VARY SIGNIFICANTLY FROM WHAT IS SHOWN ON THESE PLANS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE OWNER AND ENGINEER FOR RESOLUTION OF THE CONFLICTING INFORMATION.

THE CONTRACTOR SHALL RECORD TIE MEASUREMENTS, DEPTHS, DIMENSIONS, MATERIALS, FIELD CONDITIONS AND OTHER PERTINENT DATA ABOUT ALL UNDERGROUND PIPES, UTILITIES AND STRUCTURES ENCOUNTERED DURING THE WORK, BOTH EXISTING AND CONSTRUCTED. CONTRACTOR SHALL SUBMIT RECORD DRAWINGS WITH THIS INFORMATION TO THE OWNER AND ENGINEER PRIOR TO COMPLETION OF THE WORK.

CONTRACTOR SHALL IMMEDIATELY REPORT ANY DAMAGE TO EXISTING PIPES, UTILITIES, OR STRUCTURES TO THE OWNER AND ENGINEER, AND OBTAIN DIRECTIONS AS TO REPAIR, REPLACEMENT OR ABANDONMENT.

COMMONWEALTH OF MASSACHUSETTS
MassDOT, Highway Division
APPROVED UNDER PROVISIONS OF
MASS. GEN. LAWS CH 85 S 35
P.E. 10/11/16
STATE BRIDGE ENGINEER DATE

WILLIAM M. BARRY, P.E.

William M. Barry

Barry Engineers &
Constructors, Inc.
176 Churchill Street
Pittsfield, MA 01201
Tel (413) 443-[illegible]

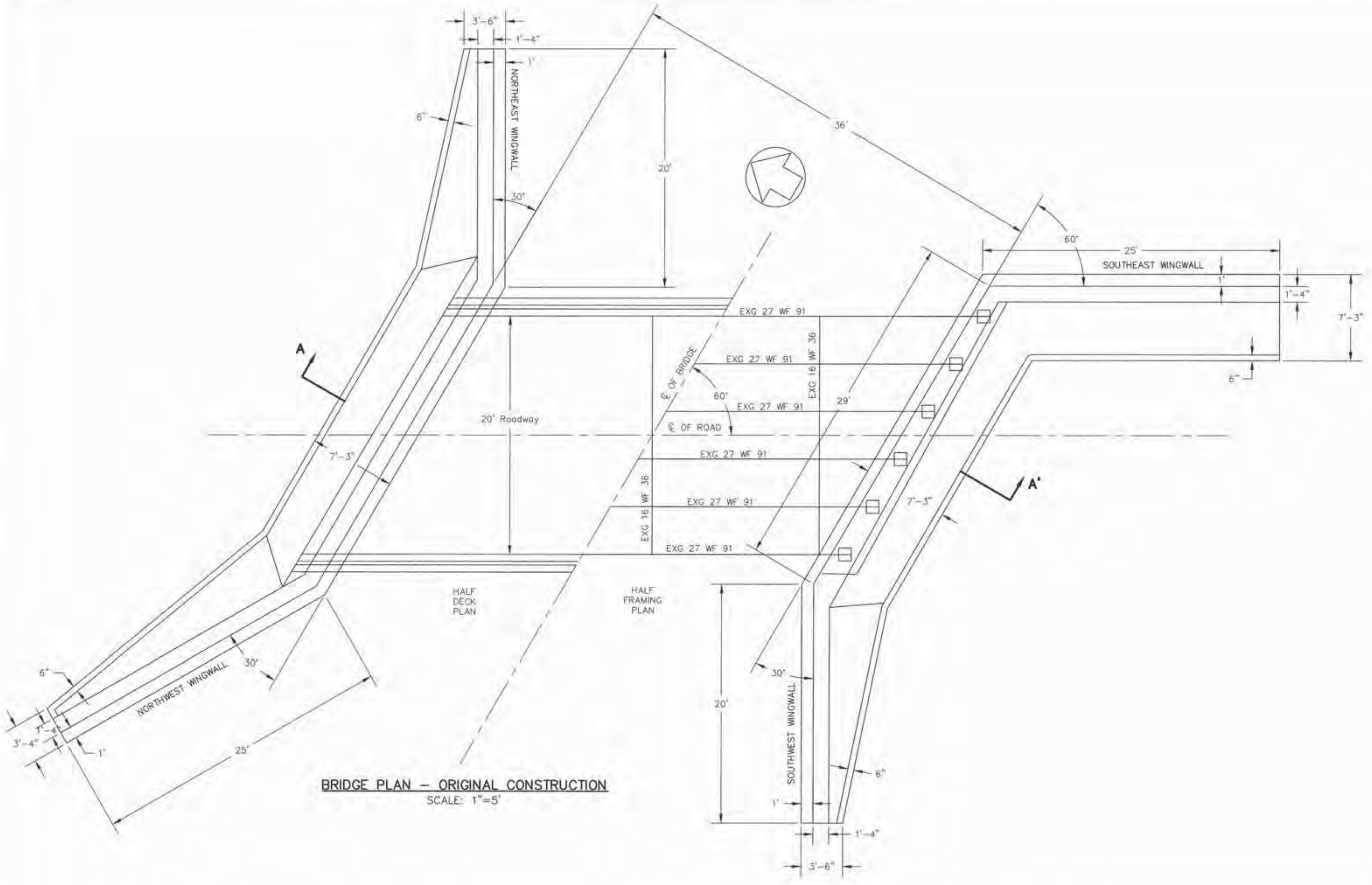
NO.	DATE	REVISION/ISSUE	BY
	9/26/2016	MYLAR CONSTRUCTION PLANS	SAM

PROPOSED BRIDGE REPAIRS
CHESHIRE
SAND MILL ROAD
OVER DRY BROOK

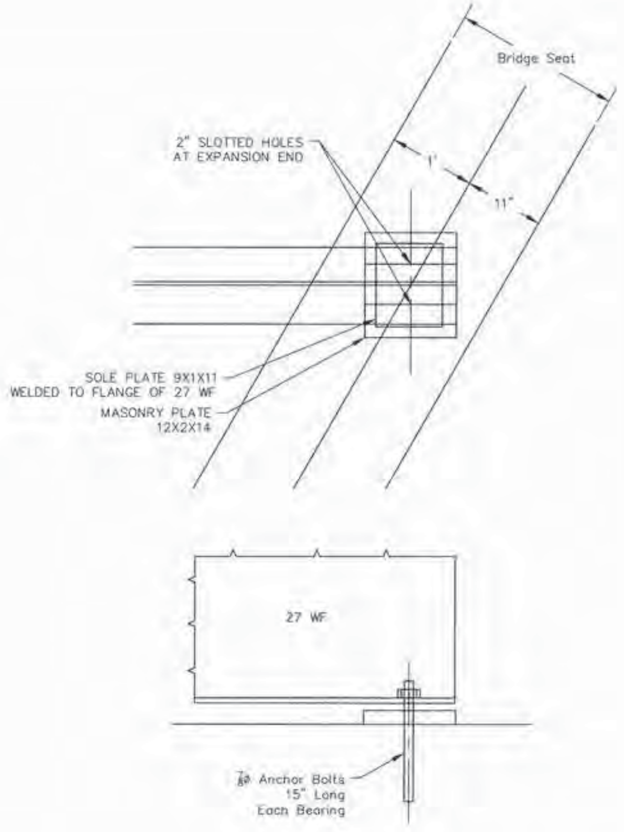
FORESIGHT LAND SERVICES
ENGINEERING SURVEYING PLANNING
FORESIGHT LAND SERVICES, INC.
1496 WEST HOUSATONIC STREET - PITTSFIELD, MA 01201
TEL (413) 499-1560 FAX (413) 499-3307 WWW.FORESIGHTLAND.COM

PROJECT NO. E2087
SCALE AS NOTED
DATE 9/16/16
DESIGNED BY WMB/SAM
DRAWN BY KAC
CHECKED BY
SHEET NO. 1
E2420D03.DWG

SHEET 1 OF 4 SHEETS BRIDGE NO. C-10-002 (03G)

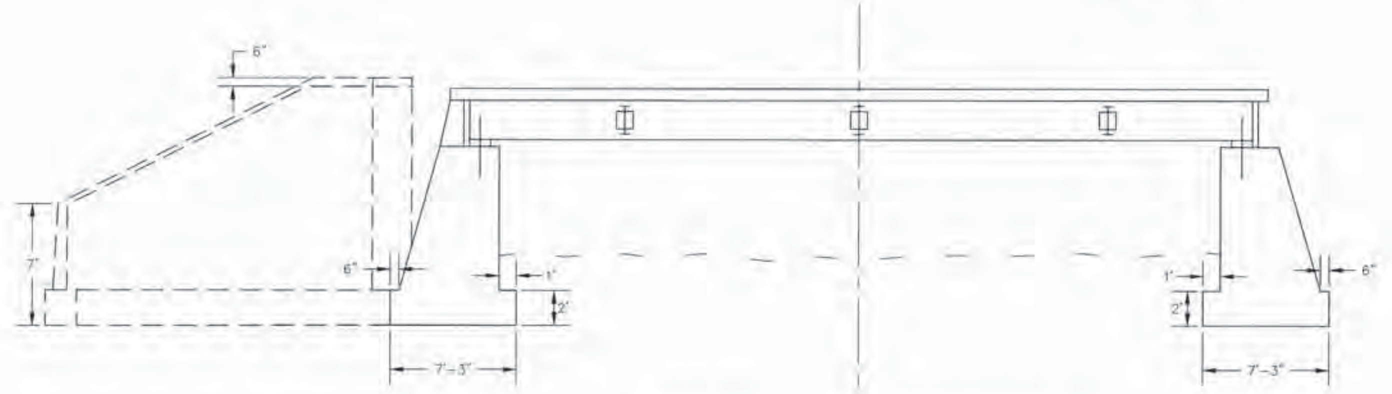


BRIDGE PLAN – ORIGINAL CONSTRUCTION
SCALE: 1"=5'

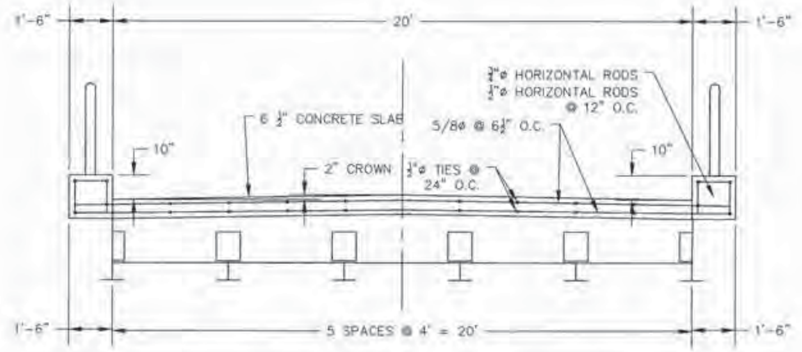


DETAIL AT BRIDGE SEAT – ORIGINAL CONSTRUCTION
SCALE: 1"=1'

NOTE REGARDING ORIGINAL CONSTRUCTION DETAILS:
THE DETAILS PROVIDED ARE BASED ON THE PLAN ENTITLED "THE COMMONWEALTH OF MASSACHUSETTS, PROPOSED BRIDGE, CHESHIRE, BRIDGE NO. 4 (REVISED), SAND MILL – SAVOY ROAD, OVER STONY BROOK, SCALES AS NOTED, OFFICE OF DEPARTMENT OF PUBLIC WORKS, 100 NASHUA ST., BOSTON, MASS., OCTOBER 1938" BY W&L ENGINEERING CO., MAURICE A. REIDY.



SECTION A–A' – ORIGINAL CONSTRUCTION
SCALE: 1"=5'



CROSS SECTION – ORIGINAL CONSTRUCTION
SCALE: 1"=5'

COMMONWEALTH OF MASSACHUSETTS
MassDOT, Highway Division
APPROVED UNDER PROVISIONS OF
MASS. GEN. LAWS CH 85 S 35
10/11/16
STATE BRIDGE ENGINEER DATE

9/26/2016	MYLAR CONSTRUCTION PLANS
DATE	DESCRIPTION
USE ONLY PRINTS OF LATEST DATE	

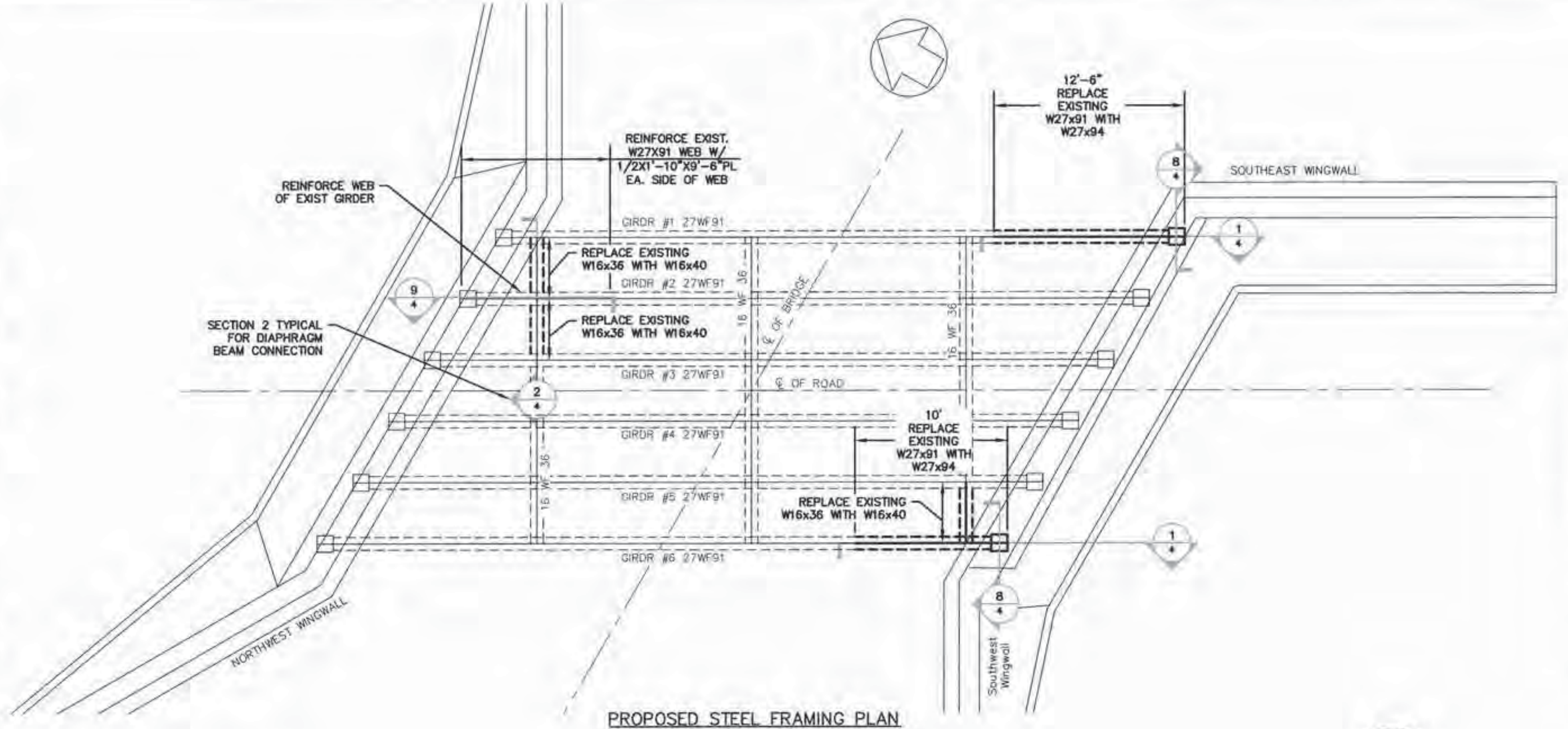
SHEET 2 OF 4 SHEETS BRIDGE NO. C-10-002 (03G)

E2429D03.DWG 26-Sep-2016

GENERAL NOTES:

STEEL:
1. ALL WORK SHALL BE IN ACCORDANCE WITH THE RELEVANT PROVISIONS OF THE MASSDOT SPECIFICATIONS SECTION 960 AS NOTED IN THE CONTRACT SPECIFICATIONS
2. ALL NEW STEEL SHALL BE AASHTO DESIGNATION M270 GRADE 50
3. THE DETAILS DEPICTED HERE ARE BASED UPON RECORD DRAWINGS ONLY. THE CONTRACTOR WILL BE REQUIRED TO CONDUCT A FIELD SURVEY TAKING ALL NECESSARY MEASUREMENTS AND IDENTIFYING ALL DETAILS REQUIRED FOR THE COMPLETION OF THE WORK PRIOR TO THE PREPARATION OF SHOP DRAWINGS.
4. ALL NEW STRUCTURAL STEEL SHALL BE SHIPPED TO THE JOB SITE WITH A PRIME COAT OF PAINT APPLIED TO FAYING SURFACES.
5. PRIOR TO THE INSTALLATION OF ANY NEW STEEL THE EXISTING STEEL SHALL BE THOROUGHLY CLEANED TO SSPC-SP6 CONDITION AND THE NEW STEEL SHALL BE THOROUGHLY CLEANED TO SSPC-SP10 CONDITION AND A PRIME COAT OF PAINT SHALL BE APPLIED. THIS PAINT SYSTEM SHALL MEET THE REQUIREMENTS OF THE MASSDOT SPECIFICATIONS AND BE COMPATIBLE WITH THE PAINT SYSTEM BEING EMPLOYED BY THE CONTRACTOR ON THE REMAINDER OF THE STRUCTURE.
6. ALL NEW BOLTS SHALL BE HIGH STRENGTH BOLTS AND SHALL CONFORM TO THE REQUIREMENTS OF ASTM A325 TYPE 1.
7. THE CONTRACTOR SHALL ENSURE THAT NO DAMAGE OCCURS TO THE EXISTING STEEL TO REMAIN. ANY DAMAGE WHICH MAY OCCUR SHALL BE REPAIRED USING A PROCEDURE APPROVED BY THE ENGINEER.
8. ONCE THE EXISTING STEEL IS REMOVED THE REMAINING FAYING SURFACE SHALL BE CLEANED TO SSPC-SP6 CONDITION AND COATED WITH A PRIME COAT OF PAINT. NOTE THE CONTRACTOR MAY BE REQUIRED TO ERECT ENCLOSURES AND PROVIDE MEANS TO CONTROL THE ENVIRONMENTAL CONDITIONS TO PROVIDE FOR THE MINIMUM CURING TIME FOR THE PRIME COATING.
9. THE PROPOSED STEEL SHALL BE PROPERLY POSITIONED AND SECURED IN PLACE WITH CLAMPS OR OTHER MECHANICAL MEANS. WELDING SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS.

CONCRETE:
1. ALL WORK SHALL BE IN ACCORDANCE WITH THE RELEVANT PROVISIONS OF THE MASSDOT SPECIFICATIONS SECTION 901 AS NOTED IN THE CONTRACT SPECIFICATIONS.
2. REINFORCING STEEL AND SUPPORT DEVICES SHALL BE EPOXY COATED AND SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M31 GRADE 60. ALL CONTACT LAP SPLICES SHALL BE AASHTO CLASS C, UNLESS OTHERWISE NOTED ON THE PLANS OR DETAILS.
3. CONCRETE FOR BRIDGE DECK SHALL BE 5,000 PSI, 3/4" 685 HP CEMENT CONCRETE AND CONCRETE FOR ABUTMENT SHALL BE 4,000 PSI, 3/4" 585 CEMENT CONCRETE.
4. GROUT SHALL BE NON-SHRINK NON-METALLIC FIVE-STAR GROUT BY U.S. GROUT, INC. OR APPROVED EQUAL.



