Paving & Bridge Deck Repairs - Fort Hill Road

City of Easthampton

Addendum No. 1

May 12, 2026,

OPENING DATE FOR BIDS: May 18, 2026 at 10:30 AM

This is an Addendum to the above bid. Special attention should be given to this addendum to preserve the validity of any proposal submitted in response to the Invitation to Bid. **Bid responses must acknowledge this and all addenda.**

QUESTIONS AND RESPONSES:

The following questions were received prior to May 11, 2026 at 10:30 AM.

Question 1: Will the addenda be sent automatically?

Answer 1: Addenda will be sent through email to all parties on the plan holders list.

Question 2: Is there a specific Bid Bond form that should be used for the Fort Hill Road project?

Answer 2: There is a sample payment bond in Section 6 - Bonds that may be used as guidelines for the requirements defined in Section 2.21 - Security Deposit/Bid Deposit.

Question 3: What is the dollar amount per day for liquidated damages for this project?

Answer 3: The Contract Agreement (Sec. 5, A14) is an example of the contract form the City will require the successful bidder to execute. The penalty fee will be negotiated based on the accepted/ approved project schedule and the completion date of Nov 15th. See Section 2.04 for Contract Performance Time, Section 2.28 for Acceptance of Offer and Section 5.A14 for an example of possible contract language.

Question 4: Is there an approved equivalent mix that would be acceptable in lieu of the specified Rapid-Setting Low Permeability Repair Concrete, which currently calls for use of a mobile volumetric mixer? Please advise if an alternative material or mix design meeting the required performance criteria (strength, set time, and permeability) would be considered acceptable under the specification.

Answer 4: Per Chapter 3 of the MassDOT Bridge Maintenance & Preservation Manual, if the deck repairs are performed in stages behind a temporary barrier (Type C repair), the rapid setting low permeability concrete is not the only option. The following MassDOT-approved mixes are acceptable in lieu of the mobile-mixed rapid setting low permeability concrete:

- 4000 psi, 3/8", 660 ready-mix concrete for partial-depth repairs (Item 905.)
- 4000 psi, 3/4", 585 HP concrete for full-depth repairs (Item 904.4)

Any mix used must be on the MassDOT Qualified Construction Materials. The type of concrete proposed must also be consistent with the duration of each stage of construction in the approved temporary traffic control plan.

Question 5: Is there any testing required of the reclaimed subbase for suitability?

Answer 5: Yes, Reclaimed material shall be tested for conformance with MassDOT Standard Specification M1.09.0: Reclaimed Pavement Borrow Material.

Question 6: There are 3 drainage structures that will need to be adjusted. Please provide a pay item for drainage structures adjusted.

Answer 6: Payment for adjustment of the three (3) existing drainage structures to final grade shall be incidental to the reclamation and paving operations. The Contractor shall include all costs for this work in the related unit prices. No separate pay item will be added.

Question 7: There is an existing asphalt berm in certain locations of the project. Will this berm need to be replaced? If so, please provide a specification and item for asphalt berm.

Answer 7: Costs for replacement of the existing HMA curb, shall be considered incidental to Item 450.22 Superpave Surface Course – 9.5 (SSC-9.5). The HMA curb shall conform to MassDOT Standard Construction Detail 570.0.1 for Type-2 Curb **(attached)** and MassDOT Standard Specifications Section 500.

Question 8: Contract Specifications, Item 994.1, Temporary Protective Shielding, paragraph 4, states the shielding shall extend the full length of the bridge span and a sufficient distance above and beyond the deck slab. The contract quantity for this item is significantly lower than the full bridge area. Please clarify the limits of shielding required as this is a deck repair project.

Answer 8: The contract quantity for Item 994.1, Temporary Protective Shielding, is sized to provide protection beneath one full bridge span at any given time. Bridge No. E-05-015 consists of five (5) spans of approximately 20 feet each, with a deck width of approximately 33.33 feet. The area of one full span is approximately 667 square feet. The contract quantity of 700 square feet meets and exceeds this requirement and is therefore sufficient as bid. The Contractor shall reposition the shielding as the deck repair work progresses from span to span. No revision to the contract quantity will be made.

Question 9: Will driveway aprons also be paved?

Answer 9: Yes.

Question 10: Are the guardrails remaining?

Answer 10: Yes.

Question 11: Could the depth for reclaim be adjusted to be less deep?

Answer 11: No, the pavement design has been established through a coring assessment and pavement evaluation report.

Question 12: Contract Specifications, page 1 of 14, states the bid time is 9:30 am. Pages 1 of 1 state the bid time is 10:30 am. Please confirm the bid time.

Answer 12: Bid submissions are due by 10:30 AM EST on May 18, 2026, and will be publicly opened immediately after in the First Floor Conference Room at 50 Payson Ave, Easthampton MA 01027.

Question 13: Special Provisions references 2" Superpave Surface Course – 12.5 (SSC – 12.5). The bid form shows 450.22 Superpave Surface Course – 9.5 (SSC – 9.5). Please clarify if the roadway Surface Course is 9.5 or 12.5.

Answer 13: HMA pavement design for the Roadway and Bridge approaches shall be as follows:

1.5" Superpave Surface Course – 9.5 (SSC - 9.5)
Over 3" Superpave Intermediate Course – 19.0 (SIC – 19.0)
Over Reclaimed Asphalt Base

GENERAL INFORMATION:

1. REPLACE "*9:30 AM*" with "*10:30 AM*" in Section 2.01, Paragraph B.

2. ADD to Special Provisions, Section 10 - Environmental Permits:

   "The Contractor shall be responsible for preparing and submitting the NPDES Stormwater Pollution Prevention Plan (SWPPP). Payment for all work related to the SWPPP will be included under Item 756. in the Contract."

3. ADD to Special Provisions, Section 15 - Protection of Utilities and Property:

   "The paved swale and culverts under driveways adjacent to the property at 35 Fort Hill Road shall be protected and maintained during construction activities."

4. ADD to Special Provisions, Section 25 - Temporary Access to Area Residents:

   "The Contractor shall also provide notice to abutters of upcoming work that will restrict or alter access to abutting properties. The contractor shall submit the notice to the City and receive City approval prior to providing notification to abutters."

5. ADD to Special Provisions, Section 31 - Public Water Supply:

   "The Contractor shall not operate any valves or hydrants. The Contractor must coordinate with the Water Department if they require access to any City water valves or hydrants."

6. REPLACE in Special Provisions, Item 127.4 & 127.41, under "Preparation of Surface" in paragraph 2: "*910."* with *"910.1"*

7. REPLACE in Special Provisions, Item 403., Item 403.1 & Item 404.5, paragraph 2:

   "The existing pavement and subbase shall be reclaimed to a depth of ten (10) inches to produce a suitable base for the placement of hot mix asphalt intermediate and surface course. The top 3.5 inches of reclaimed material shall be removed along the entire length of roadway, with the exception of 250 feet on each approach to the bridge for placement of the hot mix asphalt intermediate course and 100 feet at each project limit. The depth of material removed shall transition from 3.5 inches to 5.5 inches in depth to allow for proposed pavement to match into the pavement surface course at the bridge deck and project limits."

   with

   "The existing pavement and subbase shall be reclaimed to a depth of ten (10) inches to produce a suitable base for the placement of hot mix asphalt intermediate and surface course. The top 3 inches of reclaimed material shall be removed along the entire length of roadway, with the exception of 250 feet on each approach to the bridge for placement of the hot mix asphalt intermediate course and 100 feet at each project limit. The depth of material removed shall transition from 3 inches to 4.5 inches in depth to allow for proposed pavement to match into the pavement surface course at the bridge deck and project limits."

8. REPLACE in Special Provisions, Item 450.32:

   "ITEM 450.23 SUPERPAVE SURFACE COURSE – 12.5 (SSC – 12.5)" with
   "ITEM 450.22 SUPERPAVE SURFACE COURSE – 9.5 (SSC – 9.5)"

9. REPLACE in Special Provisions, Item 450.22, Item 450.32 & Item 450.611, under "Roadway and Bridge Approaches":

   "<u>Roadway & Bridge Approaches</u>
   2" Superpave Surface Course – 12.5 (SSC - 12.5)
   Over 3.5" Superpave Intermediate Course – 19.0 (SIC – 19.0)
   Over Reclaimed Asphalt Base"

   with

   "<u>Roadway & Bridge Approaches</u>
   1.5" Superpave Surface Course – 9.5 (SSC - 9.5)
   Over 3" Superpave Intermediate Course – 19.0 (SIC – 19.0)
   Over Reclaimed Asphalt Base"

10. ADD Special Provision Item 756. (NPDES STORMWATER POLLUTION PREVENTION PLAN) **provided as an attachment.**

11. REPLACE in Special Provisions, Item 832. & Item 847.1:

    "W16-7P(L)" with "W16-7P"
    "W11-5" with "W11-15"
    "W19-9(L)" with "W16-P"

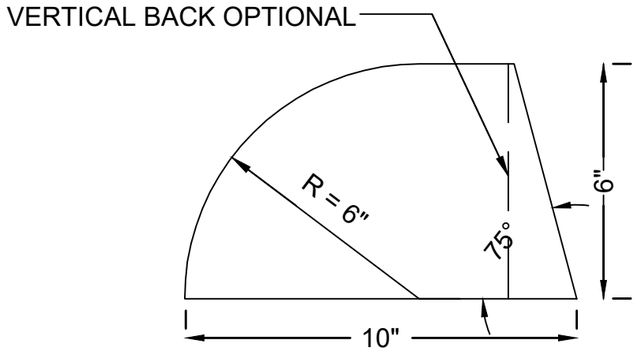
12. REPLACE in Special Provisions, Item 909.2, in Surface Preparation, paragraph 1:

    "Item 127.12" with "Item 127.41"