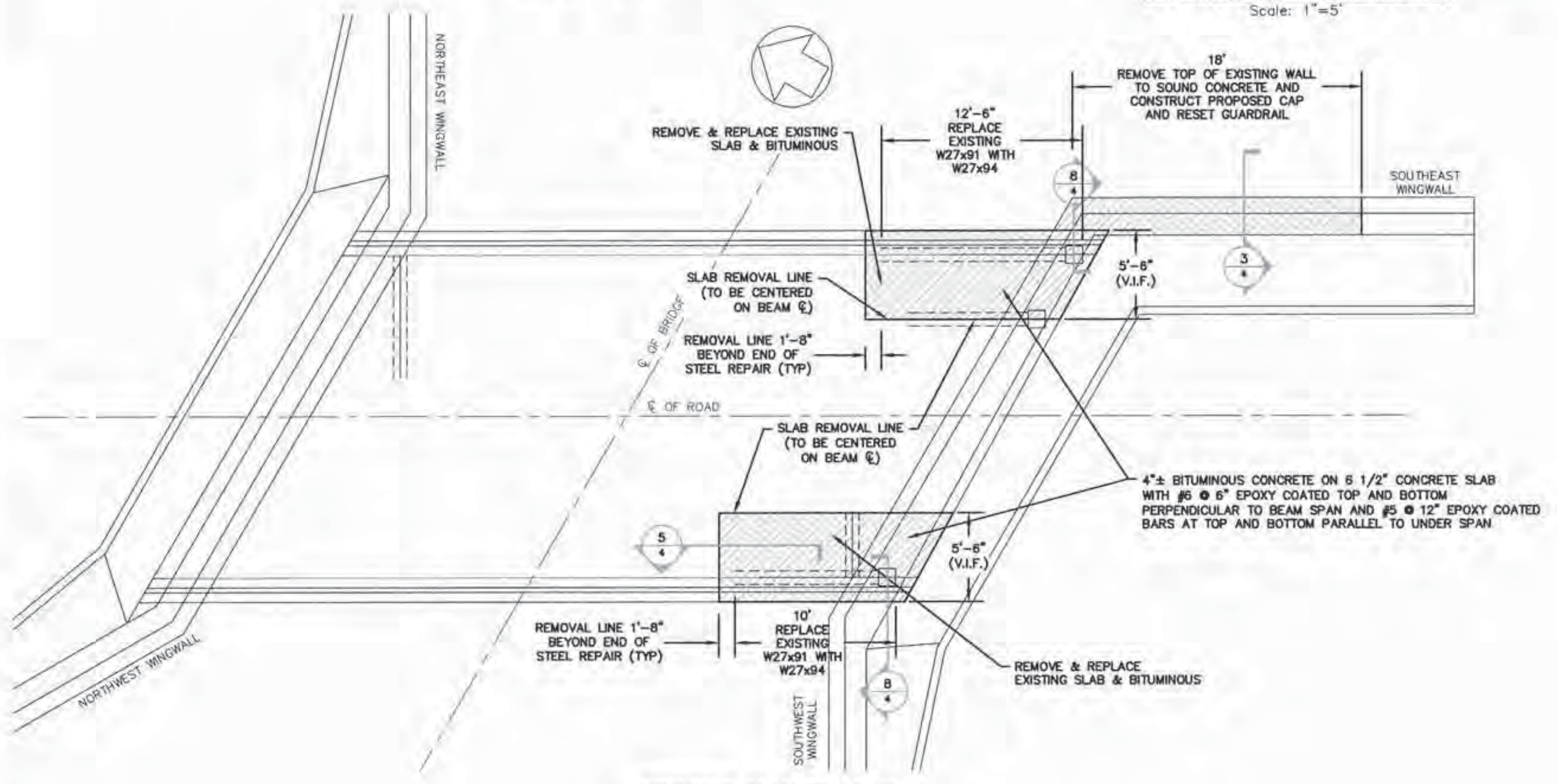
PROPOSED STEEL FRAMING PLAN

Scale: 1"=5'

EXPECTED BRIDGE RATING AFTER REPAIRS		
TRUCK TYPE	INVENTORY RATING (TONS)	OPERATING RATING (TONS)
H20	21.6	35.2
TYPE 3	26.1	42.7
TYPE 3S2	40.8	66.7
HS20	29.1*	47.6

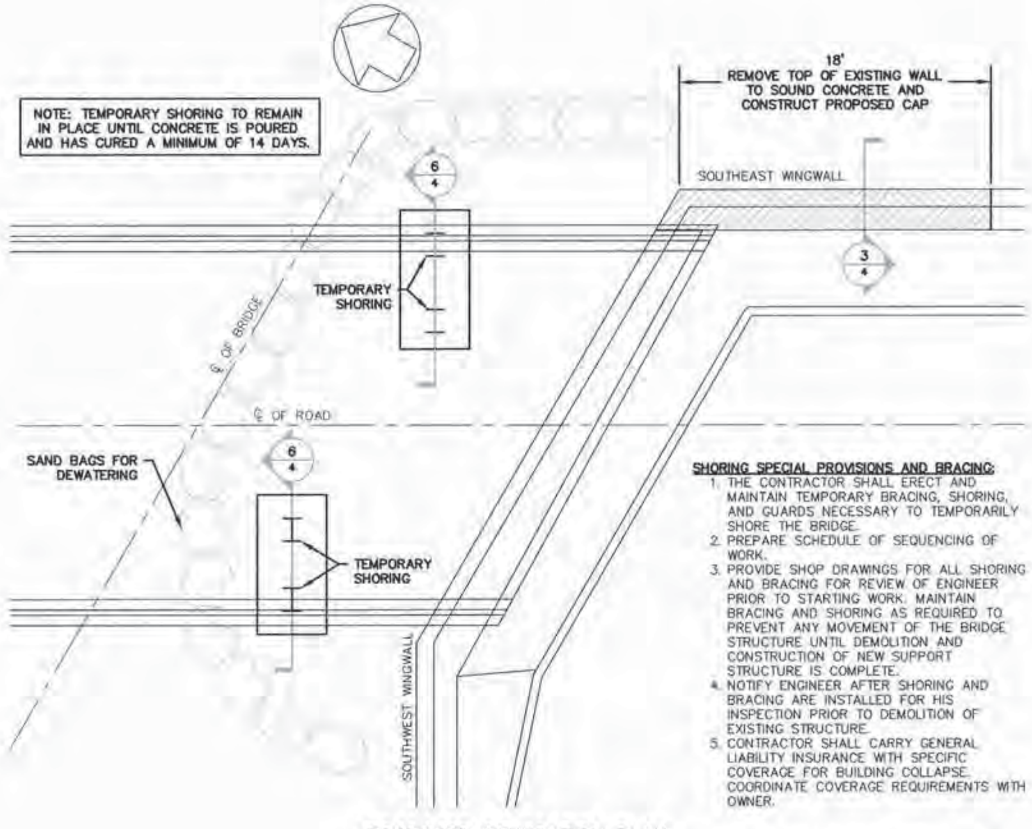
* BELOW STATUTORY FOR HS20 LOADING AT INVENTORY LEVEL.

** REFERENCE BRIDGE RATING PREPARED FOR MASS. DEPT. OF TRANSP. HIGHWAY DIVISION FOR SAND MILL ROAD OVER DRY BROOK. BRIDGE NO. – C-10-002(03G). STRUCTURE NO. C10002-03G-MUN-NBI. DATE OF RATING JANUARY 2015 PREPARED BY MICHAEL BAKER, JR. INC.



PROPOSED SLAB REPAIR PLAN

Scale: 1"=5'



SHORING SPECIAL PROVISIONS AND BRACING:
1. THE CONTRACTOR SHALL ERECT AND MAINTAIN TEMPORARY BRACING, SHORING, AND GUARDS NECESSARY TO TEMPORARILY SHORE THE BRIDGE.
2. PREPARE SCHEDULE OF SEQUENCING OF WORK.
3. PROVIDE SHOP DRAWINGS FOR ALL SHORING AND BRACING FOR REVIEW OF ENGINEER PRIOR TO STARTING WORK. MAINTAIN BRACING AND SHORING AS REQUIRED TO PREVENT ANY MOVEMENT OF THE BRIDGE STRUCTURE UNTIL DEMOLITION AND CONSTRUCTION OF NEW SUPPORT STRUCTURE IS COMPLETE.
4. NOTIFY ENGINEER AFTER SHORING AND BRACING ARE INSTALLED FOR HIS INSPECTION PRIOR TO DEMOLITION OF EXISTING STRUCTURE.
5. CONTRACTOR SHALL CARRY GENERAL LIABILITY INSURANCE WITH SPECIFIC COVERAGE FOR BUILDING COLLAPSE. COORDINATE COVERAGE REQUIREMENTS WITH OWNER.

PROPOSED FOUNDATION PLAN

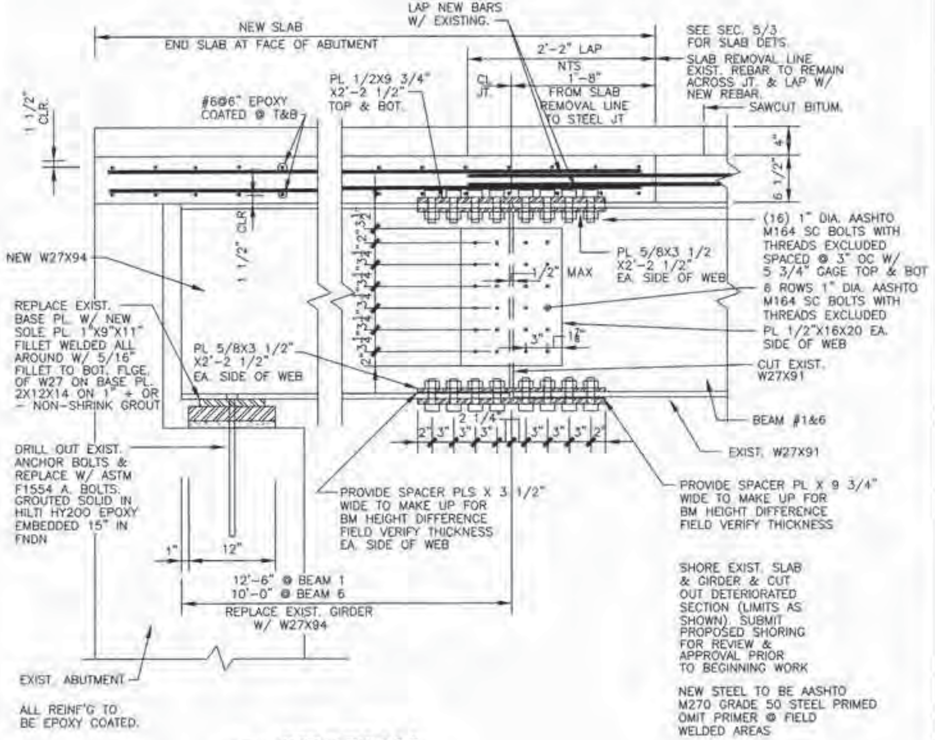
Scale: 1"=5'

COMMONWEALTH OF MASSACHUSETTS
MassDOT, Highway Division
APPROVED UNDER PROVISIONS OF MASS. GEN. LAWS CH 85 S 35
10/11/16
STATE BRIDGE ENGINEER DATE

9/26/2016	MYLAR CONSTRUCTION PLANS
DATE	DESCRIPTION
USE ONLY PRINTS OF LATEST DATE	

SHEET 3 OF 4 SHEETS BRIDGE NO. C-10-002 (03G)

E2429D03.DWG 26-Sep-2016

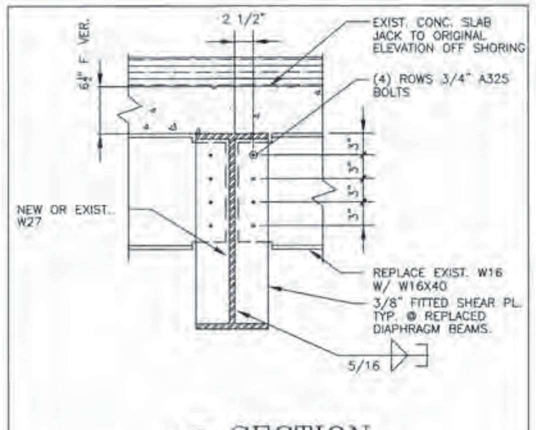


ALL REINF'G TO BE EPOXY COATED.

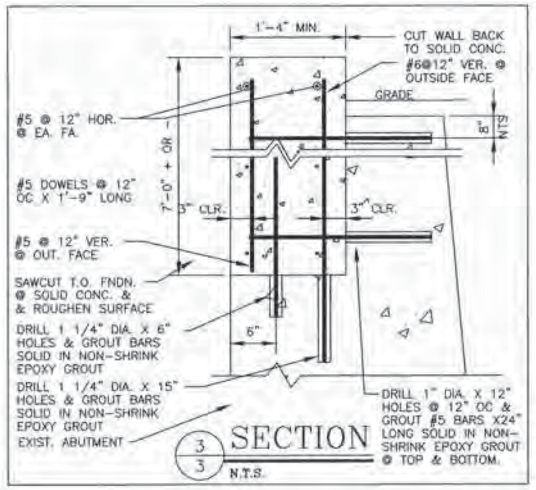
SHORE EXIST. SLAB & GIRDER & CUT OUT DETERIORATED SECTION (LIMITS AS SHOWN). SUBMIT PROPOSED SHORING FOR REVIEW & APPROVAL PRIOR TO BEGINNING WORK

NEW STEEL TO BE AASHTO M270 GRADE 50 STEEL PRIMED OMIT PRIMER @ FIELD WELDED AREAS

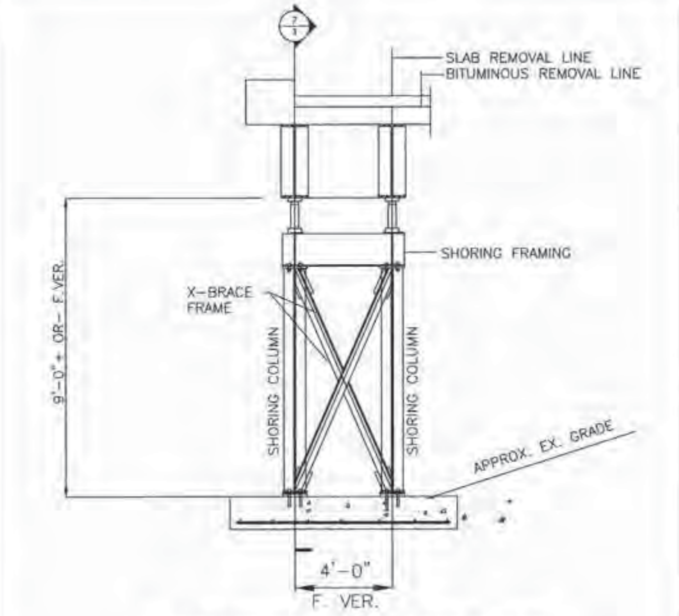
1/3 SECTION
1" = 1'



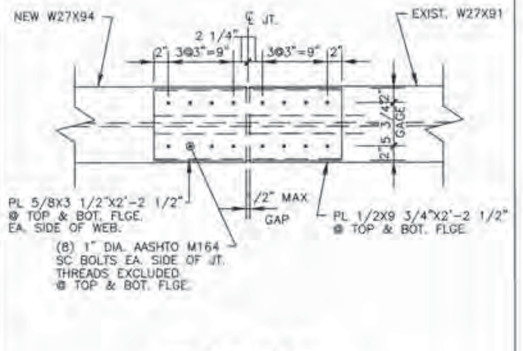
2/3 SECTION
N.T.S.



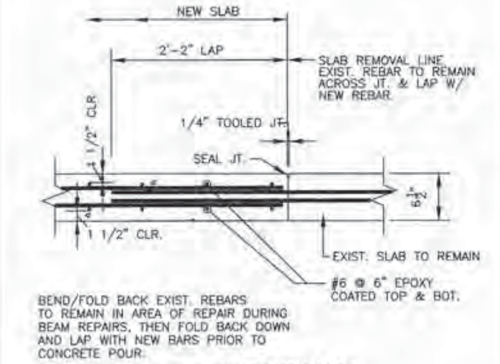
3/3 SECTION
N.T.S.



6/3 TEMPORARY SHORING
N.T.S.



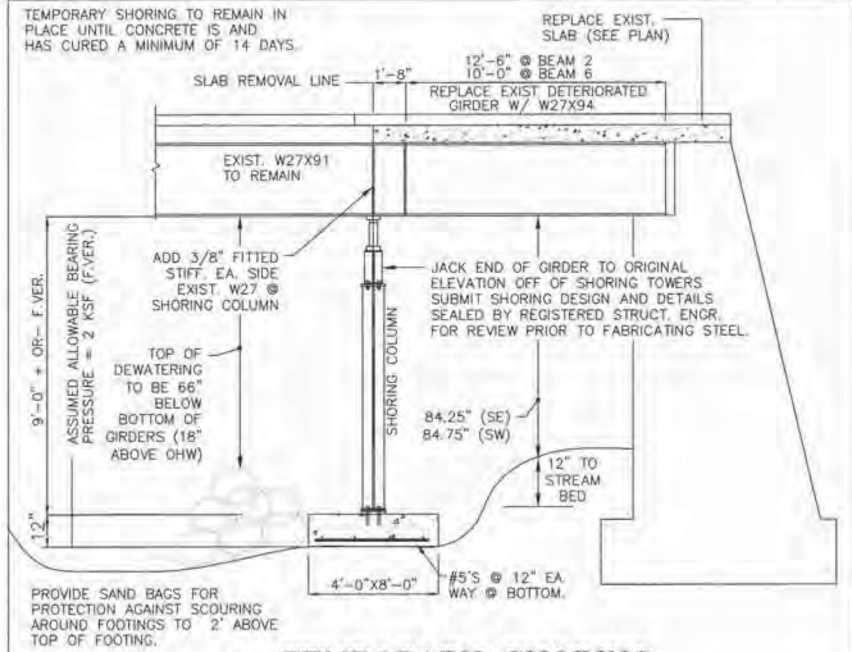
4/3 DETAIL
1" = 1'



BEND/FOLD BACK EXIST. REBARS TO REMAIN IN AREA OF REPAIR DURING BEAM REPAIRS, THEN FOLD BACK DOWN AND LAP WITH NEW BARS PRIOR TO CONCRETE POUR.

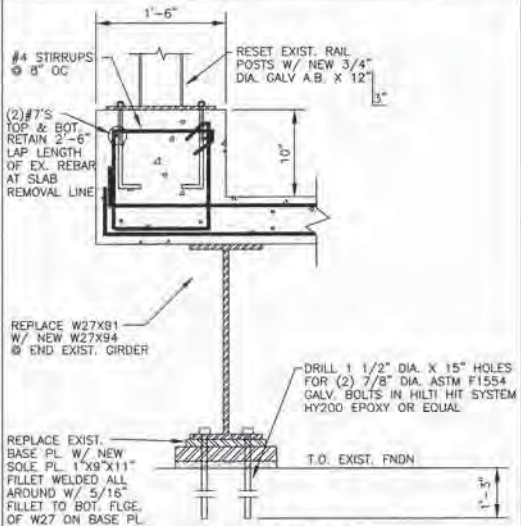
5/3 SECTION
N.T.S.

TEMPORARY SHORING TO REMAIN IN PLACE UNTIL CONCRETE IS AND HAS CURED A MINIMUM OF 14 DAYS.

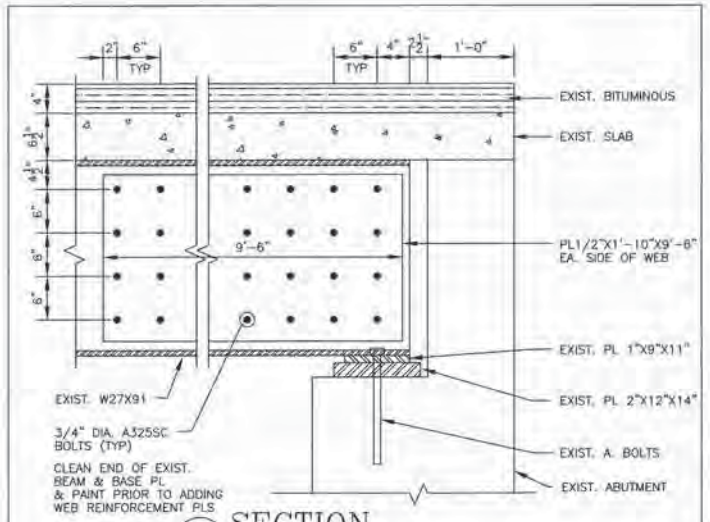


PROVIDE SAND BAGS FOR PROTECTION AGAINST SCOURING AROUND FOOTINGS TO 2' ABOVE TOP OF FOOTING.

7/3 TEMPORARY SHORING
N.T.S.



8/3 SECTION
N.T.S.



9/3 SECTION
N.T.S.