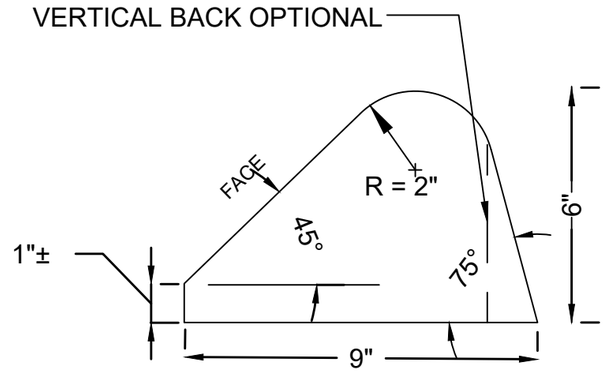
13. ADD Appendix C - MassDOT Routine Bridge Inspection Report - **provided as an attachment.**

14. ADD Appendix D - Pavement Evaluation Report - **provided as an attachment.**

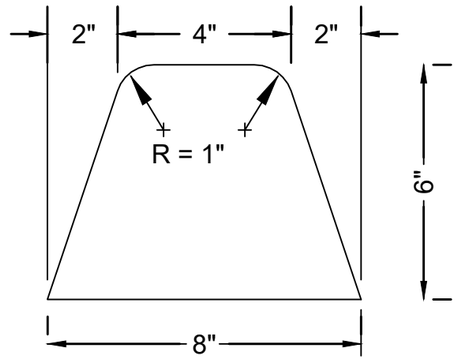
END OF ADDENDUM NO. 1



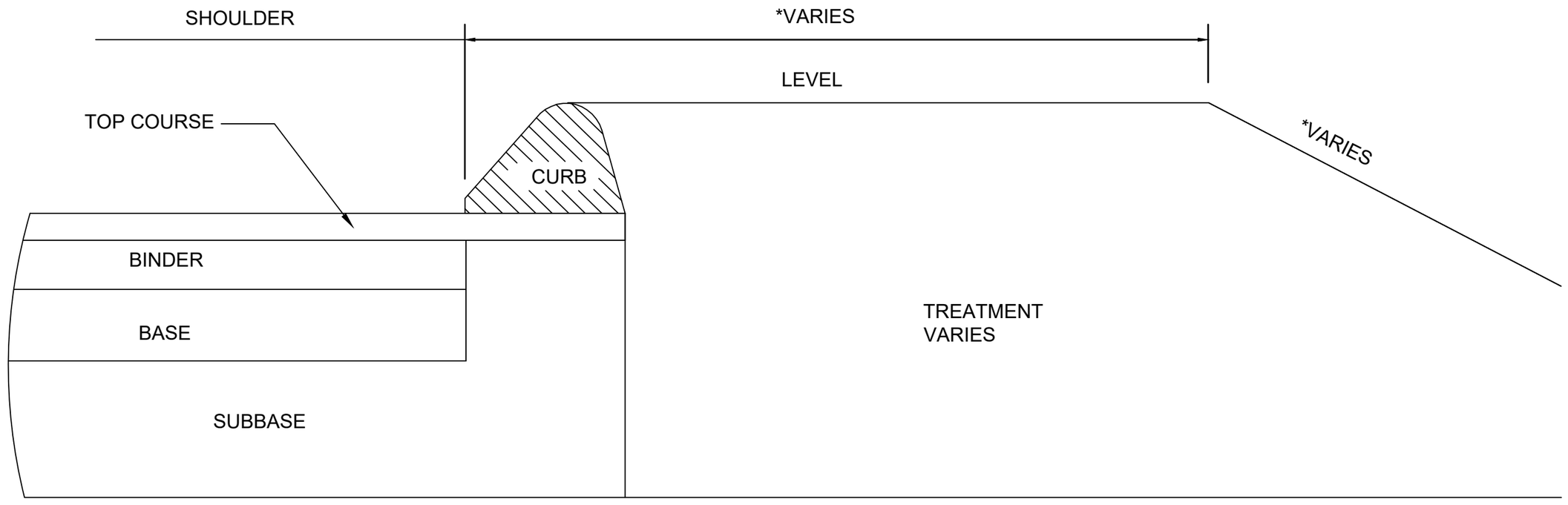
TYPE- 1



TYPE- 2



TYPE- 3



METHOD OF SETTING - TYPICAL FOR ALL TYPES

SEE TYPICAL SECTIONS FOR PROJECT

massDOT Massachusetts Department of Transportation Highway Division	CONSTRUCTION STANDARDS SECTION 500	**HOT MIX ASPHALT CURBS**	ISSUE DATE **JAN 2025**	DRAWING NUMBER **570.0.1**

ITEM 756. NPDES STORMWATER POLLUTION PREVENTION PLAN LUMP SUM

This Item addresses the preparation and implementation of a Storm Water Pollution Prevention Plan required by the National Pollutant Discharge Elimination System (NPDES) and applicable Construction General Permit.

Pursuant to the Federal Clean Water Act, effective March 10, 2003, construction activities which disturb one acre or more are required to obtain coverage under the NPDES General Permit for Storm Water Discharges From Construction Activities. The City of Easthampton has obtained existing coverage through a Bundled Order of Conditions (MassDEP File No. 151-0307), which remains in effect through February 27, 2027. On July 1, 2003 (68 FR 39087), EPA published the final NPDES construction general permit for construction activity. On August 4, 2003 (68 FR 45817), EPA reissued the General Permit for the Commonwealth of Massachusetts and included state specific requirements.

The NPDES General Permit requires coverage via a Notice of Intent (NOI) prior to the start of construction. The City of Easthampton has satisfied this requirement through its existing Bundled Order of Conditions (MassDEP File No. 151-0307). The Contractor shall verify with the Engineer that this coverage remains valid and applicable to the project scope prior to commencement of work. If the scope of the Contractor's work falls outside the coverage afforded by the existing Order, the Contractor shall be responsible for obtaining any additional required coverage.

In addition, if the project discharges to an Outstanding Resource Water, vernal pool, or is within a coastal ACEC as identified by the Massachusetts Department of Environmental Protection (DEP), a separate notification to DEP is required. DEP may also require submission of the Storm Water Pollution Prevention Plan for review and approval. Filing fees associated with the notification and, if required, the SWPPP filing to DEP will be paid by the Contractor.

The owner, The City of Easthampton, has satisfied its NOI obligation through its existing Bundled Order of Conditions (MassDEP File No. 151-0307). The Contractor, as operator, shall determine whether separate operator coverage is required under the applicable Construction General Permit (CGP). If required, the Contractor shall submit its own NOI and provide proof of authorization to the Engineer prior to commencing any land-disturbing activities.

The General Permit also requires the preparation and implementation of a Storm Water Pollution Prevention Plan (SWPPP) in accordance with the afore-mentioned statutes and regulations. The Plan shall include the General Permit conditions and detailed descriptions of controls of erosion and sedimentation to be implemented during construction. It is the responsibility of the Contractor to prepare the SWPPP to meet the requirements of the most recently issued Construction General Permit (CGP). The Contractor shall submit the Plan to the Engineer for approval at least four weeks prior to any site activities. It is the responsibility of the Contractor to be familiar with the General Permit conditions and the conditions of any state Wetlands Protection Act Order, Water Quality Certification, Corps of Engineers Section 404 Permit and other environmental permits applicable to this project and to include in the Stormwater Pollution Prevention Plan the methods and means required to comply with applicable conditions of said permits.

ITEM 756. (Continued)

It is the responsibility of the Contractor to complete the SWPPP in accordance with the EPA Construction General Permit, provide all information required, and obtain any and all certifications as required by the Construction General Permit. Any amendments to the SWPPP required by site conditions, schedule changes, revised work, construction methodologies, and the like are the responsibility of the Contractor. Amendments will require the approval of the Engineer prior to implementation.

Included in the General Permit conditions is the requirement for inspection of all erosion controls and site conditions on a weekly basis as well as after each incidence of rainfall exceeding 0.5 inches in twenty- four hours. The Contractor shall choose a qualified individual who will be on-site during construction to perform these inspections. The Engineer must approve the contractor's inspector. In addition, if the Engineer determines at any time that the inspector's performance is inadequate, the Contractor shall provide an alternate inspector. Written weekly inspection forms, storm event inspection forms, and Monthly Summary Reports must be completed and provided to the Engineer. Monthly Summary Reports must include a summary of construction activities undertaken during the reporting period, general site conditions, erosion control maintenance and corrective actions taken, the anticipated schedule of construction activities for the next reporting period, any SWPPP amendments, and representative photographs.

The Contractor is responsible for preparation of the Plan, all SWPPP certifications, inspections, reports and any and all corrective actions required to comply with the provisions of the General Permit. Work associated with performance of inspections is not included under this Item. The Standard Specifications require adequate erosion control for the duration of the Contract. Inspection of these controls is considered incidental to the applicable items. This Item addresses acceptable completion of the SWPPP, any revisions/amendments required during construction, and preparation of monthly reports. In addition, any erosion controls beyond those specified in bid items elsewhere in this contract which are selected by the Contractor to facilitate and/or address the Contractor's schedule, methods and prosecution of the work shall be considered incidental to this item.

The CGP requires the submission of a Notice of Termination (NOT) from all operators when final stabilization has been achieved. Approval of final stabilization by the Engineer and confirmation of submission of the NOT shall be required prior to submission of the Resident Engineer's Final Estimate.

BASIS OF PAYMENT

Item 756., NPDES Storm Water Pollution Prevention Plan, payment for all work detailed above, including Plan preparation, required revisions, revisions/addenda during construction, monthly report and filing fees are included in the Lump Sum for this Item. Upon final acceptance of the SWPPP by the Department, a payment equal to 50% of the Contract Lump Sum price will be paid. The remaining 50% of the Lump Sum will be paid in 10% increments distributed equally throughout the remaining period of the Contract.

APPENDIX C

MassDOT Routine Bridge Inspection Report

Report Date: January 28, 2025

State Information

BDEPT#= E05015 Agency Br.No.

Town= Easthampton L.O.