E2429D03.DWG 26-Sep-2016

COMMONWEALTH OF MASSACHUSETTS
MassDOT, Highway Division
APPROVED UNDER PROVISIONS OF MASS. GEN. LAWS CH 85 S 35
10/11/16
STATE BRIDGE ENGINEER DATE

9/26/2016	MYLAR CONSTRUCTION PLANS
DATE	DESCRIPTION
USE ONLY PRINTS OF LATEST DATE	

SHEET 4 OF 4 SHEETS BRIDGE NO. C-10-002 (03G)

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DOCUMENT A00806

BRIDGE INSPECTION REPORT

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MASSACHUSETTS DEPARTMENT OF TRANSPORTATION

PAGE 1 OF 9

STRUCTURES INSPECTION FIELD REPORT

ROUTINE INSPECTION

2-DIST	B.I.N.	BR. DEPT. NO.
01	03G	C-10-002

CITY/TOWN CHESHIRE	8.-STRUCTURE NO. C10002-03G-MUN-NBI	11-Kilo. POINT 000.000	41-STATUS A:OPEN	90-ROUTINE INSP. DATE JUL 5, 2022
07-FACILITY CARRIED HWY SAND MILL RD	MEMORIAL NAME/LOCAL NAME BRIDGE NO. 4	27-YR BUILT 1939	106-YR REBUILT 0000	YR REHAB'D (NON 106) 0000
06-FEATURES INTERSECTED WATER DRY BROOK	26-FUNCTIONAL CLASS Rural Local	DIST. BRIDGE INSPECTION ENGINEER **L. A. Briggs**		
43-STRUCTURE TYPE 302 : Steel Stringer/Girder	22-OWNER Town Agency	21-MAINTAINER Town Agency	TEAM LEADER **M. P.E. McCabe**	
107-DECK TYPE 1 : Concrete Cast-in-Place	WEATHER Cloudy	TEMP. (air) 24°C	TEAM MEMBERS G. GNIADEK	

ITEM 58 6

DECK

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

	E	W
CURB REVEAL (In millimeters)	170	130

APPROACHES

		DEF
a. Appr. Pavement Condition	6	M-P
b. Appr. Roadway Settlement	6	-
c. Appr. Sidewalk Settlement	N	-
d.	N	-

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

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

ITEM 59 6

SUPERSTRUCTURE

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

Year Painted N

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

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

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

Any Fracture Critical Member: (Y/N) N

Any Cracks: (Y/N) N

ITEM 60 6

SUBSTRUCTURE

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

UNDERMINING (Y/N) If YES please explain N

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

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

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

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

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

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
CHESHIRE	**03G**	**C-10-002**	**C10002-03G-MUN-NBI**	**JUL 5, 2022**

ITEM 61 — 6

CHANNEL & CHANNEL PROTECTION

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

STREAM FLOW VELOCITY:

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

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

93b-U/W INSP. DATE: 00/00/0000

ITEM 36 TRAFFIC SAFETY

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

WEIGHT POSTING

Not Applicable ☒

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

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

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

CLEARANCE POSTING

Not ☒

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

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

ACCESSIBILITY (Y/N/P)

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

TOTAL HOURS 6

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

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

TAPE#: ____________

List of field tests performed:

RATING

Rating Report (Y/N): **Y**

Date: 07/01/2021

Inspection data at time of existing rating

I 58: **6** I 59: **6** I 60: **6** Date : 07/06/2020

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

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

REASON: ____________

CONDITION RATING GUIDE

(For Items 58, 59, 60 and 61)

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

DEFICIENCY REPORTING GUIDE

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

CATEGORIES OF DEFICIENCIES:

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

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

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

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

URGENCY OF REPAIR:

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

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

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

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
CHESHIRE	**03G**	**C-10-002**	**C10002-03G-MUN-NBI**	**JUL 5, 2022**

REMARKS

BRIDGE ORIENTATION

Sand Mill Road travels north and south. Dry Brook flows from east to west. The structure is a single span bridge consisting of six rolled steel stringers supporting a cast-in-place reinforced concrete deck with an asphalt wearing surface. The beams and bays are numbered from east to west, upstream to downstream, in accordance with the 2021 Rating Report. See photos 1 & 2.

ITEM 58 - DECK

Item 58.1 - Wearing Surface

Throughout the wearing surface, there are several patched areas.

Along the rail bases, there are areas of sand buildup and weeds.

The north end of the wearing surface has transverse cracks and mapcracking, full roadway width.

At the south deck end, the wearing surface is patched, 1' long x 17' wide, at the interface with the approach.

Item 58.2 - Deck Condition

All bays have several transverse cracks with efflorescence and active leakage. See photo 2.

At the north ends of beams 2 - 6 and in bay 2, there are cover spalls, up to 8" long x up to 3" wide x up to 1" deep. See photo 3.

APPROACHES

Approaches a - Appr. Pavement Condition

The south approach, at the deck interface, has patching, 1' long x 17' wide.

The north approach, at the deck end, has several cracks, up to 1/8" wide x full roadway width, and minor patching on the west side. The remainder of the north approach has moderate mapcracking.

Approaches b - Appr. Roadway Settlement

Both approaches have minor settlement, up to 1/2" high.

ITEM 59 - SUPERSTRUCTURE

Item 59.4 - Girders or Beams

Beams 1, 2, and 6 have bolted repairs. Beams 1 & 6 are spliced at the south ends. Beam 2 has a bolted web reinforcing plate at the north end.

All beams have areas of moderate to heavy surface rusting with delaminations. The worst conditions are the north thirds of beams 5 & 6. See photo 2.

Item 59.9 - Bearing Devices

At the north abutment, bearings 1, and 3 - 6, have anchor bolts that are bent toward the backwall.

At the south abutment, bearings 2 - 5, have anchor bolts that are bent toward the backwall.

The north bearing 6 is undermined due to breastwall deterioration, 8" wide x 1/2" long x 1/2" deep. See photo 4. Refer to Item 60.1.d - Breastwalls.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
CHESHIRE	03G	C-10-002	C10002-03G-MUN-NBI	JUL 5, 2022

REMARKS

Item 59.10 - Diaphragms/Cross Frames
The diaphragms have areas of heavy rust with delamination. The worst conditions are in bays 1, 4, & 5.

Item 59.14 - Paint/Coating
The paint system is failing and corrosion is spreading, except in the 2017 repaired areas. See photo 2.

ITEM 60 - SUBSTRUCTURE

Item 60.1 - Abutments
Item 60.1.a - Pedestals
The pedestal for beam 5 on the south abutment has a diagonal crack/delamination through the northwest corner, that connects to a horizontal crack in the upper breastwall.

Item 60.1.b - Bridge Seats
The north seat, below beam 5, has scaling at the corner, 18" long x 3" high x 2" deep. See photo 3.

The north seat, below beam 6, has scaling at the corner, up to 12" long x 3" high x 2" deep. See photo 4.

The south seat, below beam 5, has scaling at the corner, 8" long x 18" wide x 2" deep.

Item 60.1.c - Backwalls
North Backwall
In bay 3 and behind beam 5, at the top of the backwall, are spalls, up to 12" wide x up to 6" high x up to 2" deep. See photo 3.

Bay 4 has a semicircular crack, 3' long, that is fractured through and is displaced, 1/4". This area is an older patch.

Bay 5 has a vertical hairline crack, full height, with efflorescence.

South Backwall
Bays 1 & 5 have minor mapcracking with efflorescence.

Item 60.1.d - Breastwalls
South Breastwall
Bays 1, 2, & 3 have vertical hairline cracks, full height.

At the top, there are vertical hairline cracks, 2'$^{+}/_{-}$ long under all of the beams.

Bay 5 has scaling, full width, that connects to the delamination in pedestal 5. There are also several horizontal cracks with efflorescence that extend west into the wingwall.

North Breastwall
In bay 2 and under beams 1, 3, 4, 5, & 6, there are vertical hairline cracks, full height.

Under beams 2 - 4, near the top, there is a horizontal hairline crack with efflorescence, 8' long.

Under beam 6, the top of the breastwall is spalled, approximately 12" long x 6" high x 1" deep, and extends downward, 24" high x 6" wide x 1" deep. The bearing under beam 6 is beginning to be undermined, 8" wide x 1/2" deep. See photo 4.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
CHESHIRE	03G	C-10-002	C10002-03G-MUN-NBI	JUL 5, 2022

REMARKS

The west end has heavy mapcracking with efflorescence, 3' wide x 6' high. See photos 4 & 5.

Item 60.1.e - Wingwalls
Northeast Wingwall
There is diagonal hairline cracking with efflorescence, 6' long.

Southwest Wingwall
There is hairline mapcracking with efflorescence, full length x 4' high, and along the horizontal cold joint, full length x 1' high. There is also scaling along the top, full length x up to 3" deep.

Northwest Wingwall
Near the toe, there is a diagonal hairline crack with efflorescence, full height.

At the interface with the breastwall, there is heavy mapcracking with efflorescence, 10' long x 6' high, and scaling, 6' long x 3' high x up to 3" deep. The wingwall is also covered with heavy vegetation growth. See photo 5.

Item 60.1.j - Scour
The footing on the north side is exposed, full length x up to 4" high.

SubStructure Scour Notes
Refer to Item 60.1.j - Scour.

ITEM 61 - CHANNEL AND CHANNEL PROTECTION

Item 61.1 - Channel Scour
Refer to Item 60.1.j - Scour.

Item 61.2 - Embankment Erosion
The southwest embankment, approximately 40' downstream, has eroded above a drainage pipe headwall, 10' diameter x 3' deep.

Item 61.4 - Vegetation
In the upstream channel, there is a minor vegetation bar, 30' long x 8' wide x up to 1' high.

In the downstream channel, there is heavy vegetation on the south embankment.

Item 61.7 - Aggradation
Along the south abutment, there is aggradation, reducing the minimum vertical clearance to 6' at beam 6.

TRAFFIC SAFETY

Item 36a - Bridge Railing
The railing consists of single steel W-beam panels mounted on steel posts with steel blockouts, spaced at 6'.

Item 36b - Transitions
The transitions consist of single steel W-beam panels mounted on steel posts with steel blockouts, spaced at 6'.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
CHESHIRE	**03G**	**C-10-002**	**C10002-03G-MUN-NBI**	**JUL 5, 2022**

REMARKS

Item 36c - Approach Guardrail

The approach guardrail consists of single steel W-beam panels mounted on steel posts with steel blockouts, spaced at 6'.

Item 36d - Approach Guardrail Ends

There are steel terminal ends at all four corners, not swept away from traffic.

Photo Log

Photo 1 :	General topside view, looking north.
Photo 2 :	General underside view, looking south.
Photo 3 :	Scaling at the top of the north breastwall under beam 5.
Photo 4 :	Scaling at the top of the north breastwall under beam 6. Note the undermining of the masonry plate.
Photo 5 :	Northwest wingwall with cracking, scaling, and heavy vegetation growth.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
CHESHIRE	03G	C-10-002	C10002-03G-MUN-NBI	JUL 5, 2022

PHOTOS

Photo 1: **General topside view, looking north.**

Photo 2: **General underside view, looking south.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
CHESHIRE	03G	C-10-002	C10002-03G-MUN-NBI	JUL 5, 2022

PHOTOS

Photo 3: **Scaling at the top of the north breastwall under beam 5.**

Photo 4: **Scaling at the top of the north breastwall under beam 6. Note the undermining of the masonry plate.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
CHESHIRE	**03G**	**C-10-002**	**C10002-03G-MUN-NBI**	**JUL 5, 2022**

PHOTOS

Photo 5: **Northwest wingwall with cracking, scaling, and heavy vegetation growth.**

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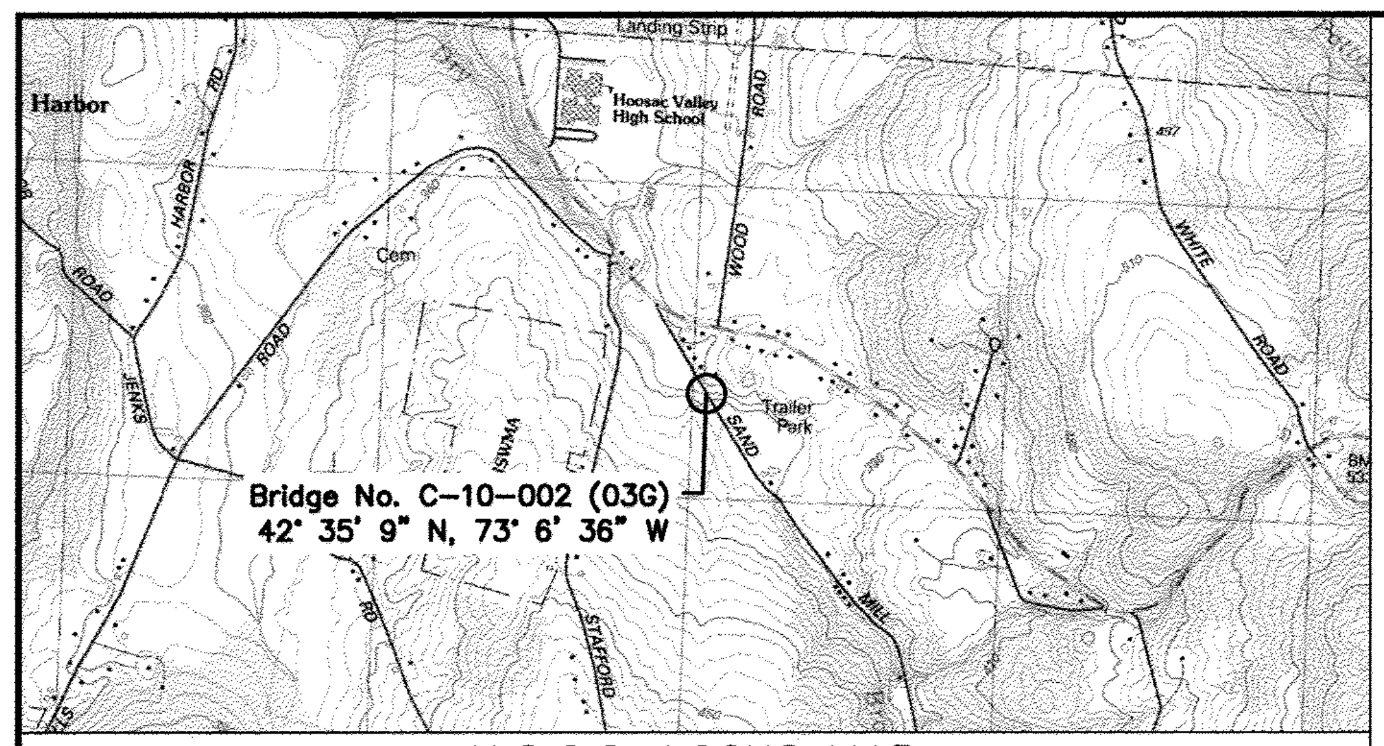
E2429D03.DWG 26-Sep-2016



U.S.G.S. LOCUS MAP

SCALE: 1"=2000'±

	SHEET INDEX
1	GENERAL NOTES, LOCUS PLAN, & KEY PLAN
2	EXISTING CONDITIONS BRIDGE DETAILS
3	PROPOSED BRIDGE DETAILS
4	BRIDGE REPAIR DETAILS

LEGEND

- APPROX. EDGE OF ASPHALT
- APPROX. EDGE OF GRAVEL
- APPROX. EDGE OF WOODS
- APPROX. WETLAND BOUNDARY
- APPROX. WETLAND BUFFER ZONE
- APPROX. RIPARIAN ZONE
- APPROX. NHESP HABITAT
- APPROX. FLOODPLAIN
- 1005 APPROX. 5' CONTOUR LINE
- 1000 APPROX. 25' CONTOUR LINE
- APPROX. RIGHT-OF-WAY LINE
- APPROX. PROPERTY LINE
- ▭ APPROX. EXISTING BUILDING

SITEWORK CONSTRUCTION NOTES

A. PROTECTION OF WETLANDS, WATER QUALITY, AND STORMWATER MANAGEMENT

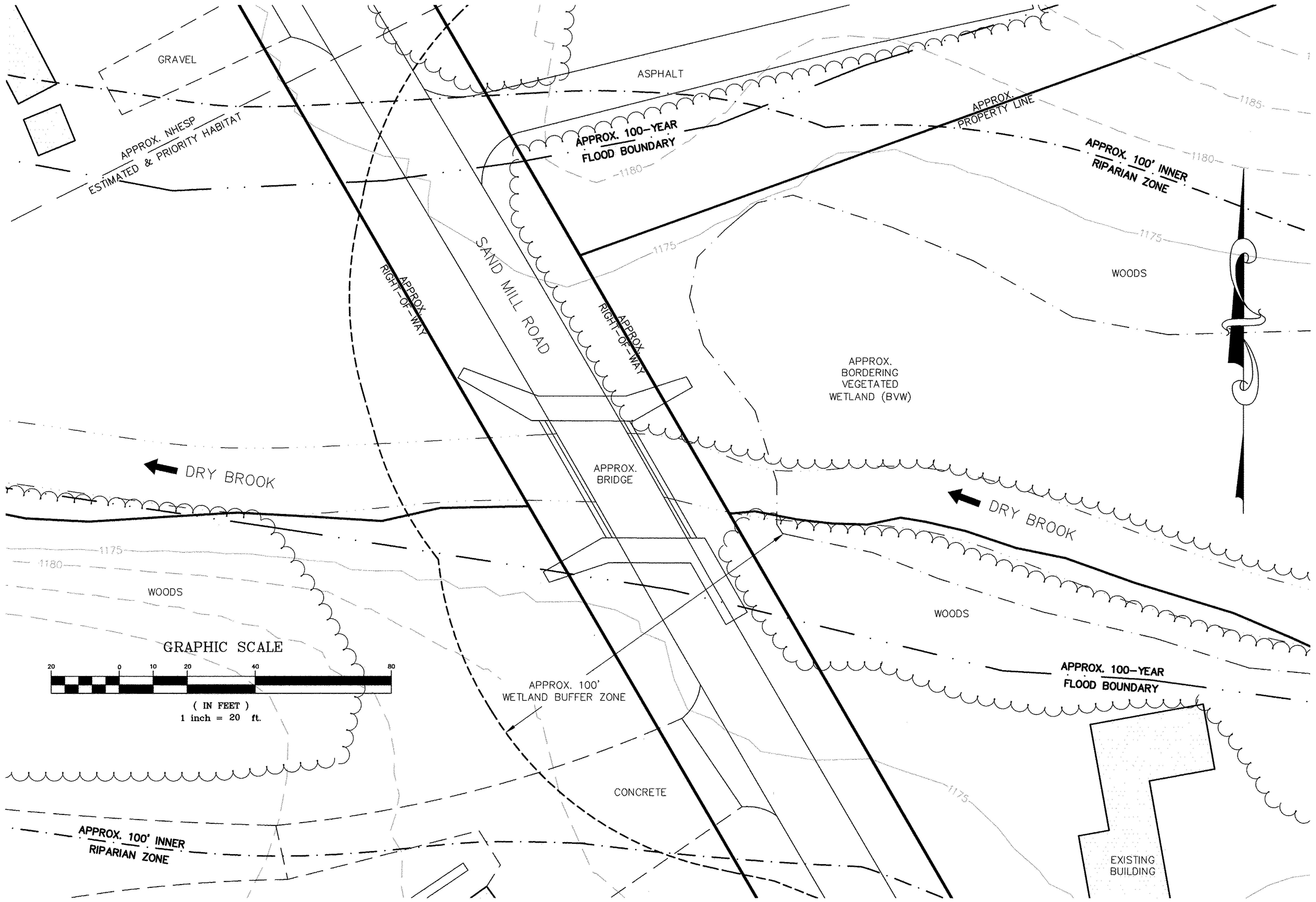
1. WORK PROPOSED ON THIS PLAN INCLUDES AREAS WHICH ARE SUBJECT TO REGULATION UNDER THE MASS. WETLANDS PROTECTION ACT (WPA), FEDERAL CLEAN WATERS ACT (CWA), NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) AND/OR OTHER STATUTES AND REGULATIONS PERTAINING TO WETLANDS, WATER QUALITY, AND STORMWATER MANAGEMENT.
2. CONTRACTOR SHALL PERFORM ALL PROPOSED WORK IN COMPLIANCE WITH THE APPROVED WETLANDS PERMIT (ORDER OF CONDITIONS OR DETERMINATION OF APPLICABILITY AS APPLICABLE).
3. CONTRACTOR SHALL INSTALL, MONITOR, MAINTAIN AND REPLACE, WHENEVER NECESSARY, ALL EROSION AND SEDIMENTATION CONTROL MEASURES REQUIRED TO CONTROL STORMWATER RUNOFF, EROSION AND SEDIMENTATION FROM THE WORK, AND TO PREVENT SEDIMENTS FROM ALTERING ANY WETLANDS OR WATERCOURSES. REFER TO PLANS, SPECIFICATIONS AND PERMITS FOR MINIMUM REQUIREMENTS. CONTRACTOR SHALL INSTALL ADDITIONAL MEASURES WHEREVER NECESSARY TO CONTROL SITE RUNOFF.
4. CONTRACTOR SHALL DISPOSE OF ANY UNSUITABLE OR EXCESS EARTH MATERIALS EXCAVATED FROM THE SITE ("SPOIL MATERIAL") IN ACCORDANCE WITH ALL APPLICABLE LAWS AND REGULATIONS. UNLESS AN ON-SITE SPOIL AREA IS SPECIFIED, CONTRACTOR SHALL DISPOSE OF EXCESS CLEAN EARTH MATERIAL OFF-SITE IN AN UPLAND AREA OUTSIDE ANY WETLAND BUFFER ZONES OR RESOURCE AREAS.
5. CONTRACTOR SHALL DISPOSE OF ANY DEMOLITION DEBRIS, CONSTRUCTION DEBRIS, WOOD WASTES, CONTAMINATED SOILS, HAZARDOUS MATERIALS AND OTHER SPECIAL WASTES IN STRICT ACCORDANCE WITH APPLICABLE LAWS AND REGULATIONS.