B.I.N= 0PQ AASHTO= 076.5

RANK= 4527 H.I.= 88.0 % FHWA Select List= N (6/21/2017)

Identification

(8) Structure Number	E050150PQMUNNBI
(5) Inventory Route	151000000
(2) State Highway Department District	02
(3) County Code 015 (4) Place code	19330
(6) Features Intersected	**WATER MANHAN RIVER**
(7) Facility Carried	**HWY FORT HILL RD**
(9) Location	0.4 MI N OF EAST STREET
(11) Kilometerpoint	0000.612
(12) Base Highway Network	N
(13) LRS Inventory Route & Subroute	000000000000
(16) Latitude	42 DEG 17 MIN 00.64 SEC
(17) Longitude	72 DEG 38 MIN 25.81 SEC
(98) Border Bridge State Code	Share %
(99) Border Bridge Structure No. #	

Structure Type and Material

(43) Structure Type Main: Concrete continuous Code 201

Slab Jointless bridge type: Not applicable

(44) Structure Type Appr:

Other Code 000

(45) Number of spans in main unit	005
(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 - Unknown Code 8

C) Type of deck protection - Unknown Code 8

Age and Service

(27) Year Built	1964
(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			000905
(30) Year of ADT	2018	(109) Truck ADT	06 %
(19) Bypass, detour length			003 KM

Geometric Data

(48) Length of maximum span	0006.1 M
(49) Structure Length	00031.1 M
(50) Curb or sidewalk: Left 00.3 M	Right 00.3 M
(51) Bridge Roadway Width Curb to Curb	008.5 M
(52) Deck Width Out to Out	010.0 M
(32) Approach Roadway Width (w/shoulders)	009.9 M

(33) Bridge Median - No median Code 0

(34) Skew 15 DEG (35) Structure Flared N

(10) Inventory Route MIN Vert Clear	99.99 M
(47) Inventory Route Total Horiz Clear	08.5 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 - Urban Local	19
(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 built after 1949 presumed to be not eligit	Z

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 - H 20=M 18	4
(63) Operating Rating Method - Allowable Stress (AS)	2
(64) Operating Rating	43.1
(65) Inventory Rating Method - Allowable Stress (AS)	2
(66) Inventory Rating	24.8
(70) Bridge Posting	5
(41) Structure - Open	A

Appraisal

	Code
(67) Structural Evaluation	6
(68) Deck Geometry	5
(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	5

Inspections

(90) Inspection Date 12/18/24 (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	Y	36	MO B)	01/02/25
(C) Other Special Inspection	N	00	MO C)	00/00/00
(*) Other Inspection ()	N	00	MO *)	00/00/00
(*) Closed Bridge	N	00	MO *)	00/00/00
(*) UW Special Inspection	N	00	MO *)	00/00/00
(*) Damage Inspection			MO *)	00/00/00

Rating Loads

Report Date 06/01/90	H20	Type 3	Type 3S2	Type HS
Operating	30.0	43.0	68.0	0.0
Inventory	20.0	25.0	39.0	0.0

Field Posting

Status LEGAL Posting Date 03/24/92

	2 Axle	3 Axle	5 Axle	Single
Actual				
Recommended				

Missing Signs N

Misc.

Bridge Name

N Anti-missile fence N Acrow Panel N Jointless Bridge Freeze/Thaw

Stairs On/Adjacent 0 Stair Owner(s)

Accessibility (Needed/Used)

N / N	Liftbucket	N / N	Rigging	P / Y	Other
P / N	Ladder	N / N	Staging	Boat	
N / N	Boat	N / N	Traffic Control		
Y / N	Wader	N / N	RR Flagperson	Inspection Hours:	012
P / N	Inspector 50	P / N	Police		

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION

STRUCTURES INSPECTION FIELD REPORT

ROUTINE INSPECTION

2-DIST	B.I.N.	BR. DEPT. NO.
02	0PQ	E-05-015

CITY/TOWN	8.-STRUCTURE NO.	11-Kilo. POINT	41-STATUS	90-ROUTINE INSP. DATE
EASTHAMPTON	E05015-0PQ-MUN-NBI	000.612	A:OPEN	DEC 11, 2024

07-FACILITY CARRIED	MEMORIAL NAME/LOCAL NAME	27-YR BUILT	106-YR REBUILT	YR REHAB'D (NON 106)
HWY FORT HILL RD		1964	0000	0000

06-FEATURES INTERSECTED	26-FUNCTIONAL CLASS	DIST. BRIDGE INSPECTION ENGINEER
WATER MANHAN RIVER	Urban Local	M. Barrett

43-STRUCTURE TYPE	22-OWNER	21-MAINTAINER	TEAM LEADER G. Gilligan
201 : Concrete continuous Slab	Town Agency	Town Agency	Glenn t Gilligan

107-DECK TYPE	WEATHER	TEMP. (air)	TEAM MEMBERS
1 : Concrete Cast-in-Place	Int. Rain	4°C	S. J. AUSEVICH, R. GOMEZ

ITEM 58 — DECK — 6

		DEF
1.Wearing Surface	4	S-A
2.Deck Condition	6	M-P
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	6	M-P
11.Lighting Standards	N	-
12.Utilities	N	-
13.Deck Joints	N	-
14.	N	-
15.	N	-
16.	N	-

CURB REVEAL (In millimeters)	E	W
	300	300

APPROACHES

		DEF
a. Appr. pavement condition	5	M-P
b. Appr. Roadway Settlement	5	M-P
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 — SUPERSTRUCTURE — 6

			DEF
1.Stringers		N	-
2.Floorbeams		N	-
3.Floor System Bracing		N	-
4.Girders or Beams		N	-
5.Trusses - General		N	-
a. Upper Chords	N		-
b. Lower Chords	N		-
c. Web Members	N		-
d. Lateral Bracing	N		-
e. Sway Bracings	N		-
f. Portals	N		-
g. End Posts	N		-
6.Pin & Hangers		N	-
7.Conn Plt's, Gussets & Angles		N	-
8.Cover Plates		N	-
9.Bearing Devices		N	-
10. Diaphragms/Cross Frames		N	-
11. Rivets & Bolts		N	-
12. Welds		N	-
13. Member Alignment		8	-
14. Paint/Coating		N	-
15. Concrete Slab		6	M-P

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 — SUBSTRUCTURE — 6

	Dive	Cur		DEF
1. Abutments			7	
a. Pedestals	N	N		-
b. Bridge Seats	N	N		-
c. Backwalls	N	N		-
d. Breastwalls	N	7		-
e. Wingwalls	N	7		-
f. Slope Paving/Rip-Rap	N	7		-
g. Pointing	N	N		-
h. Footings	N	N		-
i. Piles	N	H		-
j. Scour	N	7		-
k. Settlement	N	7		-
l.	N	N		-
m.	N	N		-
2. Piers or Bents			N	
a. Pedestals	N	N		-
b. Caps	N	N		-
c. Columns	N	N		-
d. Stems/Webs/Pierwalls	N	N		-
e. Pointing	N	N		-
f. Footing	N	N		-
g. Piles	N	N		-
h. Scour	N	N		-
i. Settlement	N	N		-
j.	N	N		-
k.	N	N		-
3. Pile Bents			6	
a. Pile Caps	N	7		-
b. Piles	6	6		-
c. Diagonal Bracing	6	6		-
d. Horizontal Bracing	N	N		-
e. Fasteners	7	7		-

UNDERMINING (Y/N) If YES please explain: N

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

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

I-60 (Dive Report): 6 *I-60 (This Report):* 6

93B-U/W (DIVE) Insp 01/05/2022

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

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
EASTHAMPTON	0PQ	E-05-015	E05015-0PQ-MUN-NBI	DEC 11, 2024

ITEM 61 — CHANNEL & CHANNEL PROTECTION — 6

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

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

ITEM 61 (Dive Report): 6 ***ITEM 61 (This Report):*** 6

93b-U/W INSP. DATE: 01/05/2022

ITEM 36 — *TRAFFIC SAFETY*

	36	COND	DEF
A. Bridge Railing	0	7	-
B. Transitions	0	5	M-P
C. Approach Guardrail	0	5	M-P
D. Approach Guardrail Ends	0	5	M-P

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		Other Advance	
	N	S	N	S
Signs In Place (Y=Yes,N=No, NR=NotRequired)				
Legibility/ Visibility				

CLEARANCE POSTING

	E		W		
	ft	in	ft	in	meter
Not X					
Actual Field Measurement		0		0	
Posted Clearance		0		0	

	At bridge		Advance	
	E	W	E	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	N
Boat	N	N
Waders	P	Y
Inspector 50	P	N
Rigging	N	N
Staging	N	N
Traffic Control	N	N
RR Flagger	N	N
Police	P	N
Other:		
Boat	P	N

TOTAL HOURS 12

PLANS (Y/N): Y

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

TAPE#: _____

List of field tests performed:

RATING

Rating Report (Y/N): Y

Date: 06/01/1990

Inspection data at time of existing rating

I 58: **6** I 59: **7** I 60: **7** Date : 09/23/1988

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
EASTHAMPTON	0PQ	E-05-015	E05015-0PQ-MUN-NBI	DEC 11, 2024

REMARKS

BRIDGE ORIENTATION
Bridge carries Fort Hill Road, north and south, over the Manhan River which flows west to east.

Spans and Bents are numbered south to north. Timber piles are numbered west to east.
See Sketches 1 - 4.

GENERAL REMARKS
Access:
Boat access from the slip on Route 5. The Manhan River has downed trees across river both upstream & downstream of bridge. It is recommended the trip is taken early in the month to avoid issues with ice in the Ox Bow.

Note: Poison ivy along embankments.

Scour Monitoring:
The Plan Sketch & Scour Monitoring Chart from the 1/5/2022 Underwater Inspection Report were included in this report. **See Sketch 5 & Chart 1.**

ITEM 58 - DECK

Item 58.1 - Wearing Surface
Hot Mix Asphalt (HMA) Wearing Surface has several HMA patches & a uneven profile. **See Photo 1.**

Item 58.2 - Deck Condition
Concrete Deck Slab was poured in two stages with a center longitudinal construction joint.

Along both curbs there are 2" diameter metal drain pipes that stops flush with the underside of the slab. Concrete around these drain pipes on the underside of the slab are delaminated with some having mortar patching. **See Photo 2.**

Span 1:
- Slab underside has efflorescence and rust staining.
- Center construction joint has a hollow area, 3' long x up to 18" wide. **See Photo 3.**
- Center construction joint has a longitudinal crack, hairline to 1/16" wide x 3' long.

Item 58.4 - Curbs
East & West Concrete Curbs have minor scaling and random vertical hairline cracks. **See Photo 4.**

Item 58.8 - Railing
Railing consists of three square concrete rails and concrete posts.

East & West Concrete Railings have minor spalls. **See Photo 5.**

Northeast Concrete Endpost has been repaired. **See Photo 6.**

East Railbase, has minor longitudinal hairline cracking.

Item 58.10 - Drainage System
Metal pipe drains are along both curbs, extends through the deck slab and stops flush with the underside.

Drains are partial covered with leaves and debris**.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
EASTHAMPTON	0PQ	E-05-015	E05015-0PQ-MUN-NBI	DEC 11, 2024

REMARKS

Drain undersides have rust around a few openings. **See Photo 2.**

APPROACHES

Approaches a - Appr. pavement condition
North & South Approach roadways have multi-cracking with several HMA patches with uneven profile. **See Photos 7 & 8.**

Approaches b - Appr. Roadway Settlement
South deck end has minor approach settlement with uneven profile. **See Photos 7 & 8.**

ITEM 59 - SUPERSTRUCTURE

Item 59.15 - Concrete Slab
Refer Item 58.2. - Deck Condition.

ITEM 60 - SUBSTRUCTURE

Item 60.1 - Abutments
Item 60.1.e - Wingwalls
Wingwalls are a continuation of the abutments.

Southeast Wingwall is spalled 3' long x 6" wide x 6" deep. **See Photo 9.**

Item 60.3 - Pile Bents
Item 60.3.b - Piles
Per the plans, the piles are 65' long. **See Photo 10.**

Timber Piles have a few vertical splits, up to 1/2" wide.

Bent 1, Pile 1, has split 1/2" wide x 5" deep x up to 8" high. **See Photo 11.**

Bent 3, Pile 2 at the waterline has a soft spot, 2'Φ x 1" deep.

Bent 4, Pile 4 is hollow. **See Photo 12.**

Underwater Inspection Report dated 1/5/2022 stated:

In general, all the timber piles have some checking with a max height of 3' and a max pen 0.3'.

Bent 2, Pile A - The upstream face has an area of delamination, 3' high, located 3' above the mudline.

Bent 2, Pile G - The pile is delaminated and hollow sounding around 75% of the circumference, 3' high, beginning 1' below the diagonal brace connection.

Bent 3, Pile B - The pile is delaminated and hollow sounding around 75% of the circumference, 2' high, located 3' above the mudline.

Item 60.3.c - Diagonal Bracing
Bent 2, Pile 1 at lower bolt, brace is split. **See Photo 13.**

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
EASTHAMPTON	0PQ	E-05-015	E05015-0PQ-MUN-NBI	DEC 11, 2024

REMARKS

Bent 3, Pile 1, at lower bolt, the brace is split. **See Photo 14.**

Bent 3, Pile 6, at lower bolt, the brace is split. **See Photo 15.**

Underwater Inspection Report dated 1/5/2022 stated:

The diagonal brace attached to Bent 2, Pile A is split for a length of 3'.
The diagonal brace attached to Bent 3, Pile A is split for a length of 6'.

ITEM 61 - CHANNEL AND CHANNEL PROTECTION

Item 61.1 - Channel Scour
Underwater Inspection Report dated 1/5/2022 stated:

According to channel soundings, a localized area of scour was reported during the 2009 Underwater Inspection at the downstream end of the bridge.
Since this time, the channel bottom has filled in with up to 4' of sand, possibly because the Manhan River is subject to a large fluctuation in water elevation & volume.

Scour will remain a "6", due to the potential of sand & silt getting flushed out.

Item 61.2 - Embankment Erosion
Channel has minor erosion along the up & downstream river embankments. **See Photo 16.**

Underwater Inspection Report dated 1/5/2022 stated:

The channel both upstream and downstream of the bridge has some undercutting of embankment tree roots.

Item 61.3 - Debris
Logs & debris are building up at upstream end & against Bent 3. **See Photo 17.**

Upstream Channel has dead trees leaning across the river.

Underwater Inspection Report dated 1/5/2022 stated:

Some tree limbs, up to 1' diameter, are scattered about the channel, and are partially buried in the sand.

Item 61.6 - Rip-Rap/Slope Protection
Channel has Rip-Rap in front of both abutments.

Rip-Rap is absent along the up & down stream embankments.

TRAFFIC SAFETY

Item 36a - Bridge Railing
Refer to Item 58.8. - Railing.

Item 36b - Transitions
Transition areas consist of a three strand steel cable system anchored to the concrete endposts on steel H-posts with steel offset blocks.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
EASTHAMPTON	0PQ	E-05-015	E05015-0PQ-MUN-NBI	DEC 11, 2024

REMARKS

Southwest Approach transition steel cables has impact damage and is sagging.

Northeast Approach transition has several loose cables.

Northwest Approach transition only has 2 cables.

Item 36c - Approach Guardrail
Approach guardrails consist of a three strand steel cable system on steel H-posts with steel offset blocks.

Southwest Approach:
- Guardrail has steel cables has impact damage and is sagging.
- Random posts have rust holes near ground surface. **See Photo 18.**
- Two posts & 2 offset blocks are out of plumb. **See Photo 19.**
- Three offset blocks are not connected to bottom cable.

Northeast Approach guardrail has sagging cables. One post has rust holes. **See Photo 20.**

Northwest Approach guardrail, middle cable is missing and the other cables are loose. Two posts have rusted with holes & lying on the ground.

Item 36d - Approach Guardrail Ends
All four approach guardrail ends have anchored end sections.

Northwest Approach guardrail end has moderate collision damage. **See Photo 7.**

Sketch / Chart / Photo Log

Sketch 1 :	Plan
Sketch 2 :	East Elevation
Sketch 3 :	Cross Section of Bent
Sketch 4 :	Longitudinal Section
Sketch 5 :	Plan Sketch from 1/5/2022 Underwater Inspection Report
Chart 1 :	Scour Monitoring Chart from 1/5/2022 Underwater Inspection Report
Photo 1 :	Wearing Surface has several HMA patches with an uneven profile.
Photo 2 :	Deck Underside, concrete around these drain pipes are delaminated with some having mortar patching.
Photo 3 :	Deck Underside, Span 1, has heavy efflorescence, rust staining & minor scaling. Center construction joint has a hollow area.
Photo 4 :	East concrete curbs has minor scaling and random vertical hairline cracks.
Photo 5 :	East top Concrete Railings have minor spall.
Photo 6 :	Northeast Concrete Endpost has been repaired.
Photo 7 :	North Approach roadway has multi-cracking with several HMA patches with uneven profile.
Photo 8 :	South Approach roadway has multi-cracking with several HMA patches with uneven profile.
Photo 9 :	Southeast Wingwall is spalled 3' long x 6" wide x 6" deep.
Photo 10 :	Bent 1 has deterioration.
Photo 11 :	Bent 1, Pile 1, has split 1/2" wide x 5" deep x up to 8" high.
Photo 12 :	Bent 4, Pile 4 is hollow.
Photo 13 :	Bent 2, Pile 1 at lower bolt, brace is split.
Photo 14 :	Bent 3, Pile 1, at lower bolt, the brace is split.
Photo 15 :	Bent 3, Pile 6, at lower bolt, the brace is split.
Photo 16 :	Northeast Embankment has erosion.

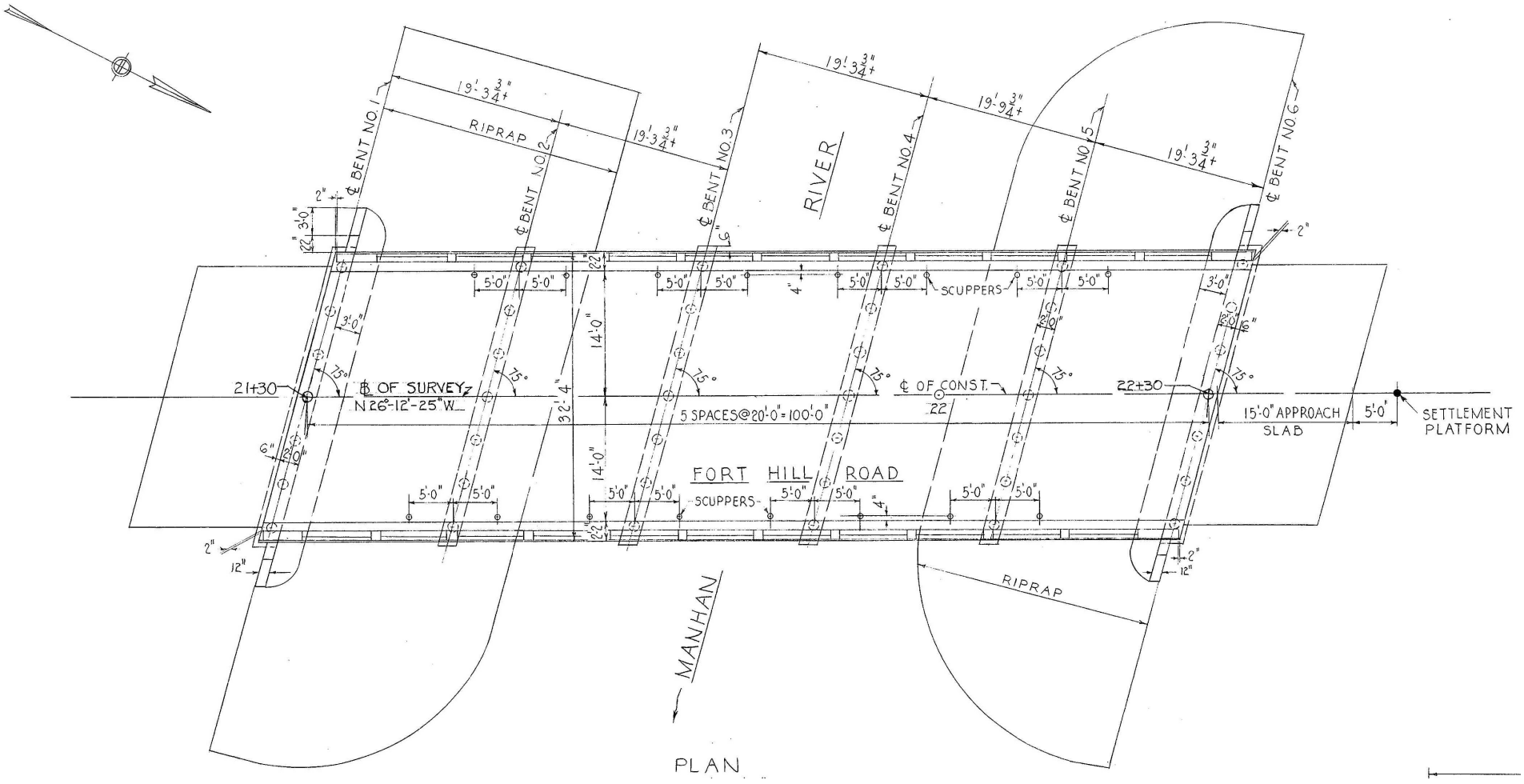
CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
EASTHAMPTON	**0PQ**	**E-05-015**	**E05015-0PQ-MUN-NBI**	**DEC 11, 2024**