B. WORK LIMITS

1. CONTRACTOR SHALL CONFINE ACTIVITIES TO THE WORK LIMITS SHOWN ON THE PLANS OR DIRECTED IN THE FIELD.
2. UNLESS OTHERWISE INDICATED, CONTRACTOR SHALL PROTECT ALL TREES, STRUCTURES, AND UTILITIES AGAINST DAMAGE, AND SHALL REPAIR OR REPLACE DAMAGED AREAS AT CONTRACTOR'S EXPENSE.
3. IN ORDER TO AVOID DAMAGING TREE ROOTS BY COMPACTING THE SOIL, CONTRACTOR SHALL NOT ALLOW EQUIPMENT OR VEHICLES TO OPERATE UNDER TREE CANOPIES EXCEPT WHERE NECESSARY TO CARRY OUT THE WORK.

C. SOIL CONDITIONS

1. REFER TO SPECIFICATIONS FOR SOILS INFORMATION. ANY REFERENCE ON THE PLANS TO LEDGE OR BEDROCK ARE FOR INFORMATION ONLY AND SHALL NOT BE RELIED UPON AS REPRESENTING LIMITS, QUANTITIES, PRESENCE OR ABSENCE OF ROCK REQUIRING EXCAVATION.



KEY PLAN

SCALE: 1"=20'

GENERAL NOTES ABOUT COMPILED SITE PLAN BASE MAP:

THE SITE PLAN BASE MAP IS COMPILED FROM AVAILABLE SOURCES AND IS NOT THE RESULT OF A RECENT FIELD SURVEY.

COMPILED INFORMATION INCLUDES MASSGIS (OFFICE OF GEOGRAPHIC AND ENVIRONMENTAL INFORMATION, COMMONWEALTH OF MASSACHUSETTS OFFICE OF ENVIRONMENTAL AFFAIRS) AERIAL PHOTOS, FEMA FLOOD MAPS, NHESP HABITAT MAPS AND OTHER PUBLISHED SOURCES. PROPERTY LINES ARE COMPILED FROM ASSESSORS MAPPING. UTILITIES ARE FROM AVAILABLE PLANS, RECORDS AND DIRECT OBSERVATION.

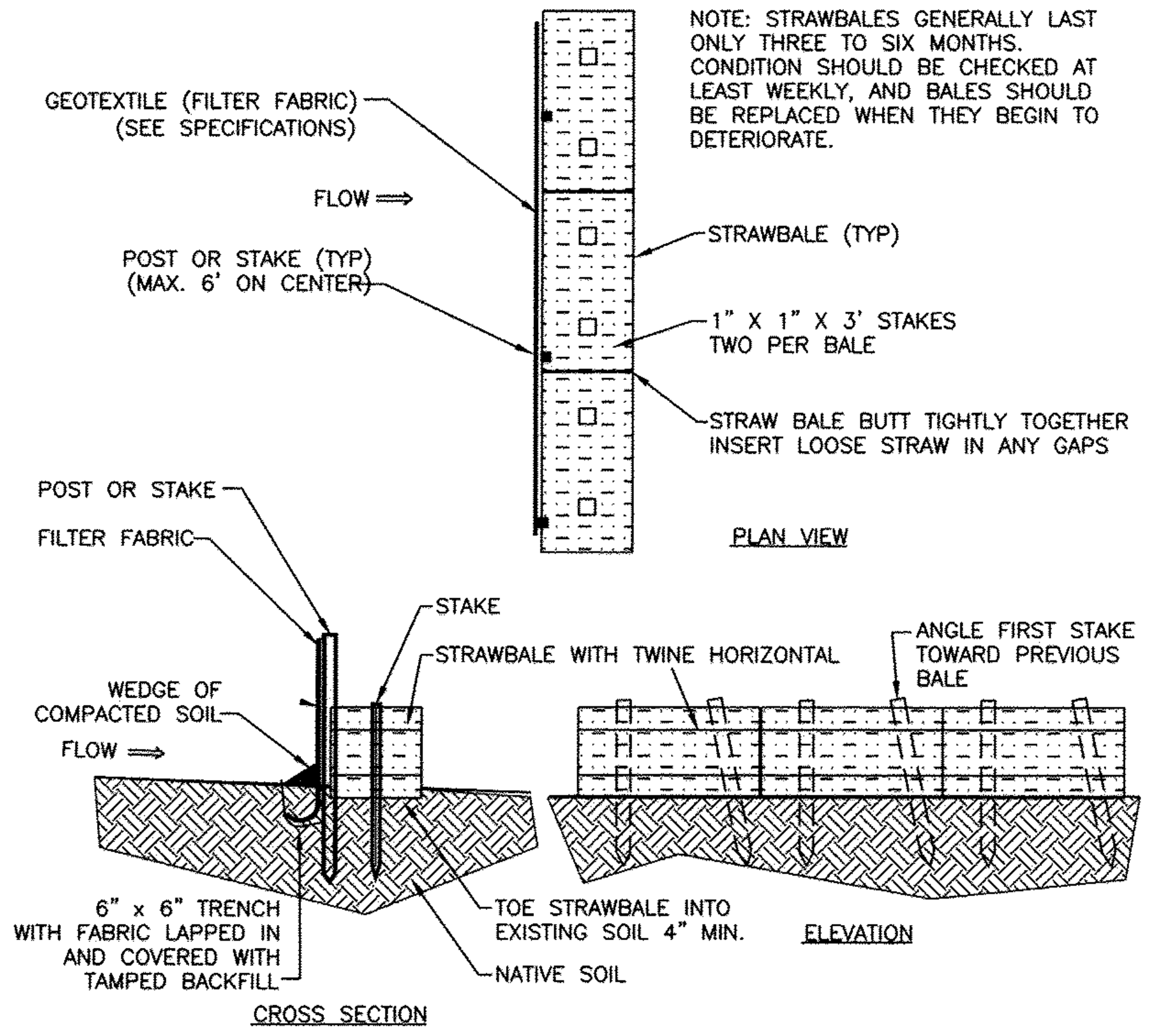
ALL COMPILED INFORMATION IS APPROXIMATE ONLY AND IS SUBJECT TO FIELD VERIFICATION AND CHANGE.

UNLESS OTHERWISE NOTED, THE LOCATIONS AND INFORMATION ABOUT UNDERGROUND PIPES, UTILITIES OR OTHER STRUCTURES ARE COMPILED FROM AVAILABLE RECORD DATA AND VISIBLE FIELD EVIDENCE AND ARE NOT REPRESENTED AS BEING EXACT OR COMPLETE. PRIOR TO BEGINNING EXCAVATION, THE EXCAVATOR SHALL GIVE ADEQUATE ADVANCE NOTICE TO THE DIG SAFE CENTER, THE MUNICIPAL AND/OR STATE PUBLIC WORKS DEPARTMENT, AND PRIVATE UTILITY COMPANIES, TO ALLOW FOR FIELD LOCATION OF FACILITIES IN THE VICINITY.

IF CONTRACTOR OBSERVES ANY FIELD CONDITIONS WHICH VARY SIGNIFICANTLY FROM WHAT IS SHOWN ON THESE PLANS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE OWNER AND ENGINEER FOR RESOLUTION OF THE CONFLICTING INFORMATION.

THE CONTRACTOR SHALL RECORD TIE MEASUREMENTS, DEPTHS, DIMENSIONS, MATERIALS, FIELD CONDITIONS AND OTHER PERTINENT DATA ABOUT ALL UNDERGROUND PIPES, UTILITIES AND STRUCTURES ENCOUNTERED DURING THE WORK, BOTH EXISTING AND CONSTRUCTED. CONTRACTOR SHALL SUBMIT RECORD DRAWINGS WITH THIS INFORMATION TO THE OWNER AND ENGINEER PRIOR TO COMPLETION OF THE WORK.

CONTRACTOR SHALL IMMEDIATELY REPORT ANY DAMAGE TO EXISTING PIPES, UTILITIES, OR STRUCTURES TO THE OWNER AND ENGINEER, AND OBTAIN DIRECTIONS AS TO REPAIR, REPLACEMENT OR ABANDONMENT.



SILT FENCE & STRAW BALE DETAIL

N.T.S.

CONSTRUCTION-PHASE MEASURES FOR CONTROL OF SEDIMENT AND EROSION AND PROTECTION OF WETLANDS

1. DO NOT DISTURB EXISTING VEGETATED AREAS FAR IN ADVANCE OF CONSTRUCTION. LIMIT DISTURBANCE ONLY TO THE EXTENT AND DURATION REQUIRED FOR IMMINENT CONSTRUCTION ACTIVITIES. RETAIN AND PROTECT NATURAL VEGETATION AND VEGETATIVE FILTER STRIPS WHEREVER POSSIBLE.
2. TEMPORARY VEGETATION OR A HEAVY MAT OF WOOD CHIPS SHALL BE ESTABLISHED ON ALL EARTH STOCKPILES OR STRIPPED AREAS WHICH WILL BE BARE FOR MORE THAN TWO MONTHS AND LESS THAN 12 MONTHS. SUCH VEGETATION SHALL CONSIST OF A COMMERCIAL CONSERVATION SEED MIXTURE WITH A HIGH PERCENTAGE OF ANNUAL RYE GRASS. PERMANENT HERBACEOUS COVER SHALL BE ESTABLISHED ON AREAS WHICH WOULD BE BARE MORE THAN 12 MONTHS.
3. A HEAVY MAT OF STRAW MULCH, WOOD CHIPS, EROSION CONTROL NETTING, MESH OR BLANKET MATTING SHALL BE USED ON DISTURBED AREAS IF VEGETATION CANNOT BE ESTABLISHED DUE TO SEASON OR ON-GOING CONSTRUCTION PROCESS, OR IF OTHERWISE REQUIRED.
4. SILT FENCE OR CAREFULLY POSITIONED STAKED STRAW BALES SHALL BE INSTALLED ALONG THE DOWNHILL EDGE OF DISTURBED EARTHWORK AREAS WHERE REQUIRED TO CONTROL EROSION AND SEDIMENTATION.
5. WATER COURSES, INCLUDING INTERMITTENT DRAINAGE SWALES, SHALL BE PROTECTED FROM SILTATION BY SILT FENCE BARRIERS OR CAREFULLY POSITIONED STAKED STRAW BALE CHECK DAMS.
6. SEDIMENT TRAPS SHALL BE CONSTRUCTED DOWNHILL OF DISTURBED AREAS AND UPSTREAM OF WATERCOURSES AND/OR WETLANDS. TRAPPED SEDIMENTS SHALL BE REMOVED FROM THE BASINS DURING THE CONSTRUCTION PERIOD BEFORE THEY BECOME 50% FULL TO PREVENT SEDIMENT FROM BEING TRANSPORTED DOWNHILL. DISPOSE OF SEDIMENTS IN ON-SITE UPLAND DISPOSAL AREAS, PROPERLY GRADED, SEEDED AND MULCHED.
7. PERMANENT DRAINAGE CONTROL STRUCTURES SHALL BE INSTALLED AS EARLY AS POSSIBLE IN THE CONSTRUCTION PROCESS. DRAINS SHALL BE PROVIDED WITH DRAIN INLET SEDIMENT FILTERS AND/OR TRAPS.
8. DO NOT FUEL CONSTRUCTION EQUIPMENT OR STORE FUEL OR OTHER POTENTIAL CONTAMINANTS WITHIN 100 FEET OF WATER COURSES OR WETLANDS.
9. STRICTLY ADHERE TO ALL GENERAL AND SPECIAL CONDITIONS OF ANY WETLANDS PROTECTION ACT PERMITS, INCLUDING PLANS, DETAILS, CONSTRUCTION SEQUENCING OUTLINE, AND OTHER APPLICABLE REQUIREMENTS.

SPECIAL EROSION AND SEDIMENTATION CONTROL CONSTRUCTION PHASE NOTE

CONTRACTOR SHALL INSPECT AND MAINTAIN EROSION AND SEDIMENTATION CONTROLS DAILY AND SUBMIT DAILY REPORTS ON A WEEKLY BASIS TO THE CONSERVATION COMMISSION, TOWN, AND ENGINEER. DAILY REPORTS SHALL INCLUDE, AT A MINIMUM, DATE AND TIME OF REVIEW, REVIEWER NAME AND COMPANY, RECENT PRECIPITATION EVENTS, ACTIONS PERFORMED (IF ANY), AND ANY OTHER COMMENTS. PHOTOGRAPHS OF THE EROSION CONTROLS SHALL ALSO BE PROVIDED ON A WEEKLY BASIS.

COMMONWEALTH OF MASSACHUSETTS
MassDOT, Highway Division
APPROVED UNDER PROVISIONS OF MASS. GEN. LAWS CH 85 S 35
P.E. 10/11/16
STATE BRIDGE ENGINEER DATE

WILLIAM M. BARRY, P.E.

William M. Barry

Barry Engineers & Constructors, Inc.
176 Churchill Street
Pittsfield, MA 01201
Tel: (413) 443-6591

NO.	DATE	REVISION/ISSUE	BY
	9/26/2016	MYLAR CONSTRUCTION PLANS	SAM

PROPOSED BRIDGE REPAIRS

CHESHIRE

SAND MILL ROAD
OVER DRY BROOK

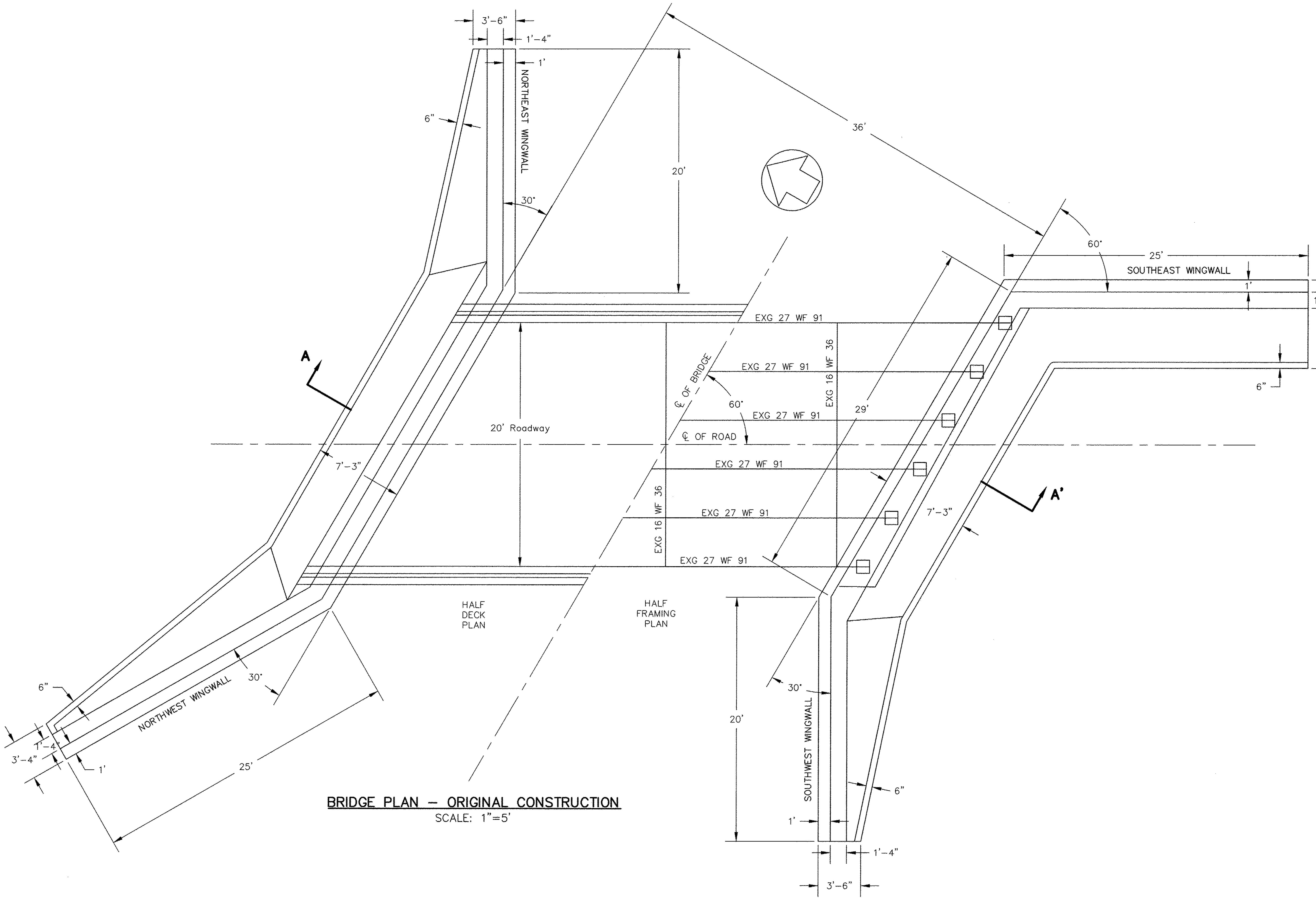
PROJECT NO. E2087
SCALE AS NOTED
DATE 9/16/16
DESIGNED BY WMB/SAM
DRAWN BY KAC
CHECKED BY
SHEET NO. 1

FORESIGHT LAND SERVICES *ENGINEERING SURVEYING PLANNING*
FORESIGHT LAND SERVICES, INC.
1496 WEST HOUSATONIC STREET - PITTSFIELD, MA 01201
TEL: (413) 499-1560 FAX: (413) 499-3307 WWW.FORESIGHTLAND.COM