REMARKS

Photo 17 : Logs built up against Bent 3.
Photo 18 : Southwest Approach guardrail post has hole in post at ground level.
Photo 19 : Southwest Approach has 2 blocks out of plum.
Photo 20 : Northeast Approach guardrail post has rust hole at ground level.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
EASTHAMPTON	0PQ	E-05-015	E05015-0PQ-MUN-NBI	DEC 11, 2024

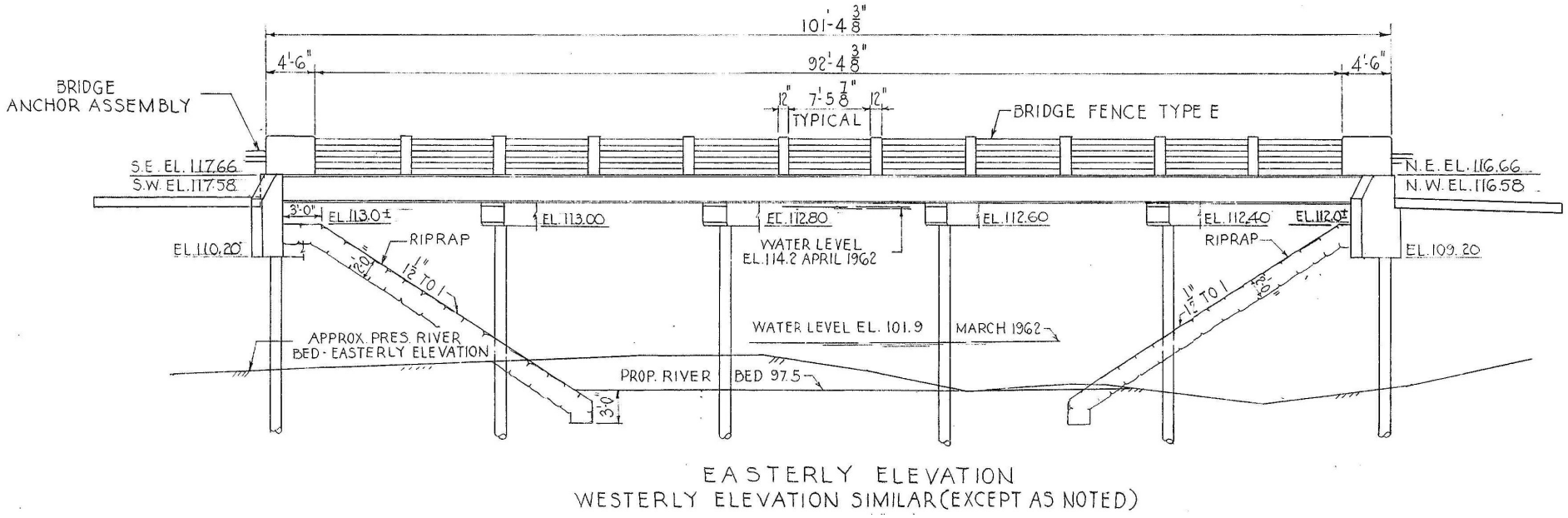
SKETCHES



Sketch 1: Plan

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
EASTHAMPTON	0PQ	E-05-015	E05015-0PQ-MUN-NBI	DEC 11, 2024

SKETCHES

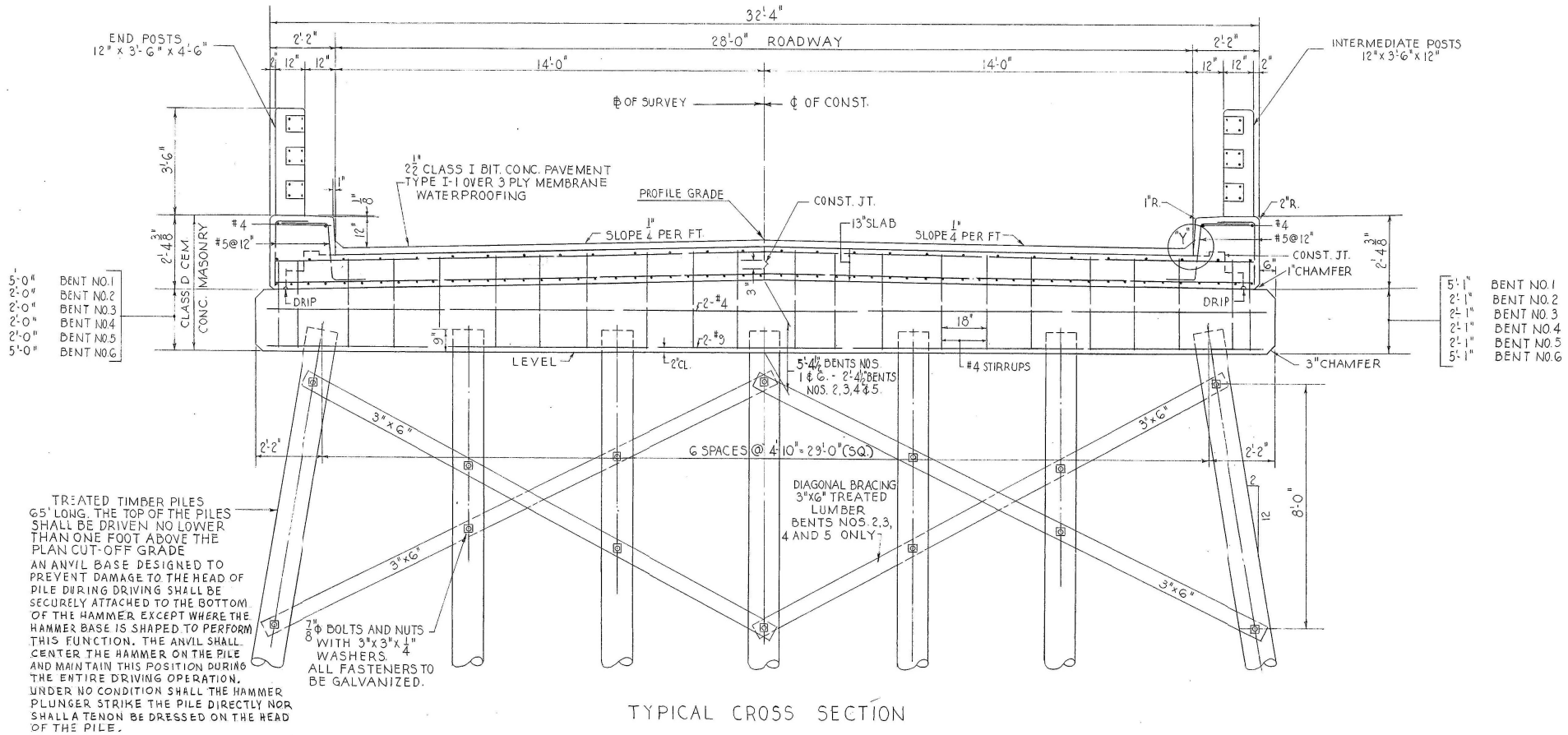


EASTERLY ELEVATION
WESTERLY ELEVATION SIMILAR (EXCEPT AS NOTED)

Sketch 2: East Elevation

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
EASTHAMPTON	**0PQ**	**E-05-015**	**E05015-0PQ-MUN-NBI**	**DEC 11, 2024**

SKETCHES

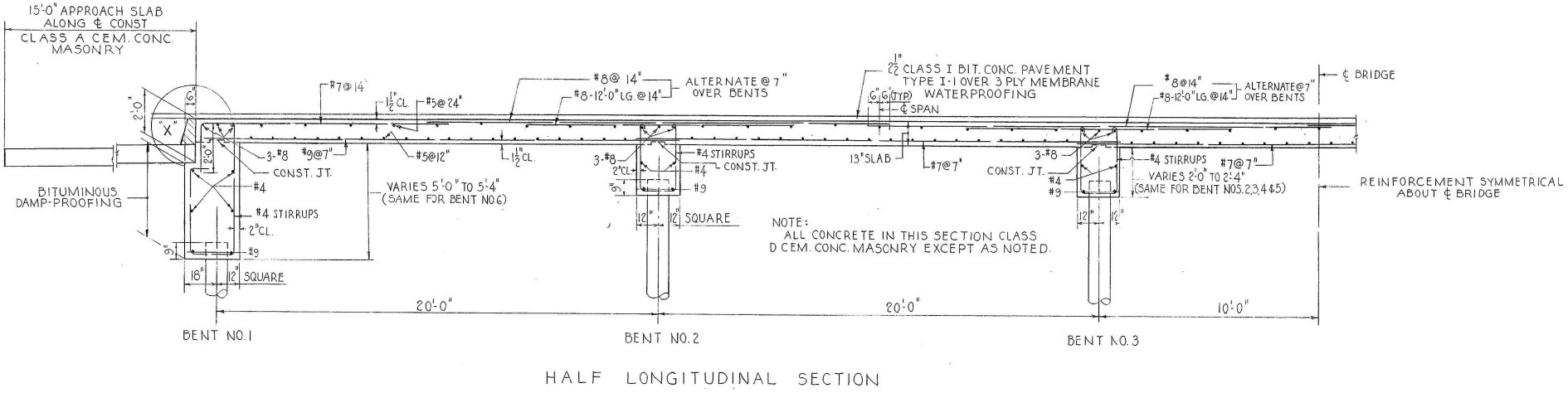


TYPICAL CROSS SECTION

Sketch 3: Cross Section of Bent

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
EASTHAMPTON	**0PQ**	**E-05-015**	**E05015-0PQ-MUN-NBI**	**DEC 11, 2024**

SKETCHES

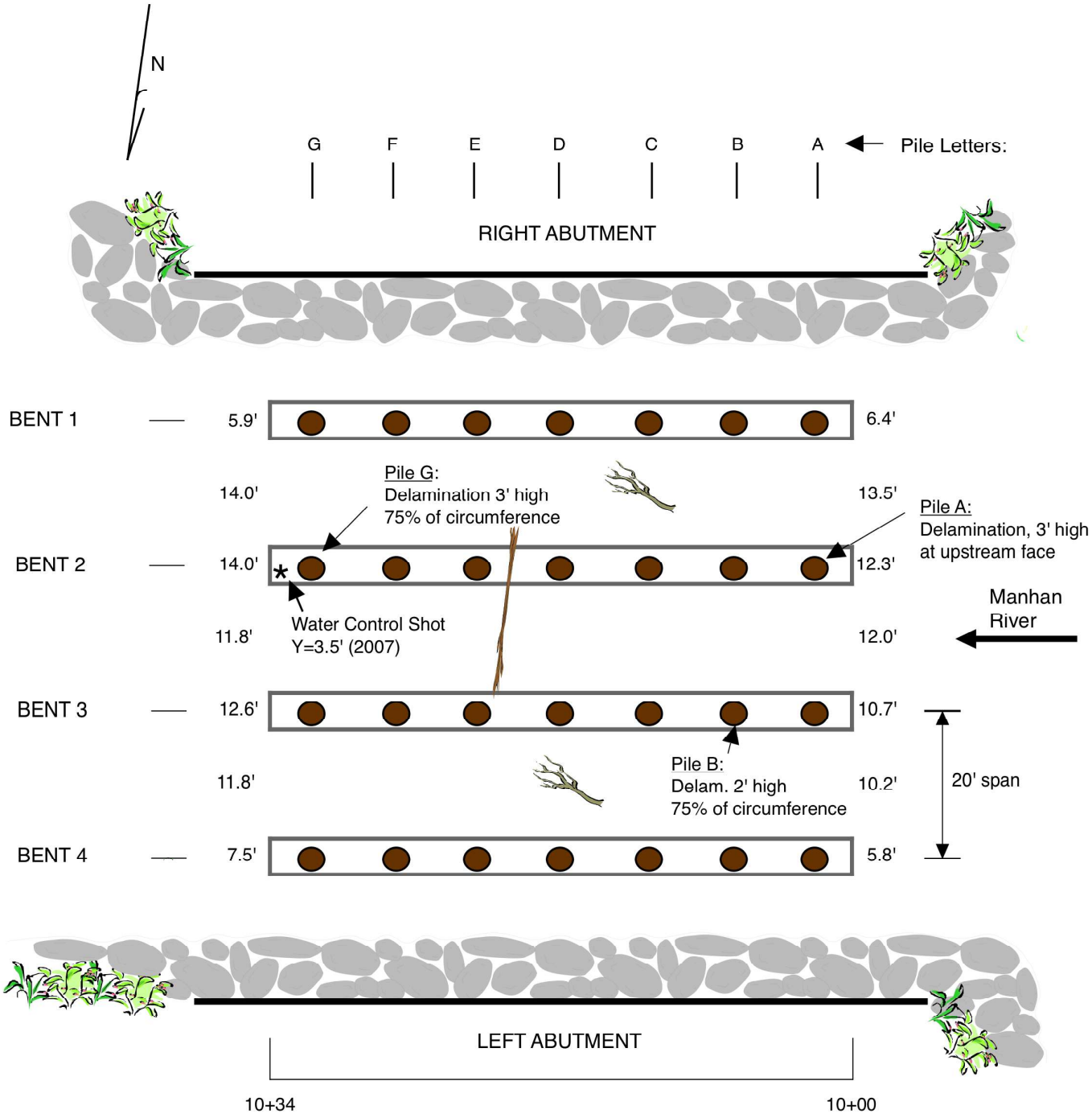


HALF LONGITUDINAL SECTION

Sketch 4: Longitudinal Section

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
EASTHAMPTON	0PQ	E-05-015	E05015-0PQ-MUN-NBI	DEC 11, 2024

SKETCHES



Notes:
Channel soundings are from the 03/29/07 UW Inspection.
All other measurements are current.

Plan Sketch
(NTS)

Sketch 5: Plan Sketch from 1/5/2022 Underwater Inspection Report

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
EASTHAMPTON	0PQ	E-05-015	E05015-0PQ-MUN-NBI	DEC 11, 2024

CHARTS

Scour Monitoring Chart
STA 10+00 (upstream) & STA 10+34 (downstream)

OFFSETS	3/29/07	12/23/09	12/11/12	12/10/15	12/5/18	1/5/22	
STA 10+00							
Bent 1 nose	6.4'	-	-	-	-	6.3'	
CL of Bents 1 & 2	13.5'	-	-	-	-	10.9'	
Bent 2 nose	12.3'	-	-	-	-	10.8'	
CL of Bents 2 & 3	12.0'	-	-	-	-	10.4'	
Bent 3 nose	10.7'	-	-	-	-	10.9'	
CL of Bents 3 & 4	10.2'	-	-	-	-	9.9'	
Bent 4 nose	5.8'	-	-	-	-	5.9'	
STA 10+34							
Bent 1 nose	5.9'	Dry	Dry	Dry	6.9'	6.3'	
CL of Bents 1 & 2	14.0'	14.9'	15.0'	11.6'	11.7'	11.8'	
Bent 2 nose	14.0'	14.9'	16.0'	11.8'	12.0'	10.9'	
CL of Bents 2 & 3	11.8'	13.6'	15.0'	10.6'	12.1'	11.5'	
Bent 3 nose	12.6'	15.5'	15.4'	10.7'	12.3'	14.3'	
CL of Bents 3 & 4	11.8'	11.9'	12.9'	9.9'	10.3'	12.4'	
Bent 4 nose	7.5'	7.7'	7.1'	7.0'	7.6'	7.2'	
Y	3.5'	11.2'	10.6'	11.5'	7.8'	10.4'	
Correction	-	+ 7.7'	+7.1'	+8.0'	+4.3'	+6.9'	

Notes:
1. Water control (Y) = downstream nose of Bent 2, underside of cap to water.
2. For comparison, all soundings are adjusted to the 03/29/07 water level.
3. Reference STA 10+00 is at the upstream end, and STA 10+34 is at the downstream end.

Chart 1: Scour Monitoring Chart from 1/5/2022 Underwater Inspection Report

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
EASTHAMPTON	0PQ	E-05-015	E05015-0PQ-MUN-NBI	DEC 11, 2024

PHOTOS

Photo 1: Wearing Surface has several HMA patches with an uneven profile.

Photo 2: Deck Underside, concrete around these drain pipes are delaminated with some having mortar patching.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
EASTHAMPTON	0PQ	E-05-015	E05015-0PQ-MUN-NBI	DEC 11, 2024

PHOTOS

Photo 3: Deck Underside, Span 1, has heavy efflorescence, rust staining & minor scaling. Center construction joint has a hollow area.

Photo 4: East concrete curbs has minor scaling and random vertical hairline cracks.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
EASTHAMPTON	0PQ	E-05-015	E05015-0PQ-MUN-NBI	DEC 11, 2024

PHOTOS

Photo 5: East top Concrete Railings have minor spall.

Photo 6: Northeast Concrete Endpost has been repaired.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
EASTHAMPTON	0PQ	E-05-015	E05015-0PQ-MUN-NBI	DEC 11, 2024

PHOTOS

Photo 7: North Approach roadway has multi-cracking with several HMA patches with uneven profile.

Photo 8: South Approach roadway has multi-cracking with several HMA patches with uneven profile.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
EASTHAMPTON	0PQ	E-05-015	E05015-0PQ-MUN-NBI	DEC 11, 2024

PHOTOS

Photo 9: Southeast Wingwall is spalled 3' long x 6" wide x 6" deep.

Photo 10: Bent 1 has deterioration.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
EASTHAMPTON	0PQ	E-05-015	E05015-0PQ-MUN-NBI	DEC 11, 2024

PHOTOS

Photo 11: Bent 1, Pile 1, has split 1/2" wide x 5" deep x up to 8" high.

Photo 12: Bent 4, Pile 4 is hollow.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
EASTHAMPTON	0PQ	E-05-015	E05015-0PQ-MUN-NBI	DEC 11, 2024

PHOTOS

Photo 13: Bent 2, Pile 1 at lower bolt, brace is split.

Photo 14: Bent 3, Pile 1, at lower bolt, the brace is split.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
EASTHAMPTON	0PQ	E-05-015	E05015-0PQ-MUN-NBI	DEC 11, 2024

PHOTOS

Photo 15: Bent 3, Pile 6, at lower bolt, the brace is split.

Photo 16: Northeast Embankment has erosion.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
EASTHAMPTON	0PQ	E-05-015	E05015-0PQ-MUN-NBI	DEC 11, 2024

PHOTOS

Photo 17: Logs built up against Bent 3.

Photo 18: Southwest Approach guardrail post has hole in post at ground level.

CITY/TOWN	B.I.N.	BR. DEPT. NO.	8.-STRUCTURE NO.	INSPECTION DATE
EASTHAMPTON	0PQ	E-05-015	E05015-0PQ-MUN-NBI	DEC 11, 2024

PHOTOS

Photo 19: Southwest Approach has 2 blocks out of plum.

Photo 20: Northeast Approach guardrail post has rust hole at ground level.

APPENDIX D

Pavement Evaluation Report

Fort Hill Road in Easthampton, MA

(East St. to Clapp St.)