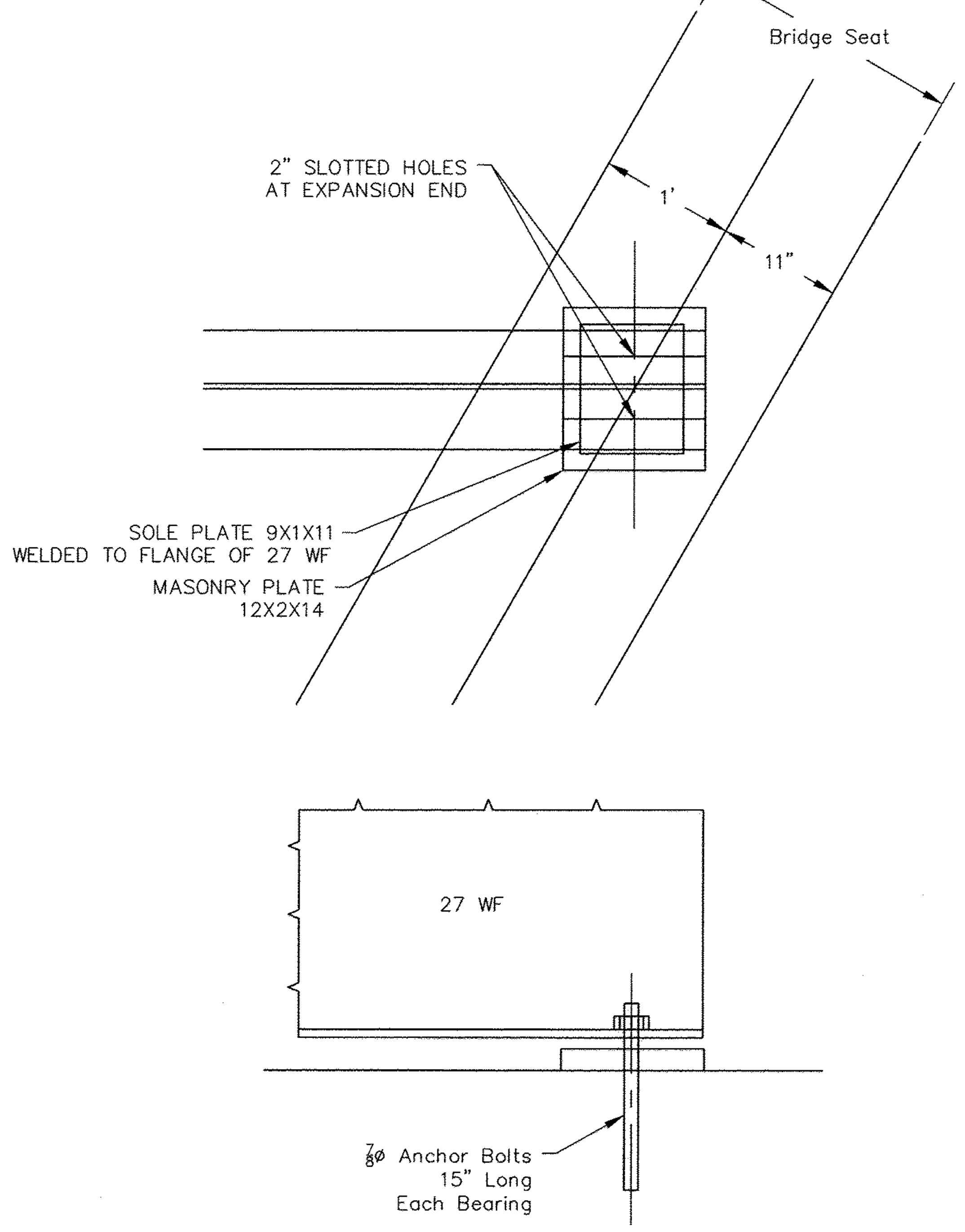
CADFILE NO: E2429D03.DWG

SHEET 1 OF 4 SHEETS BRIDGE NO. C-10-002 (03G)

E2429D03.DWG 26-Sep-2016

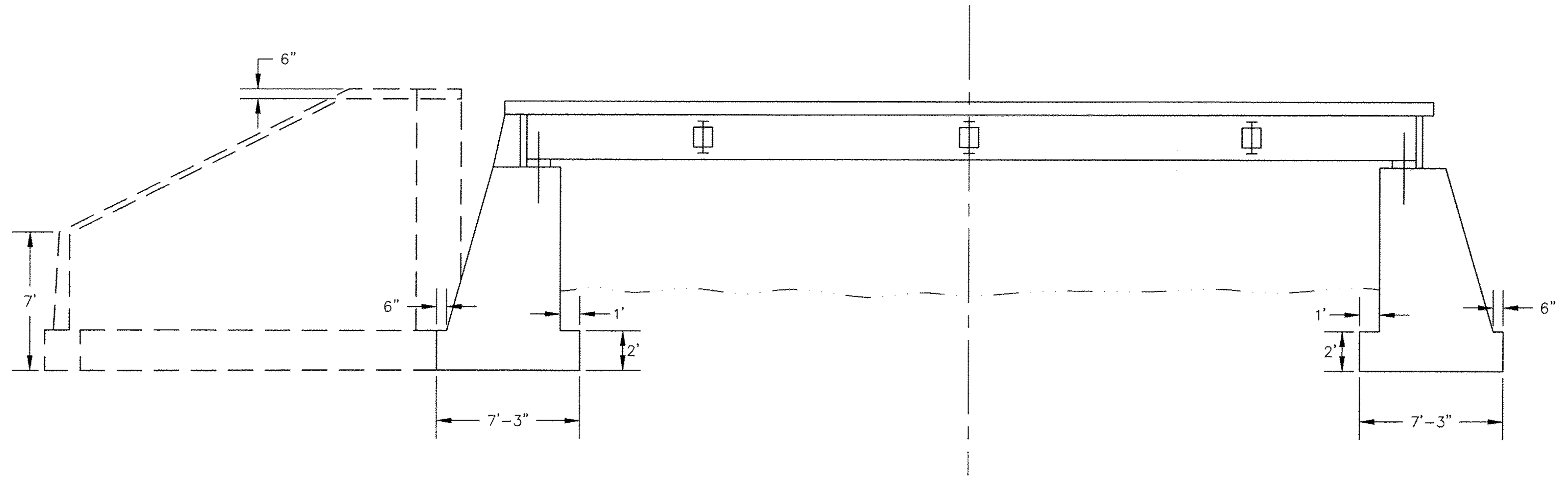


BRIDGE PLAN – ORIGINAL CONSTRUCTION
SCALE: 1"=5'

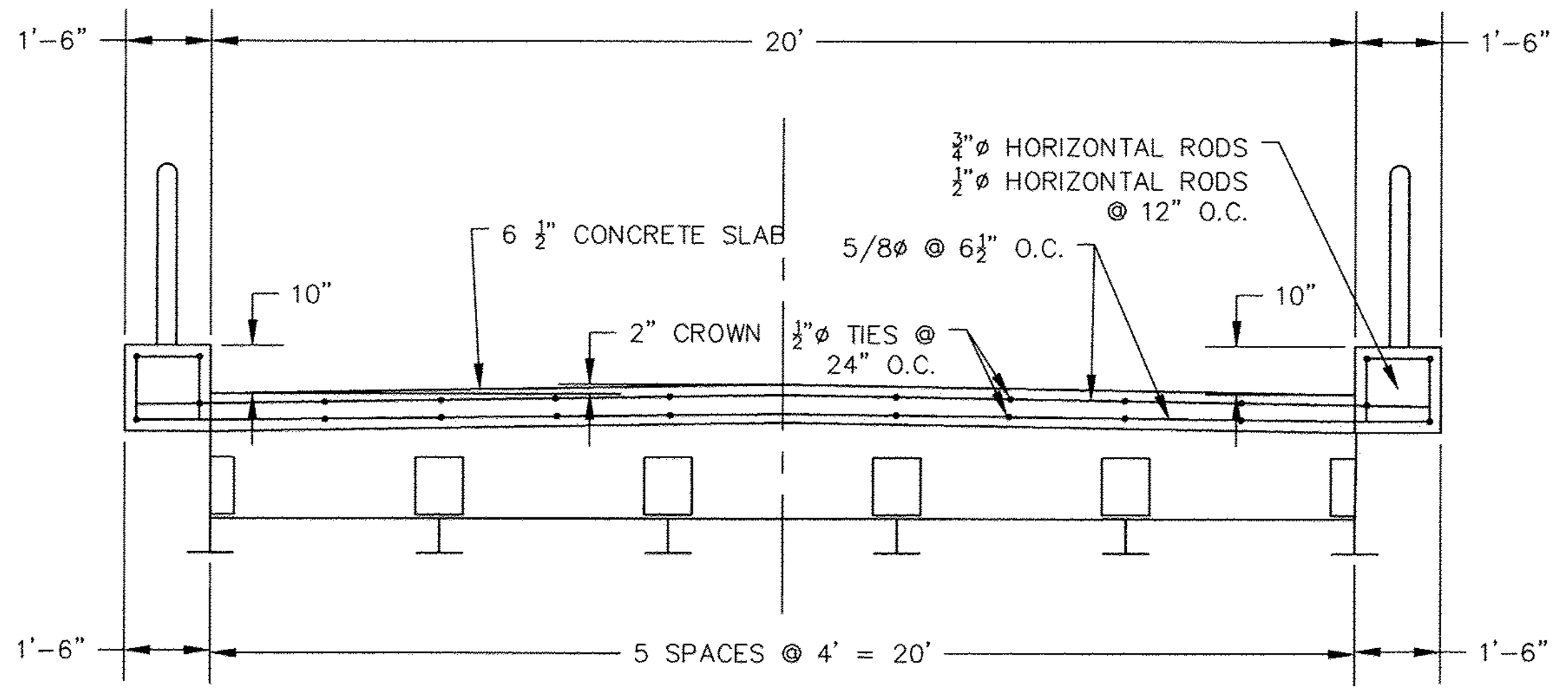


DETAIL AT BRIDGE SEAT – ORIGINAL CONSTRUCTION
SCALE: 1"=1'

NOTE REGARDING ORIGINAL CONSTRUCTION DETAILS:
THE DETAILS PROVIDED ARE BASED ON THE PLAN ENTITLED "THE COMMONWEALTH OF MASSACHUSETTS, PROPOSED BRIDGE, CHESHIRE, BRIDGE NO. 4 (REVISED), SAND MILL – SAVOY ROAD, OVER STONY BROOK, SCALES AS NOTED, OFFICE OF DEPARTMENT OF PUBLIC WORKS, 100 NASHUA ST., BOSTON, MASS., OCTOBER 1938" BY W&L ENGINEERING CO., MAURICE A. REIDY.



SECTION A–A' – ORIGINAL CONSTRUCTION
SCALE: 1"=5'



CROSS SECTION – ORIGINAL CONSTRUCTION
SCALE: 1"=5'

COMMONWEALTH OF MASSACHUSETTS
MassDOT, Highway Division
APPROVED UNDER PROVISIONS OF
MASS. GEN. LAWS CH 85 S 35
P.E. 10/11/16
STATE BRIDGE ENGINEER DATE

9/26/2016	MYLAR CONSTRUCTION PLANS
DATE	DESCRIPTION

USE ONLY PRINTS OF LATEST DATE

SHEET 2 OF 4 SHEETS BRIDGE NO. C-10-002 (03G)

E2428D03.DWG 26-Sep-2016

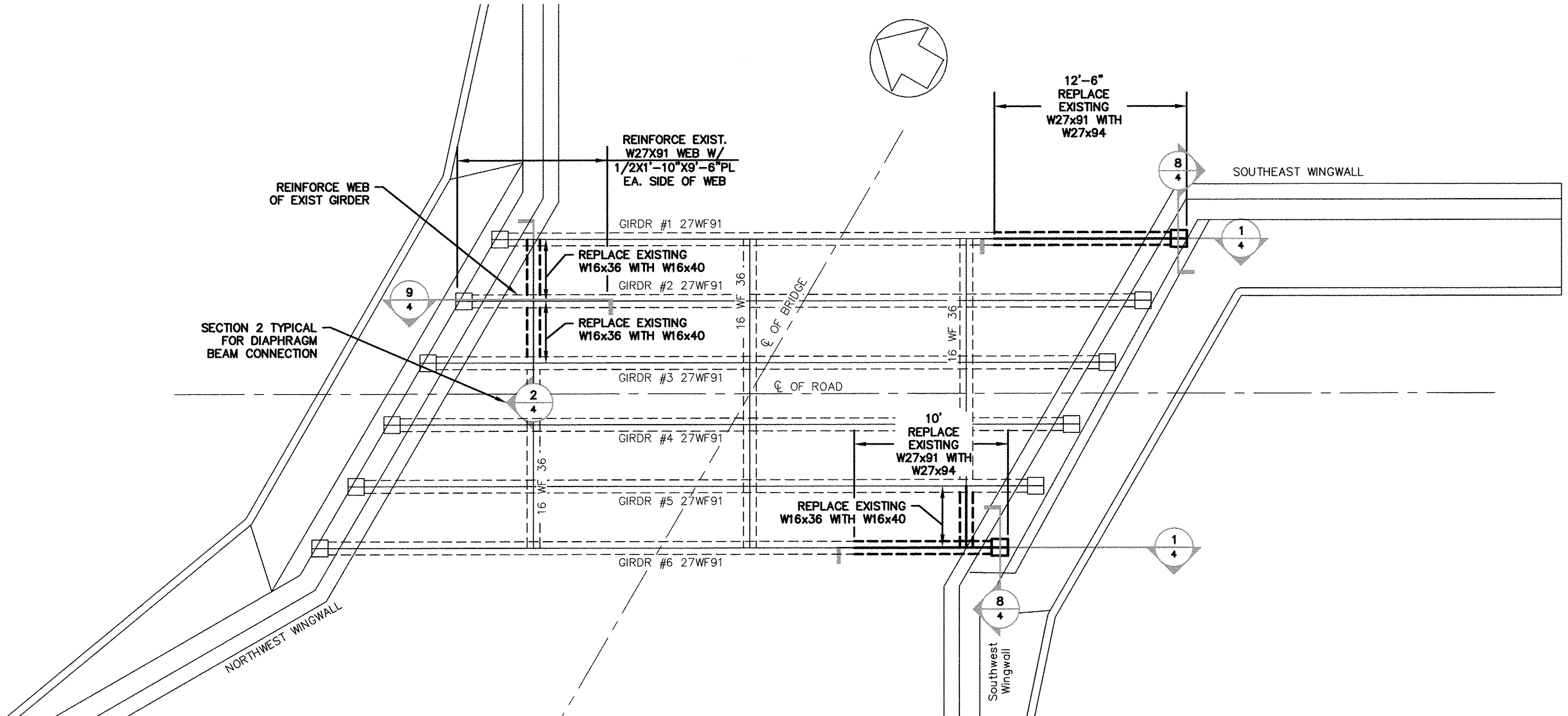
GENERAL NOTES:

STEEL:

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE RELEVANT PROVISIONS OF THE MASSDOT SPECIFICATIONS SECTION 960 AS NOTED IN THE CONTRACT SPECIFICATIONS
2. ALL NEW STEEL SHALL BE AASHTO DESIGNATION M270 GRADE 50
3. THE DETAILS DEPICTED HERE ARE BASED UPON RECORD DRAWINGS ONLY. THE CONTRACTOR WILL BE REQUIRED TO CONDUCT A FIELD SURVEY TAKING ALL NECESSARY MEASUREMENTS AND IDENTIFYING ALL DETAILS REQUIRED FOR THE COMPLETION OF THE WORK PRIOR TO THE PREPARATION OF SHOP DRAWINGS.
4. ALL NEW STRUCTURAL STEEL SHALL BE SHIPPED TO THE JOB SITE WITH A PRIME COAT OF PAINT APPLIED TO FAYING SURFACES.
5. PRIOR TO THE INSTALLATION OF ANY NEW STEEL THE EXISTING STEEL SHALL BE THOROUGHLY CLEANED TO SSPC–SP6 CONDITION AND THE NEW STEEL SHALL BE THOROUGHLY CLEANED TO SSPC–SP10 CONDITION AND A PRIME COAT OF PAINT SHALL BE APPLIED. THIS PAINT SYSTEM SHALL MEET THE REQUIREMENTS OF THE MASSDOT SPECIFICATIONS AND BE COMPATIBLE WITH THE PAINT SYSTEM BEING EMPLOYED BY THE CONTRACTOR ON THE REMAINDER OF THE STRUCTURE.
6. ALL NEW BOLTS SHALL BE HIGH STRENGTH BOLTS AND SHALL CONFORM TO THE REQUIREMENTS OF ASTM A325 TYPE 1.
7. THE CONTRACTOR SHALL ENSURE THAT NO DAMAGE OCCURS TO THE EXISTING STEEL TO REMAIN. ANY DAMAGE WHICH MAY OCCUR SHALL BE REPAIRED USING A PROCEDURE APPROVED BY THE ENGINEER.
8. ONCE THE EXISTING STEEL IS REMOVED THE REMAINING FAYING SURFACE SHALL BE CLEANED TO SSPC–SP6 CONDITION AND COATED WITH A PRIME COAT OF PAINT. NOTE THE CONTRACTOR MAY BE REQUIRED TO ERECT ENCLOSURES AND PROVIDE MEANS TO CONTROL THE ENVIRONMENTAL CONDITIONS TO PROVIDE FOR THE MINIMUM CURING TIME FOR THE PRIME COATING.
9. THE PROPOSED STEEL SHALL BE PROPERLY POSITIONED AND SECURED IN PLACE WITH CLAMPS OR OTHER MECHANICAL MEANS. WELDING SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS.

CONCRETE:

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE RELEVANT PROVISIONS OF THE MASSDOT SPECIFICATIONS SECTION 901 AS NOTED IN THE CONTRACT SPECIFICATIONS.
2. REINFORCING STEEL AND SUPPORT DEVICES SHALL BE EPOXY COATED AND SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M31 GRADE 60. ALL CONTACT LAP SPLICES SHALL BE AASHTO CLASS C, UNLESS OTHERWISE NOTED ON THE PLANS OR DETAILS.
3. CONCRETE FOR BRIDGE DECK SHALL BE 5,000 PSI, 3/4" 685 HP CEMENT CONCRETE AND CONCRETE FOR ABUTMENT SHALL BE 4,000 PSI, 3/4" 585 CEMENT CONCRETE.
4. GROUT SHALL BE NON–SHRINK NON–METALLIC FIVE–STAR GROUT BY U.S. GROUT, INC. OR APPROVED EQUAL.



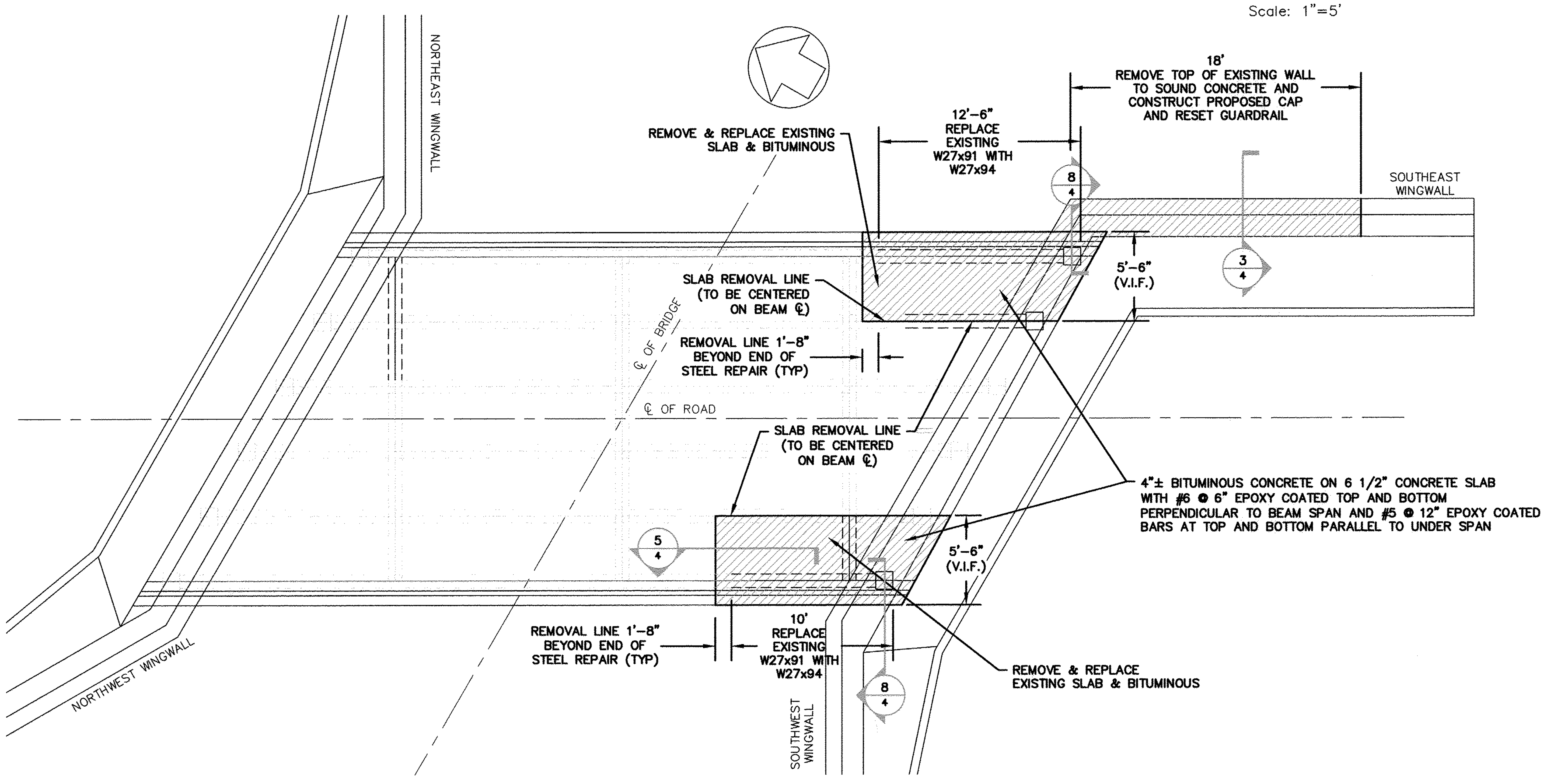
PROPOSED STEEL FRAMING PLAN

Scale: 1"=5'

EXPECTED BRIDGE RATING AFTER REPAIRS		
TRUCK TYPE	INVENTORY RATING (TONS)	OPERATING RATING (TONS)
H20	21.6	35.2
TYPE 3	26.1	42.7
TYPE 3S2	40.8	66.7
HS20	29.1*	47.6

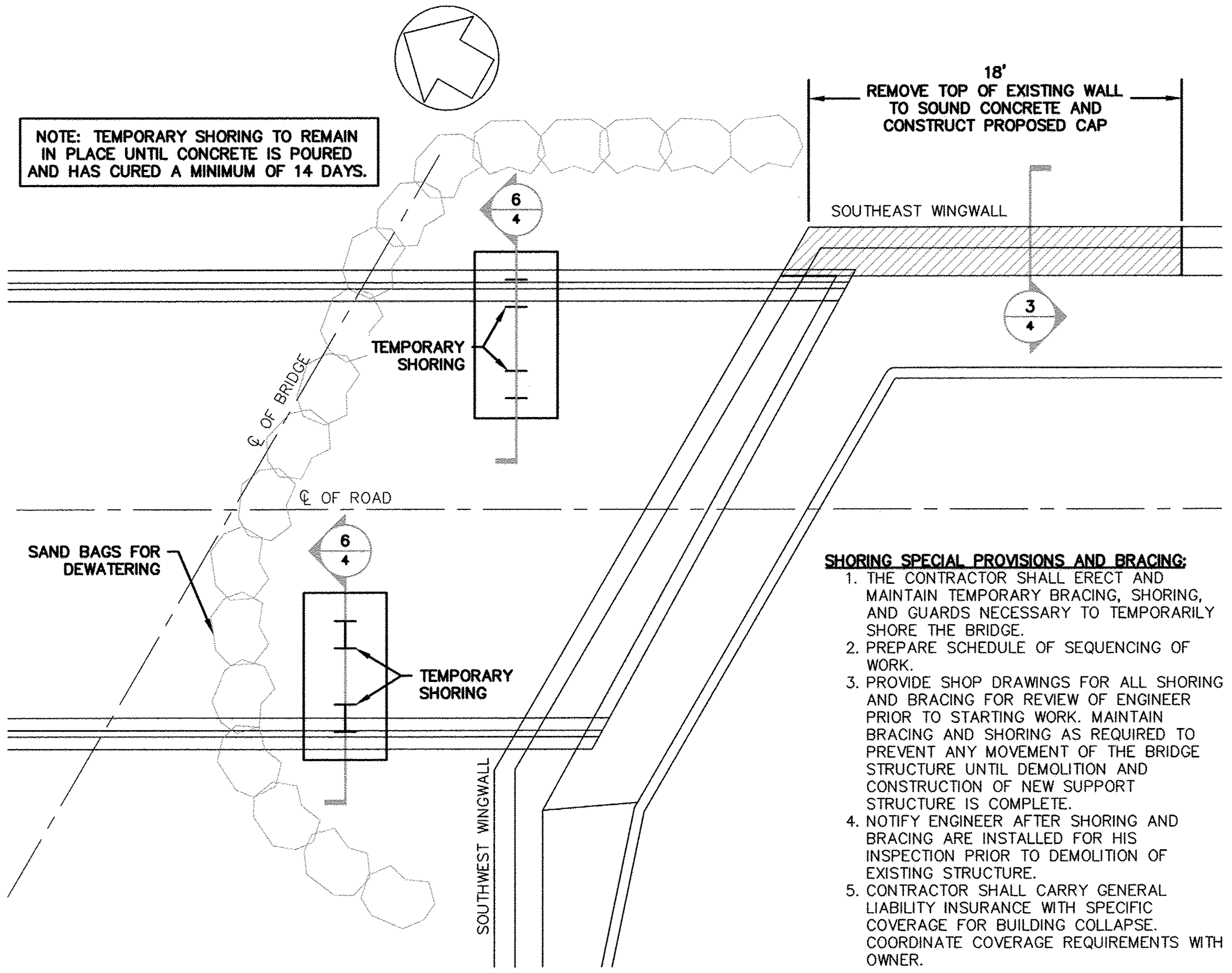
* BELOW STATUTORY FOR HS20 LOADING AT INVENTORY LEVEL.

** REFERENCE BRIDGE RATING PREPARED FOR MASS. DEPT. OF TRANSP. HIGHWAY DIVISION FOR SAND MILL ROAD OVER DRY BROOK. BRIDGE NO. – C–10–002(03G). STRUCTURE NO. C10002–03G–MUN–NBI. DATE OF RATING JANUARY 2015 PREPARED BY MICHAEL BAKER, JR. INC.



PROPOSED SLAB REPAIR PLAN

Scale: 1"=5'



SHORING SPECIAL PROVISIONS AND BRACING:

1. THE CONTRACTOR SHALL ERECT AND MAINTAIN TEMPORARY BRACING, SHORING, AND GUARDS NECESSARY TO TEMPORARILY SHORE THE BRIDGE.
2. PREPARE SCHEDULE OF SEQUENCING OF WORK.
3. PROVIDE SHOP DRAWINGS FOR ALL SHORING AND BRACING FOR REVIEW OF ENGINEER PRIOR TO STARTING WORK. MAINTAIN BRACING AND SHORING AS REQUIRED TO PREVENT ANY MOVEMENT OF THE BRIDGE STRUCTURE UNTIL DEMOLITION AND CONSTRUCTION OF NEW SUPPORT STRUCTURE IS COMPLETE.
4. NOTIFY ENGINEER AFTER SHORING AND BRACING ARE INSTALLED FOR HIS INSPECTION PRIOR TO DEMOLITION OF EXISTING STRUCTURE.
5. CONTRACTOR SHALL CARRY GENERAL LIABILITY INSURANCE WITH SPECIFIC COVERAGE FOR BUILDING COLLAPSE. COORDINATE COVERAGE REQUIREMENTS WITH OWNER.

PROPOSED FOUNDATION PLAN

Scale: 1"=5'

COMMONWEALTH OF MASSACHUSETTS
MassDOT, Highway Division
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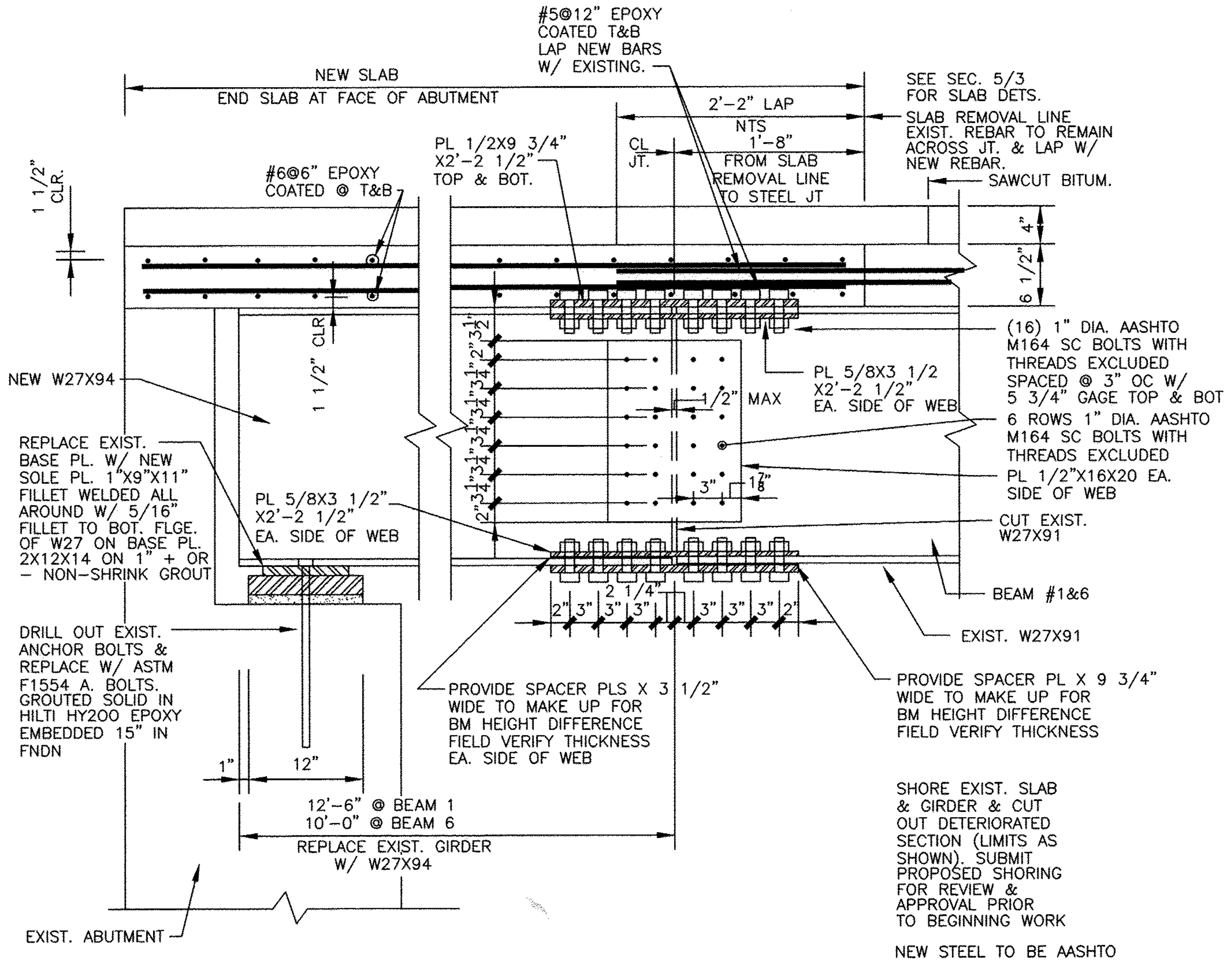
MASS. GEN. LAWS CH 85 S 35
Alexander K. Bardow P.E. 10/11/16
STATE BRIDGE ENGINEER DATE

9/26/2016	MYLAR CONSTRUCTION PLANS
DATE	DESCRIPTION
USE ONLY PRINTS OF LATEST DATE	

SHEET 3 OF 4 SHEETS BRIDGE NO. C–10–002 (03G)

E2429D03.DWG 26-Sep-2016



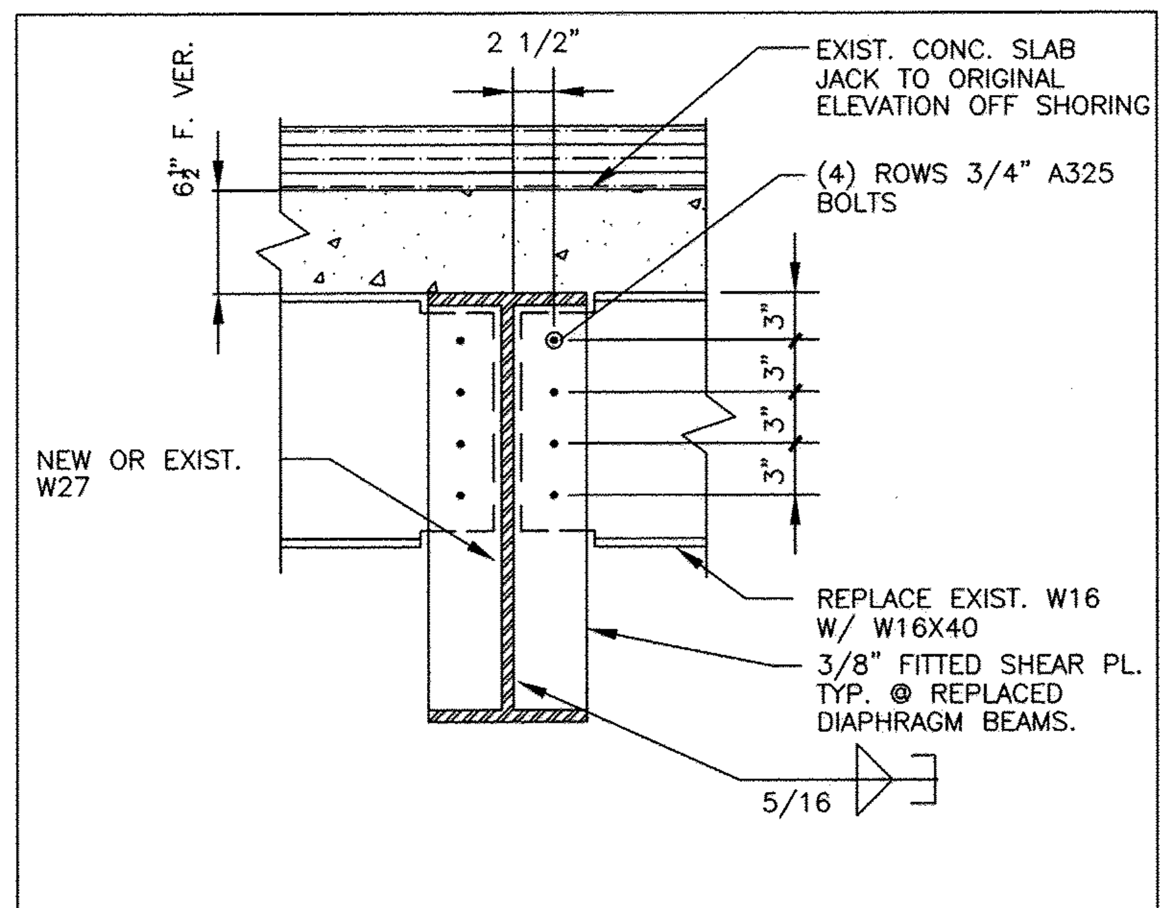
SHORE EXIST. SLAB & GIRDER & CUT OUT DETERIORATED SECTION (LIMITS AS SHOWN). SUBMIT PROPOSED SHORING FOR REVIEW & APPROVAL PRIOR TO BEGINNING WORK

NEW STEEL TO BE AASHTO M270 GRADE 50 STEEL PRIMED OMIT PRIMER @ FIELD WELDED AREAS

ALL REINF'G TO BE EPOXY COATED.

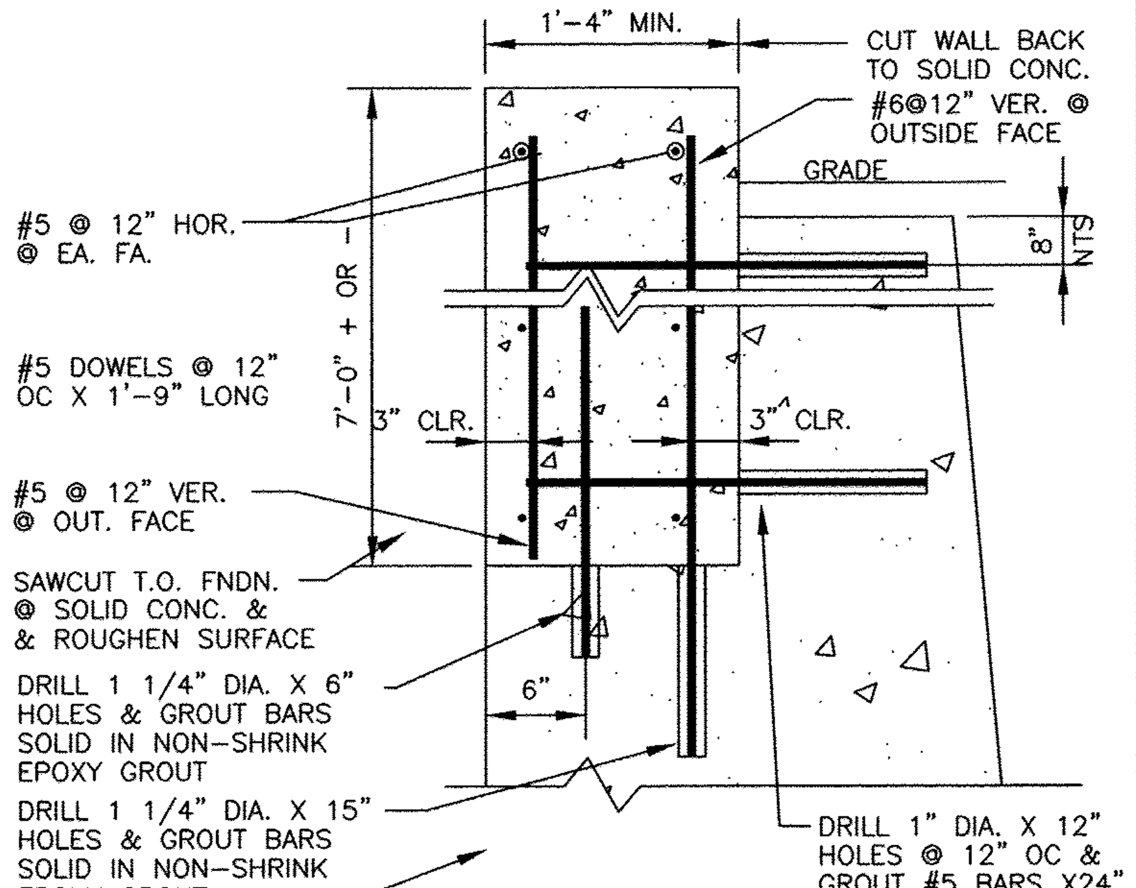
1/3 SECTION

1" = 1'



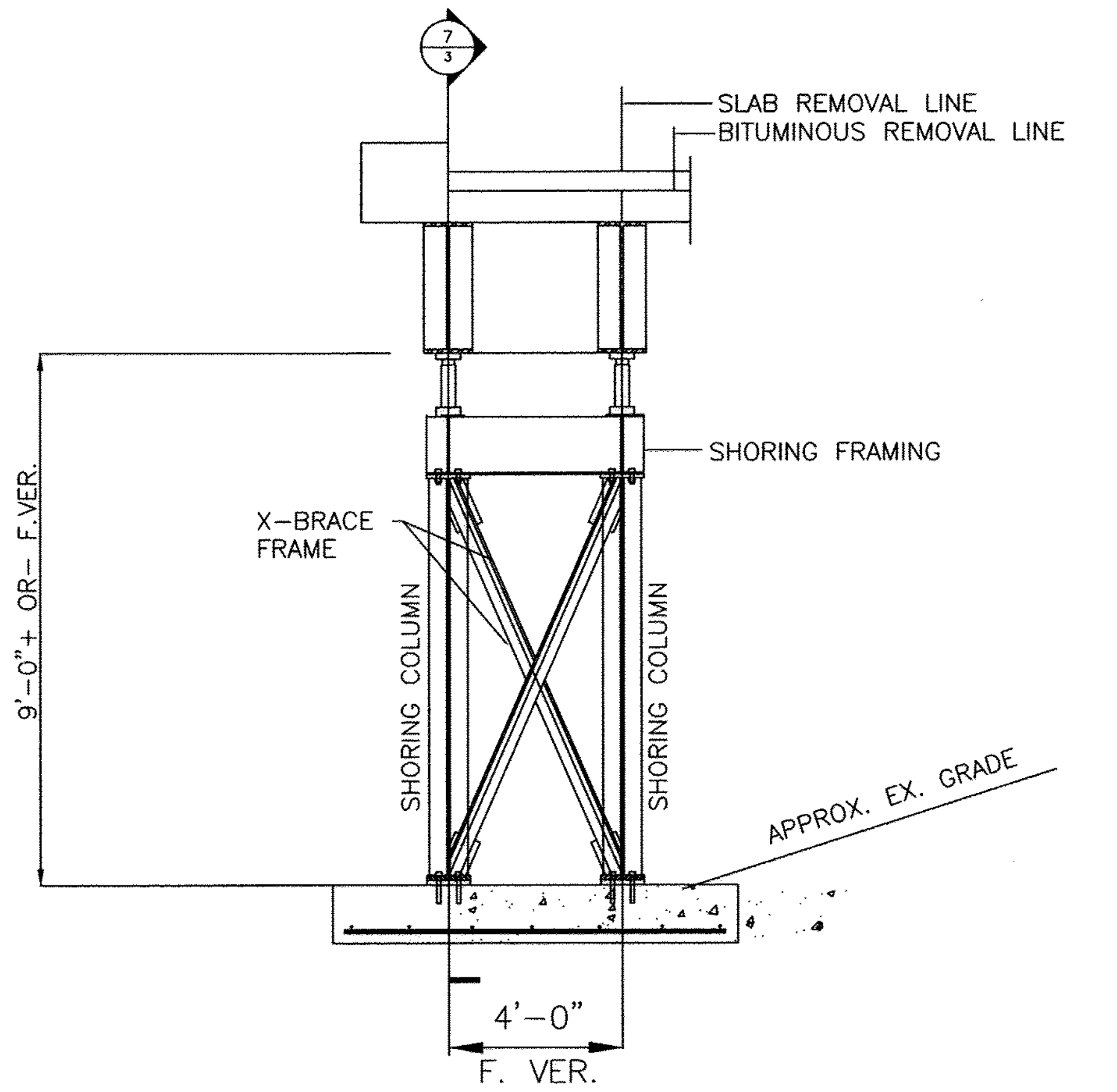
2/3 SECTION

N.T.S.