Pavement Evaluation Report

November 8th, 2025

PREPARED FOR:
(DISTRIBUTION VIA EMAIL)
KIM ARMSTRONG, P.E.
SENIOR BRIDGE ENGINEER
MCCLURE
25 New Hampshire Ave,
Suite 255 | Portsmouth, NH 03801
|d| (603) 956-9121
|o| (603) 766-0435
|c| (603) 799-1864
karmstrong@mcclurevision.com

PREPARED BY:
Roger Fernandes (NETTCP PT, PI, SAI, QAT), MCPPO
Director of Roadway, Bridge, Utility & Transportation Infrastructure Services
FERN CEM CORP
PO Box 279
Raynham Center, Ma 02768
|o| (857) 227-0246
|c| (781) 353-8555
roger@fern-corp.com

SUPPLIER DIVERSITY OFFICE CERTIFIED
SDO Client ID: 20210072
mass.gov/sdo

www.fern-corp.com

Contents

INTRODUCTION

FERN CORP, in coordination with **McClure Engineering of Portsmouth, New Hampshire**, performed a pavement and subsurface evaluation along **Fort Hill Road in Easthampton, Massachusetts**. This investigation was commissioned to assess existing pavement and subbase conditions, identify material variability, and provide recommendations to guide roadway rehabilitation and reconstruction planning.

The study area extends approximately **3,590 linear feet**, from **East Street** (southern limit) to **Clapp Street** (northern limit). Fort Hill Road functions as a **local collector** within the Town's roadway hierarchy, serving residential neighborhoods, institutional facilities, and connecting traffic between local and arterial routes. Although not a designated truck route, the corridor accommodates a mixture of passenger vehicles, school and municipal buses, and periodic service vehicles that impose both light and moderate axle loads throughout the year.

FERN CORP's field investigation was conducted on **October 25, 2025**, and included the extraction of representative pavement cores, visual inspections, and limited soil sampling to characterize the in-situ materials. All boreholes were patched following sampling, and each core was photographed, logged, and measured in the field. Laboratory testing was then performed to classify the underlying soils and evaluate gradation and conformance with applicable MassDOT standards.

The primary objectives of this evaluation were to:

- Characterize pavement structure and layer composition;
- Assess drainage characteristics and frost susceptibility of the subgrade;
- Quantify variability in material type and thickness;
- Evaluate the applicability of industry standards, emerging technologies, and construction equipment capabilities or limitations relevant to pavement restoration; and
- Support the selection of suitable rehabilitation and reconstruction strategies based on anticipated traffic loading and long-term maintainability.

The results summarized herein consolidate field observations, laboratory analyses, and engineering interpretation to establish a practical understanding of existing roadway conditions. These findings are intended to complement McClure Engineering's design development efforts by providing verified field data and context for design decisions. Final pavement design details, including layer thicknesses, milling depths, and drainage provisions—will be determined by the Engineer of Record (McClure Engineering) during subsequent stages of design.

Project Limits

The **Fort Hill Road pavement evaluation** encompasses the full roadway segment between **East Street** (southern limit) and **Clapp Street** (northern limit) within the Town of Easthampton, Massachusetts—a total length of approximately **3,590 linear feet**.

This corridor serves as a **local collector roadway**, connecting residential and institutional areas to the broader arterial network, including Route 10 and other adjoining streets. The roadway alignment traverses rolling terrain, characterized by shallow roadside swales and localized depressions, particularly near the ponded area north of East Street.

Field observations and resident feedback indicate that sections of Fort Hill Road experience periodic flooding and surface ponding during seasonal storms, which contribute to accelerated deterioration at the edges and along low points. Edge-of-pavement drainage is primarily governed by cross-slope and the shallow ditches, as the corridor lacks closed drainage infrastructure or curb systems.

For the purpose of this evaluation, the project limits define the continuous segment of Fort Hill Road from station 0+00 at East Street to station 35+90 at Clapp Street. Within these limits, conditions were observed to be relatively uniform in geometry but variable in pavement thickness, subbase quality, and drainage performance.

These limits establish the basis for all coring, sampling, and visual inspection activities described in this report.

Scope of Work

FERN CORP's work program—developed in coordination with **McClure Engineering**—was designed to evaluate the structural composition and condition of the existing pavement system along Fort Hill Road and to identify limited subsurface characteristics influencing roadway performance and rehabilitation feasibility.

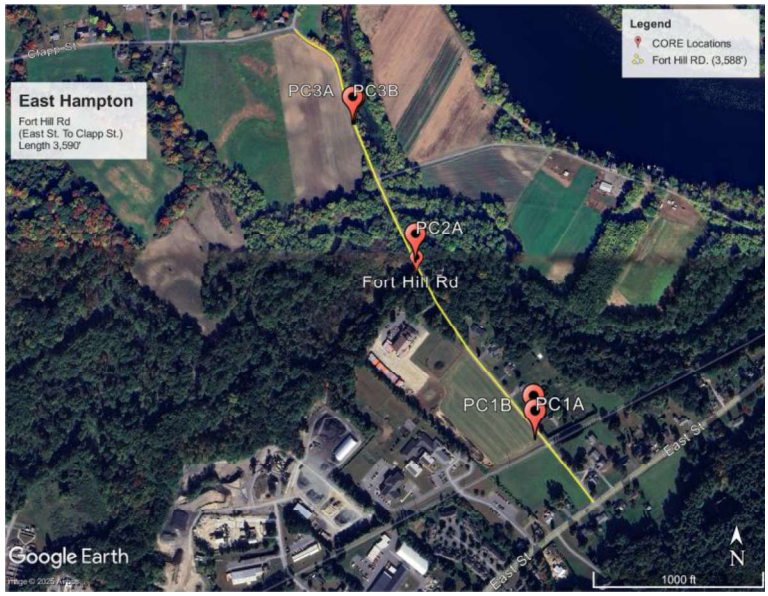
The field and laboratory program included:

- **Extraction of asphalt pavement cores** at representative locations along the corridor to document layer thicknesses, bonding, and material composition;
- **Subbase soil sampling** at select core locations for laboratory classification and sieve gradation testing;
- **Visual surface condition assessment**, including identification of cracking patterns, drainage deficiencies, and edge deterioration; and
- **Engineering analysis and interpretation** of results to inform restoration strategy development and alignment with municipal and MassDOT standards.

Sampling locations were selected in coordination with McClure to capture representative conditions across both travel lanes and shoulders, as well as areas exhibiting visible distress or poor drainage. Each location was photographed and logged in the field, and all boreholes were backfilled with cold patch material compacted flush to grade.

Laboratory analyses were performed to determine grain-size distribution, classify materials and evaluate compliance with MassDOT M1.03.0 Type B Gravel Borrow gradation limits.

Sample Locations



Purpose of Report

This report consolidates findings from field sampling, laboratory testing, and visual surface evaluations to provide an integrated understanding of the existing pavement and subbase conditions along Fort Hill Road in Easthampton, Massachusetts.

The purpose of this document is to establish a data-supported framework for planning roadway rehabilitation and reconstruction, providing McClure Engineering with the information necessary to make informed design decisions regarding pavement structure, drainage, and long-term maintainability.

The report identifies spatial variations in pavement thickness, subbase composition, and material performance, and outlines practical restoration strategies aligned with MassDOT standards, municipal maintenance objectives, and constructability considerations. It also considers the influence of industry standards, current technologies, and construction equipment capabilities or constraints on feasible rehabilitation methods.

This document is not a final design package. Final decisions regarding pavement thickness, milling depths, drainage improvements, and staging details will be determined by the Engineer of Record (McClure Engineering) during design development and subsequent construction phases.

FIELD INVESTIGATION / SAMPLING PLAN

Field Program Overview

FERN CORP conducted a detailed field investigation along **Fort Hill Road** on **October 25, 2025**, under the direction of **McClure Engineering**. The program included **pavement coring, subbase soil sampling, and a visual surface condition assessment** to characterize pavement structure, material variability, and drainage behavior throughout the approximately 3,590-foot corridor.

A total of **five (5) pavement cores** and **three (3) subbase soil samples** were obtained at representative locations selected jointly by FERN CORP and McClure. Core sites were chosen to capture both typical and distressed areas—including mid-block segments, edges, and low points—to provide a complete cross-sectional understanding of the pavement system.
All boreholes were backfilled with **hot-mix asphalt patch material** and compacted flush to grade immediately after sampling to maintain traffic safety and roadway integrity.

Sampling and documentation were performed in accordance with **FERN CORP's standard procedures for pavement and subsurface investigation**, ensuring consistency with **MassDOT and AASHTO testing practices**.

Field data collected at each location included:

- Pavement layer thicknesses and composition;
- Layer bonding and visible voids or delamination;
- Subbase type and moisture condition; and
- Surface distress observations correlated to FHWA distress categories.

Each core and soil sample was photographed, labeled, and logged on site. Approximate GPS coordinates were recorded and referenced in a companion **KMZ file** provided under separate cover.

Pavement Coring

The pavement coring program was designed to obtain representative cross-sections under varying loading and environmental conditions.

Cores were extracted using a 6-inch-diameter wet coring barrel, allowing for clear layer differentiation and minimizing disturbance. Pavement thickness was measured to the nearest ⅛ inch, and layer composition was recorded by type—typically wearing course, binder/intermediate, base/asphaltic materials (where present) and subbase soil materials.

Coring confirmed **significant variation in pavement thickness** along the corridor, generally ranging between **1 ½ inches and 2 ½ inches**, with multiple zones lacking intermediate layers. Observed conditions included **fatigue cracking**, and surface patching and age-related deterioration.

Representative core photographs and detailed measurements are presented in the **Technical Summary of Pavement Core Results** section of this report.

Subbase Soil Sampling

In addition to pavement coring, **three (3) subbase soil samples** were collected from locations where full-depth access was achievable.

Sampling extended below the asphalt layer into the **granular subbase immediately beneath the pavement structure**. Samples were classified visually in the field, sealed in labeled containers, and delivered to the laboratory for testing in accordance with:

- **AASHTO T 27 –** *Sieve Analysis of Fine and Coarse Aggregates*
- **AASHTO T 11 –** *Material Finer than 75 µm (No. 200) Sieve by Washing*

Laboratory analysis determined **grain-size distribution, fines content, and compliance with MassDOT M1.03.0 Type B Gravel Borrow** specifications.