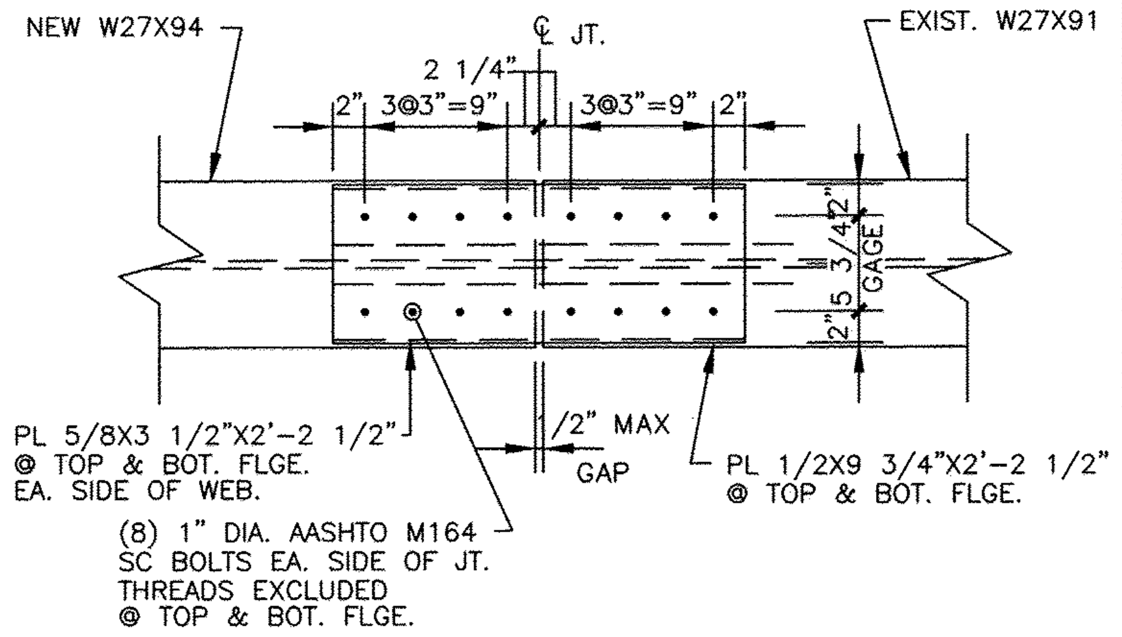
3/3 SECTION

N.T.S.



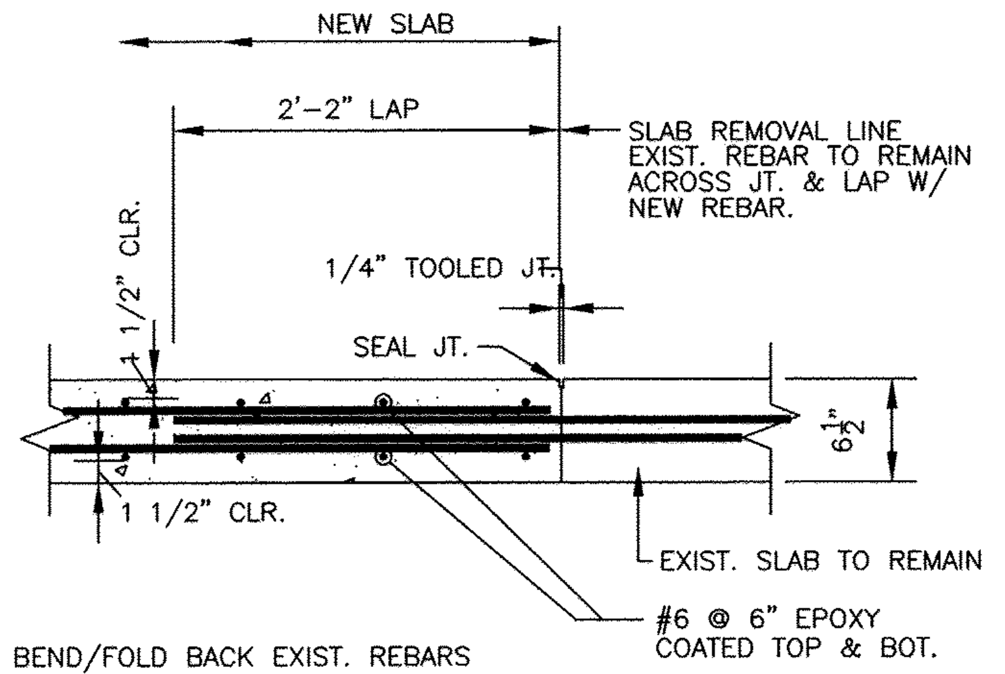
6/3 TEMPORARY SHORING

N.T.S.



4/3 DETAIL

1" = 1'

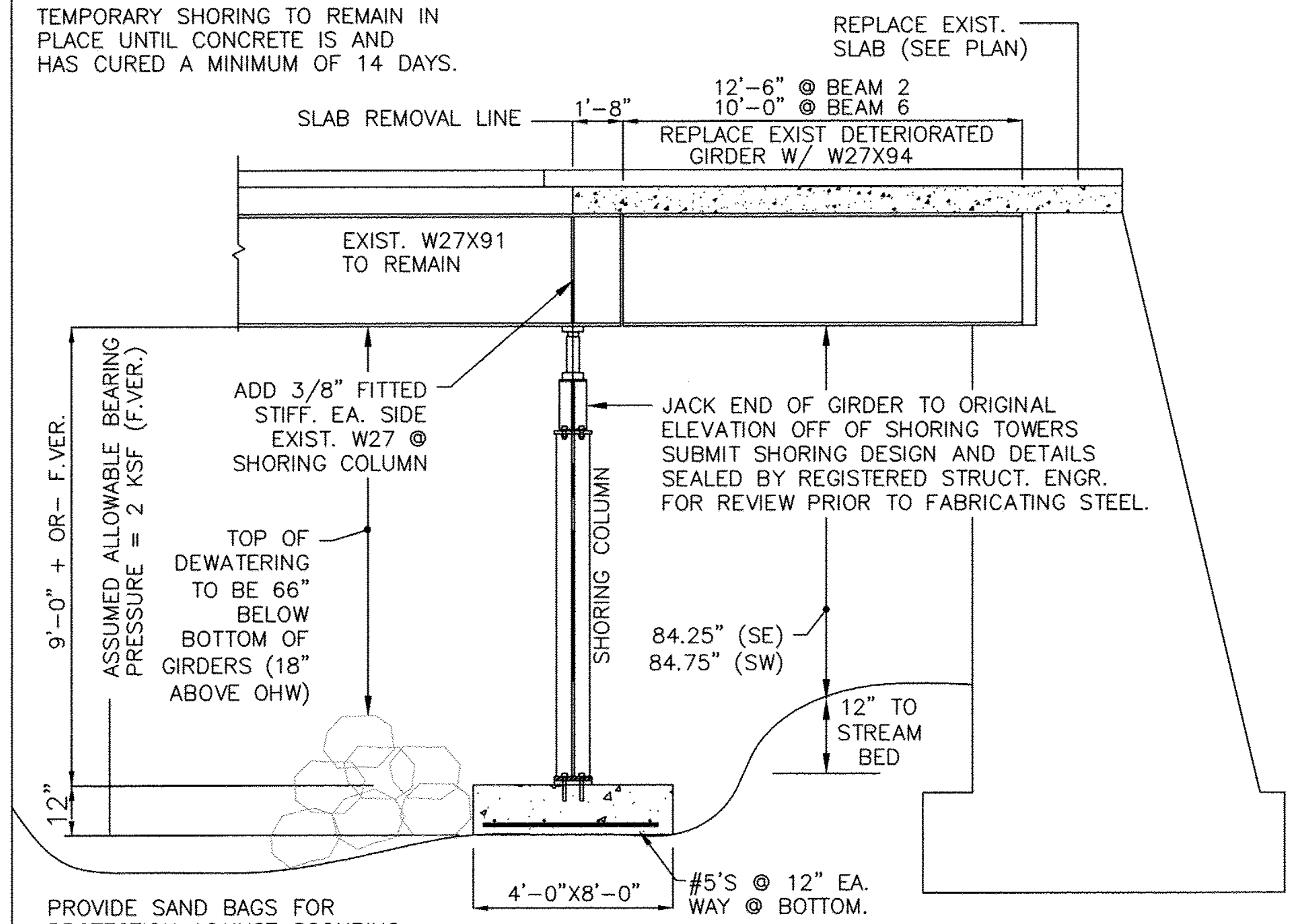


BEND/FOLD BACK EXIST. REBARS TO REMAIN IN AREA OF REPAIR DURING BEAM REPAIRS, THEN FOLD BACK DOWN AND LAP WITH NEW BARS PRIOR TO CONCRETE POUR.

5/3 SECTION

N.T.S.

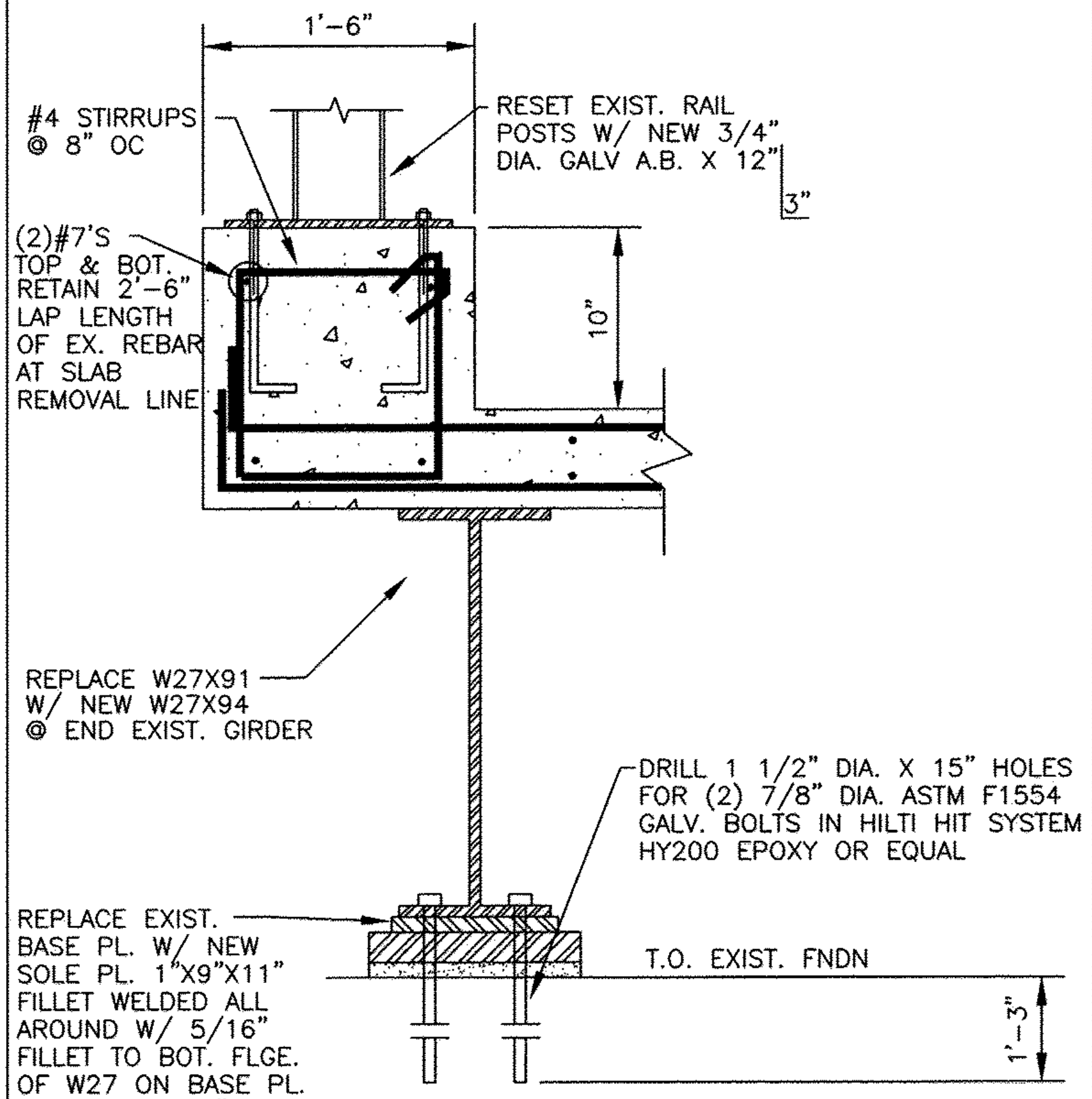
TEMPORARY SHORING TO REMAIN IN PLACE UNTIL CONCRETE IS AND HAS CURED A MINIMUM OF 14 DAYS.



PROVIDE SAND BAGS FOR PROTECTION AGAINST SCOURING AROUND FOOTINGS TO 2' ABOVE TOP OF FOOTING.

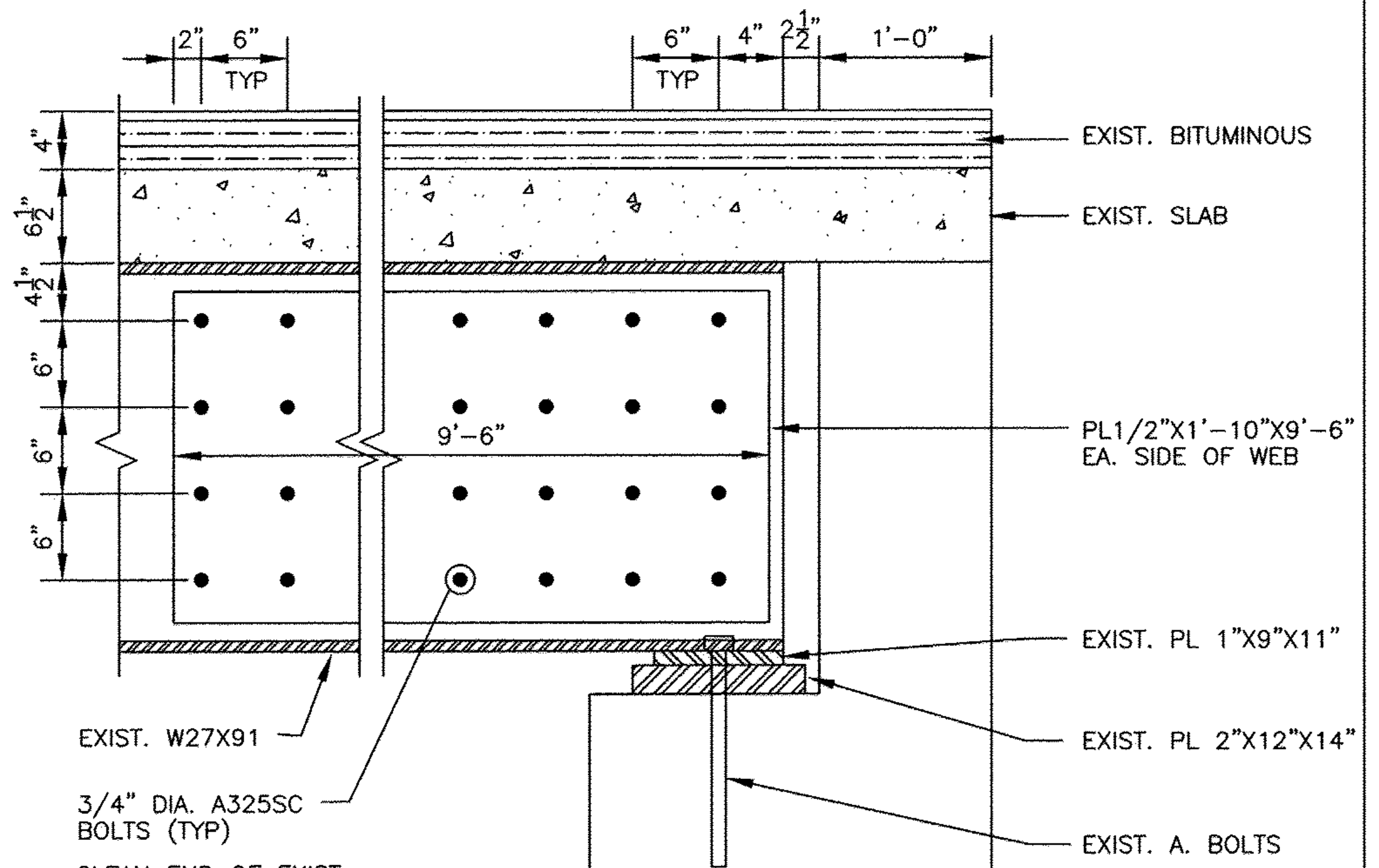
7/3 TEMPORARY SHORING

N.T.S.



8/3 SECTION

N.T.S.



CLEAN END OF EXIST. BEAM & BASE PL & PAINT PRIOR TO ADDING WEB REINFORCEMENT PLS

9/3 SECTION

N.T.S.

COMMONWEALTH OF MASSACHUSETTS
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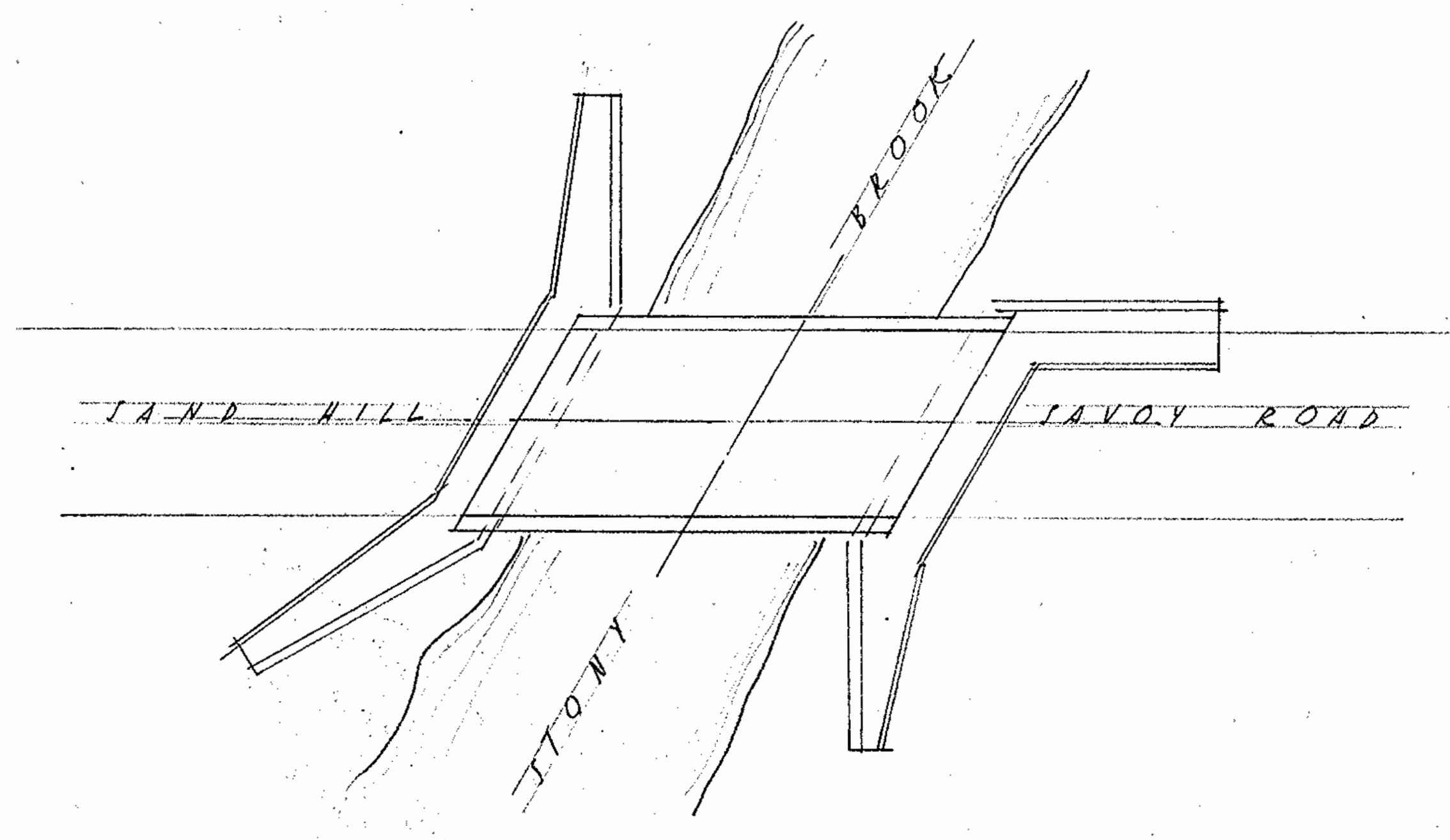
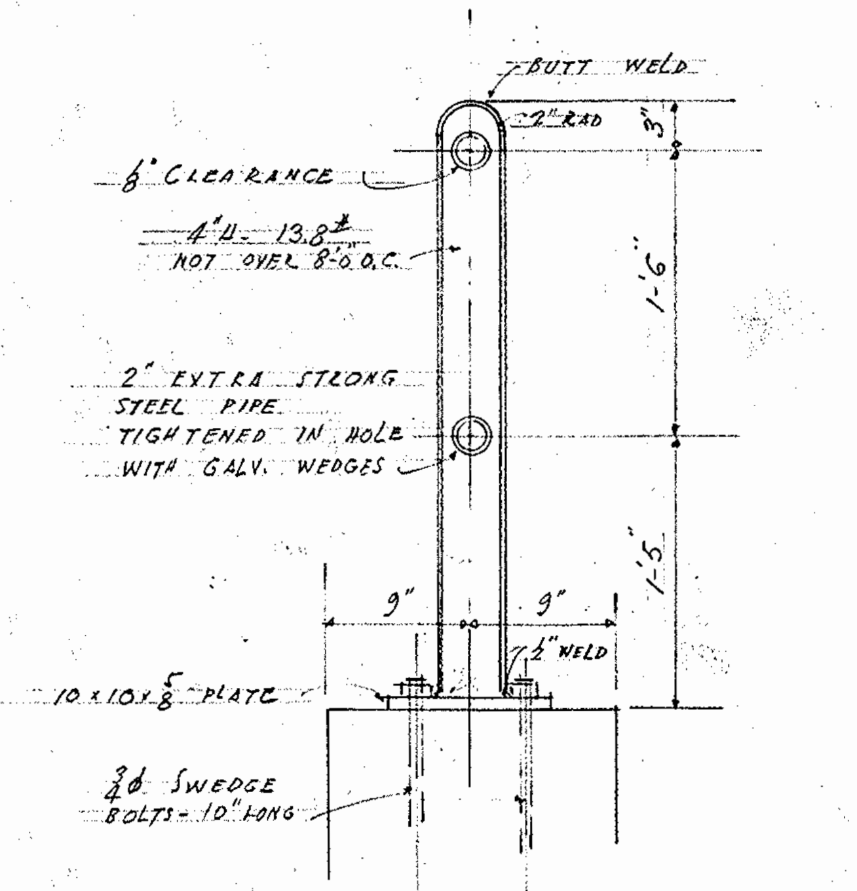
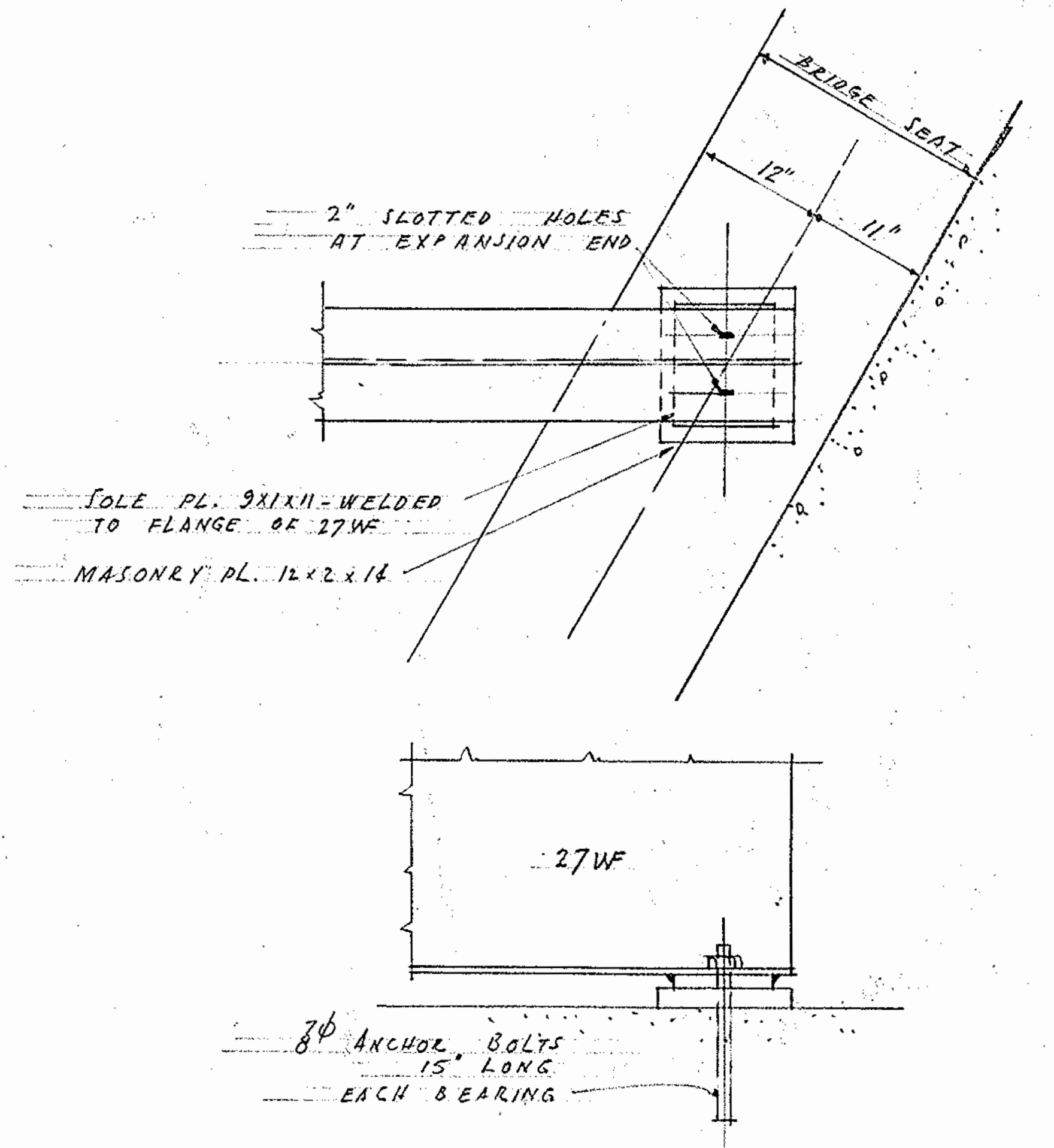
SHEET 4 OF 4 SHEETS BRIDGE NO. C-10-002 (03G)



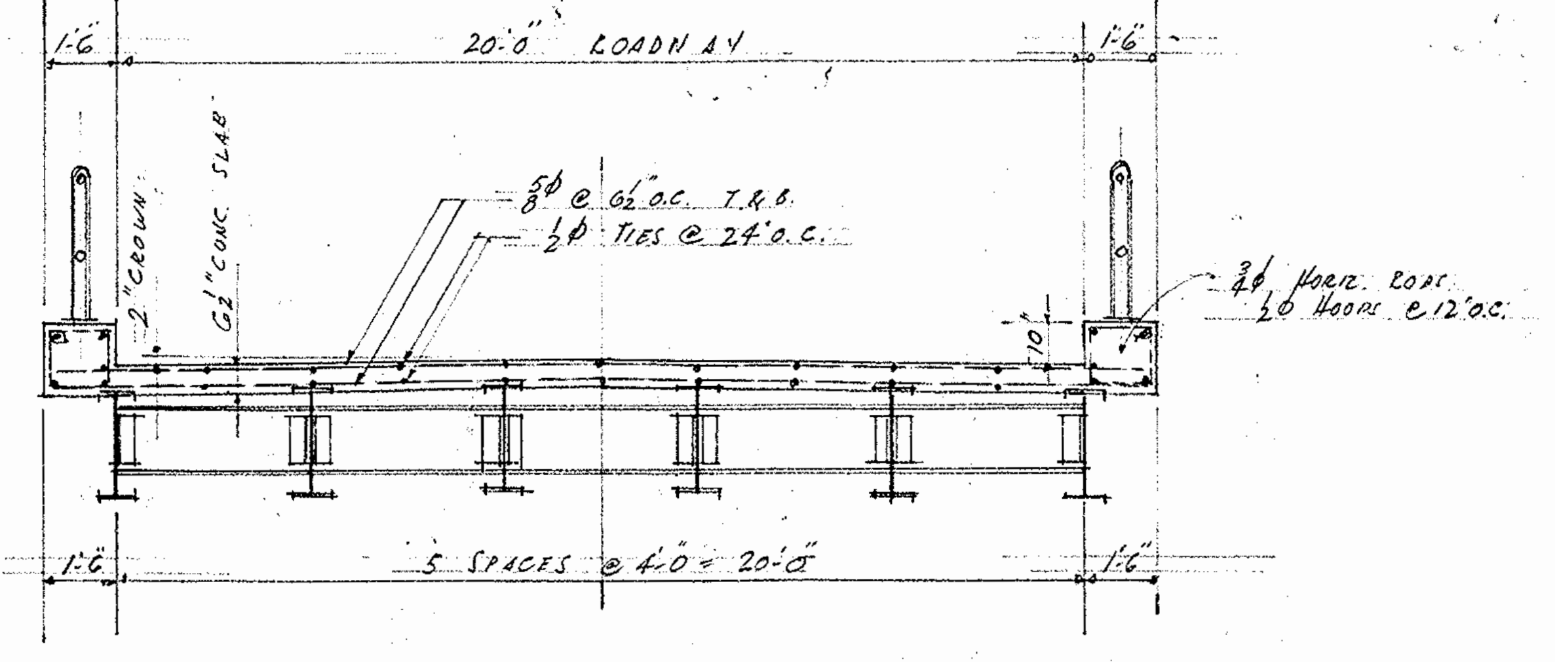
LOCATION PLAN
No Scale



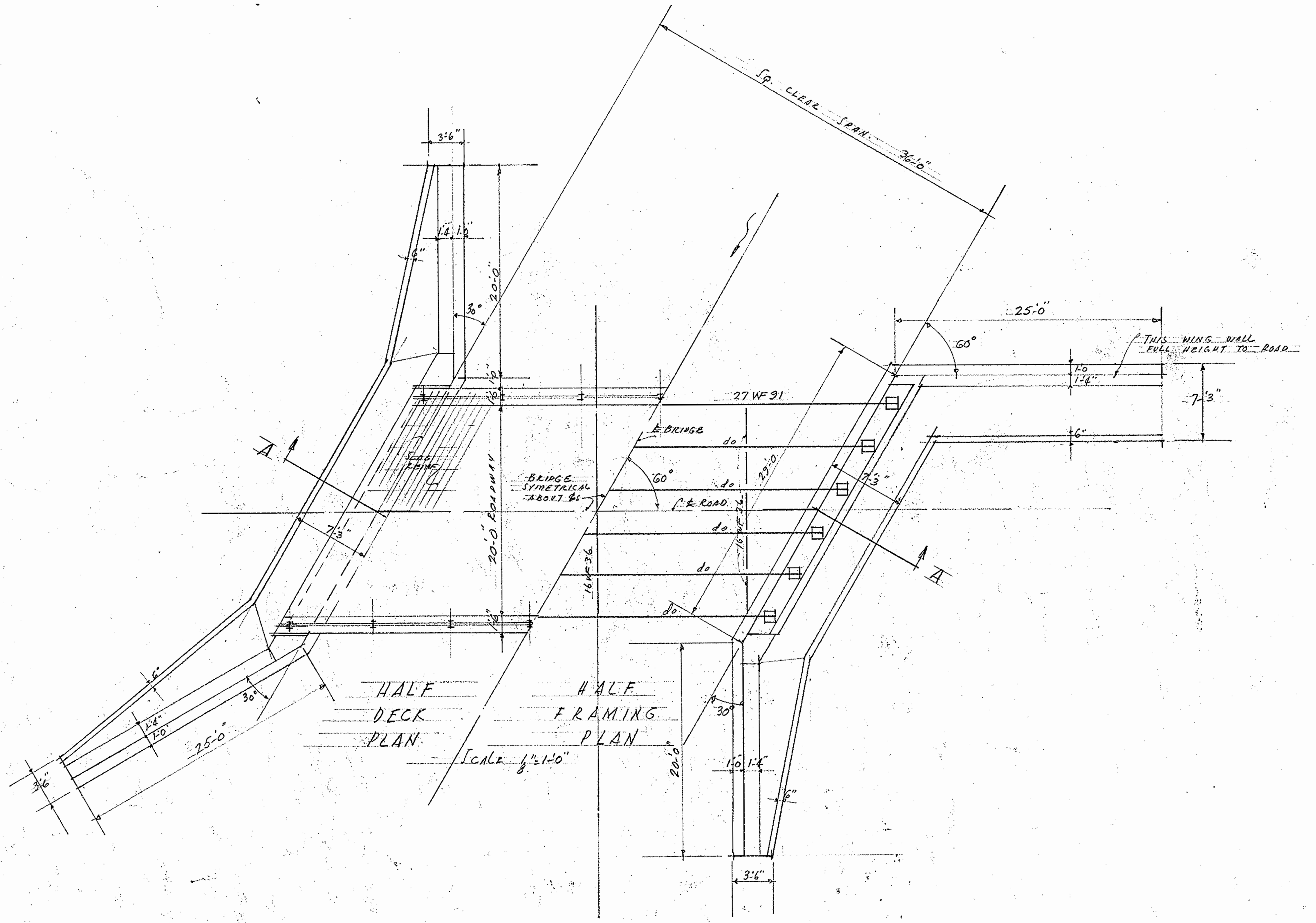
DETAIL OF FENCE
Scale 1" = 1'-0"



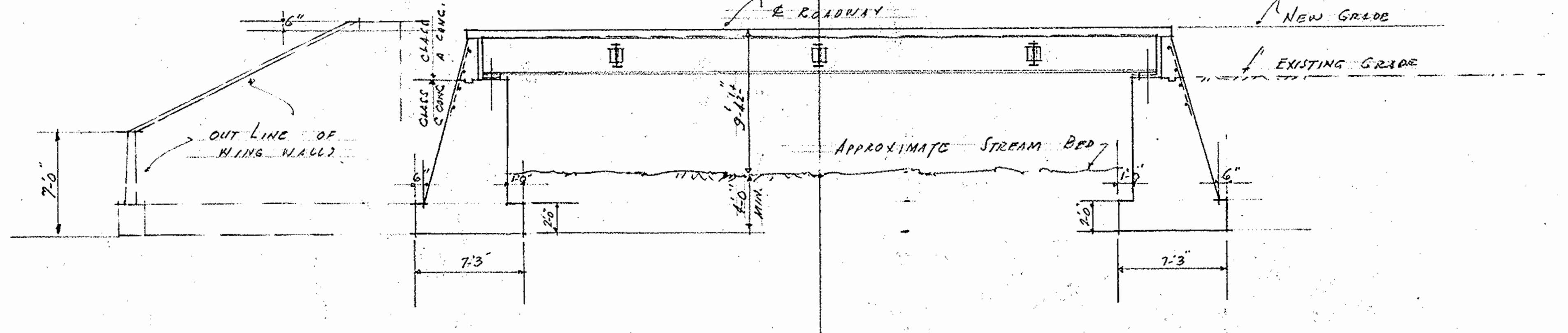
DETAIL AT BRIDGE SEAT
Scale 3/4" = 1'-0"



CROSS SECTION
Scale 1/4" = 1'-0"



HALF DECK PLAN
HALF FRAMING PLAN
Scale 1/8" = 1'-0"



SECTION "AA"
Scale 1/8" = 1'-0"

ESTIMATED QUANTITIES

(NOT GUARANTEED)

EXCAVATION (BRIDGE)	550	CU. YDS.
EXCAVATION (TRENCH LEDGE)	50	CU. YDS.
EXCAVATION (CONCRETE)	10	CU. YDS.
EXCAVATION (CHANNEL)	4200	CU. YDS.
BORROW GRAVEL	350	CU. YDS.
CONCRETE (CLASS A)	26	CU. YDS.
CONCRETE (CLASS C)	250	CU. YDS.
STRUCTURAL STEEL	31456	POUNDS
REINFORCING STEEL	8400	POUNDS
BITUMINOUS CONCRETE SURFACING (CLASS I)	-	TONS
BITUMINOUS WATERPROOFING	-	SQ. YDS.
RAIL STEEL FENCE	93	LIN. FT.
WELDED IRON FENCE	-	LIN. FT.
STEEL SHEETING	47500	POUNDS
LUMBER SHEETING	-	M. FT. B. M.
LUMBER PLATFORMS	-	M. FT. B. M.
RIP RAP	40	CU. YDS.

GENERAL NOTES

FOUNDATIONS:	MAY BE ALTERED IF NECESSARY TO SUIT CONDITIONS OF CONSTRUCTION.
WEEP HOLES:	TO BE PROVIDED IN ABUTMENTS AND WING WALLS WITH INLETS PROTECTED BY BROKEN STONE OR SCREENED GRAVEL AS DIRECTED BY THE ENGINEER
DESIGN:	ACCORDING TO SPECIFICATIONS OF THE AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS (1935 ED.) FOR H-15 LOADING.
CONCRETE:	CONCRETE FOR DECK SLABS CLASS "A" CONCRETE FOR ABUTMENT AND WING WALLS CLASS "C".
STEEL SHEETING:	AS DIRECTED BY THE ENGINEER DRIVE AND LEAVE IN PLACE 23 POUND STEEL SHEET PILING ± 10'-0" LONG ON STREAM FACES OF ALL ABUTMENTS AND WING WALLS; ALSO TURN ACROSS ENDS OF WING WALL AND RETURN 6'-0" ALONG BACK OF SAME. USE WOOD SHEETING IN REMAINDER OF ABUTMENT AND WING WALLS.

FOR CONSTRUCTION
DATE 11/15/38

REVISION DATE Nov. 11, 1938
ORIGINAL DATE Oct. 11, 1938

W. & L. ENGINEERING CO. ENGINEERS
MAURICE A. REIDY CONSULTANT

THE COMMONWEALTH OF MASSACHUSETTS
PROPOSED BRIDGE
CHESHIRE
BRIDGE No. 4 (REVISED)
SAND MILL - SAVOY ROAD
OVER STONY BROOK
SCALES AS NOTED
OFFICE OF
DEPARTMENT OF PUBLIC WORKS
100 NASHUA ST., BOSTON, MASS.
OCTOBER 1938

BRIDGE ENGINEER
CHIEF ENGINEER

DESIGNED BY J.J.O'N. TRACED BY CHECKED BY

DATE OF ISSUE					
ADVERTISING	CONSTRUCTION				

BRIDGE No. C-10-2