The results—summarized later under *Technical Soils Laboratory Results*—provide the basis for evaluating the subbase's structural suitability, drainage capacity, and reuse potential as part of future reconstruction.

REPORT TERMINOLOGY — Terms & Definitions

- **Subbase |** Compacted granular layer **above subgrade** and **below base**; distributes loads, improves drainage, adds stability. | *Crushed stone/gravel typical.*
- **Subgrade |** Native/prepared soil **supporting the pavement system**; strength and compaction govern performance/longevity. | *Foundation layer.*
- **Base (Base Course) |** Layer between subbase and surface; provides strength/stiffness/load distribution.
    - **Aggregate Base |** Crushed stone/gravel compacted to dense, load-bearing layer.
    - **Asphalt-Treated Base (ATB) |** Aggregate with small asphalt binder addition for stability/durability.
    - **Stabilized Base |** Aggregate base improved with cement/lime or similar stabilizers.
    - **Macadam Construction |** Successive compacted stone layers bound with hot tar/asphalt; voids filled; rolled.
    - **Cold Mix |** Emulsified/cutback asphalt mix placed at lower temps; common for patching/temporary use.
    - **Tarmacadam (Tarmac) |** Bituminous macadam (aggregate + bitumen); essentially hot-mix asphalt surface (UK/IE usage).
- **Good Interlayer Bond |** Adequate adhesion between lifts ensuring composite action and even load transfer; reduces slippage/delamination.
- **No Signs of Distress |** No notable defects (cracking, potholes, rutting, raveling) at time of observation.
- **Bus Traffic / Bus Route |** Repeated heavy axles with frequent braking/turning and dwell; elevates shear demand in curb lanes/intersections.
- **ESAL | Equivalent Single Axle Load |** Cumulative traffic loading normalized to an **18-kip (80 kN)** single axle; basis for pavement design (≈20-yr).
- **HMA | Hot-Mix Asphalt |** Asphalt binder + graded aggregates placed hot; includes base, intermediate, wearing lifts.
- **Wearing Course |** Top HMA lift; **12.5 mm** nominal; provides texture, friction, weathering resistance.
- **Intermediate Course |** Structural HMA below wearing; commonly **19.0 mm**; carries shear/stress and builds thickness.
- **Base Course (HMA) |** Lower structural HMA lift(s); often **19.0–25.0 mm** to reach design totals.
- **PG64E-28 |** Performance-grade, **polymer-modified** binder for **extremely heavy** traffic (AASHTO M332); +64 °C/−28 °C.
- **PG64-28 |** Standard performance-grade binder (no "E" traffic level); +64 °C/−28 °C climatic grade.
- **RAP | Reclaimed Asphalt Pavement |** Milled/pulverized asphalt concrete reused in base or mixes.
- **FDR | Full-Depth Reclamation |** In-place pulverization/blending of asphalt + upper subbase to create a reclaimed base (**no stabilizer** in this project).

- **Reclaimed Base | Crushed asphalt + in-situ granular soils**; compacted and trimmed prior to new HMA.
- **Asphalt-Rich (Reclaimed) Layer |** Reclaimed layer with **excess aged binder**; prone to **slippage, rutting, poor bonding**. Mitigate via granular blending and removal of excess material.
- **Box-Out / Trimming | Post-reclamation** removal to fit design section (final grades/HMA totals).
- **Two-Stage Milling |** Milling in two passes; used where legacy asphalt **> ~8″** to maintain grade/smoothness.
- **SAMI (Paving Fabric) | Stress-Absorbing Membrane Interlayer**; asphalt-saturated geotextile placed between existing surface and overlay to **delay reflective cracking** *(MassDOT Item 464.50)*.
- **Tack Coat |** Bonding asphalt emulsion ensuring adhesion between existing surface/SAMI and new HMA lifts.
- **Reflective Cracking |** Cracks propagating from underlying joints/layers; common over concrete; mitigated by **SAMI** or saw-and-seal.
- **PCC | Portland Cement Concrete |** Rigid concrete slab/layer; reclaimer cannot pulverize; mill/remove or bridge with SAMI.
- **CDF / Flowable Fill |** Controlled-density, self-leveling backfill; frequent in utility trenches.
- **DGB | Dense-Graded Base |** Well-graded crushed aggregate with good interlock and drainage.
- **USCS | Unified Soil Classification System |** Soil classes (e.g., **SW, SP, GW-GM**) based on gradation/plasticity.
- **AASHTO Soil Group |** M145 roadway soil groups (e.g., **A-1-a** granular/free-draining to **A-7** clayey).
- **Granite Curb Reveal |** Exposed curb height above gutter; must be preserved through milling/reclamation.
- **Cross-Slope |** Transverse slope for drainage; often **1.5–2.0%** on urban streets.
- **IRI | International Roughness Index |** Smoothness metric (m/km or in/mi); lower = smoother.
- **Rutting |** Permanent wheelpath depressions from shear deformation; mitigated by **PG64E-28** and adequate thickness.
- **Slippage |** Lateral movement of HMA over weak/asphalt-rich or poorly bonded layers under braking/turning loads.

CORRIDOR DESCRIPTION

Segment Limits

The evaluated segment of **Fort Hill Road** extends approximately **3,590 linear feet** from **East Street** at the south limit to **Clapp Street** at the north limit. The roadway generally follows a north–south alignment with gentle vertical curvature and variable cross-slopes ranging from 1.5 to 2 percent. The corridor lies within a mixed residential and open-space area of Easthampton, connecting neighborhood streets and recreational destinations to the regional network.

Setting & Function

Fort Hill Road functions as a **local collector** that provides access to residential properties, municipal facilities, and local parks while serving as a feeder route to the East Street/Route 10 corridor. Daily use is dominated by passenger vehicles with intermittent bus and municipal truck traffic. The roadway typically consists of **two narrow travel lanes** (≈ 10–11 ft each) with **minimal or no defined shoulders**, lacking curbing or formal bicycle accommodations. Although not striped for bike use, the corridor is occasionally used by **recreational cyclists and pedestrians** accessing nearby conservation areas and community recreation fields. The absence of continuous sidewalks or bike lanes constrains multimodal mobility and highlights the need for improved edge definition and drainage in future design phases.

Drainage & Edge Conditions

Drainage is achieved primarily through **sheet flow and shallow roadside swales**. There is **no closed drainage system**, and runoff generally follows natural ground contours toward vegetated ditches or driveway outlets. Several locations—particularly near the **northerly ponded low area approaching Clapp Street**—exhibit **standing water and surface softening** after rainfall events. Residents have **anecdotally reported intermittent flooding and slow drainage** in this vicinity, though direct evidence of persistent groundwater issues was not observed during fieldwork. Additional hydrologic evaluation may be warranted if reconstruction activities alter existing grades or introduce new drainage structures.

Traffic Context and Pavement Performance

Traffic volumes are moderate and primarily residential, estimated at **under 5,000 vehicles per day**, with heavier loading from school and municipal buses during peak hours. The combination of **repeated freeze-thaw cycles, inadequate subsurface drainage, and limited structural thickness** has produced widespread alligator cracking, raveling, and edge failures. Observed distress patterns are consistent with **end-of-life flexible-pavement behavior**, where cumulative environmental and loading stresses exceed the pavement's structural capacity.

Summary of Corridor Characteristics

Attribute	*Description*
Location	Fort Hill Road — East Street to Clapp Street (Easthampton MA)
Functional Class	Local Collector
Land Use Context	Residential and open-space corridor with limited sidewalks and recreational use
Drainage Type	Open swales and sheet flow; no closed system
Utilities	Standard municipal services; limited trench influence observed

Recreational Use	Occasional bicycle and pedestrian activity connecting to nearby parks and trails
Environmental Sensitivity	Ponded low area near Clapp Street; potential seasonal flooding
Dominant Distress Types	Fatigue/alligator cracking, oxidation, edge unraveling, and drainage-related distress
Indicative Structural Condition	Pavement at or beyond design life; structural rehabilitation required

TRAFFIC VOLUMES, LOADING, AND DESIGN CONSIDERATIONS

Traffic Volumes & Vehicle Mix

Traffic along **Fort Hill Road** is characteristic of a **local collector roadway** serving primarily residential and institutional users. Average daily traffic (ADT) is estimated in the range of **3,000–5,000 vehicles per day (vpd)**, based on typical volumes observed on comparable local collectors in Easthampton and neighboring municipalities.
The vehicle mix is dominated by passenger cars and light trucks, with **1–2 percent heavy vehicles**, primarily consisting of **school buses, municipal service trucks, and local delivery vehicles**. These heavier axles, while limited in frequency, represent a disproportionately large share of cumulative pavement loading and contribute to distress observed near intersections, drive aprons, and turning radii.

No regional transit service (e.g., PVTA or MBTA routes) operates along this corridor. However, **school and municipal buses** regularly travel the route during peak hours, introducing localized wheelpath stresses typical of stop-and-turn operations.

Design Note

Unlike older urban corridors with legacy transit infrastructure, **Fort Hill Road shows no evidence of buried rail, concrete base panels, or other rigid inclusions**. The existing structure appears to be a traditional flexible pavement system constructed over a granular subbase. This simplifies rehabilitation design and improves compatibility with full-depth reclamation or structural mill-and-overlay options.

Estimated ESALs (Planning Basis)

To support planning-level structural evaluation, an order-of-magnitude **Equivalent Single Axle Load (ESAL)** estimate was developed using the above traffic range and a typical local collector vehicle mix (≈ 95% cars, 4% single-unit trucks, 1% combination trucks or buses).
Using standard AASHTO equivalency factors (passenger car = 0.0004 ESAL, single-unit truck = 0.4 ESAL, combination truck or bus = 0.8 ESAL), the resulting structural demand is estimated at:

- **Low Estimate:** ≈ 150 ESALs/day (≈ 55,000 ESALs/year)
- **High Estimate:** ≈ 300 ESALs/day (≈ 110,000 ESALs/year)

Over a **20-year design life**, this equates to roughly **1.0–2.0 million ESALs**, consistent with a **light-to-moderate duty local collector**.

These estimates are intended for **planning and comparative design only**. Final design ESALs may be verified by McClure Engineering (*although probably not necessary for this typical of roadway*) once local traffic count and classification data are obtained and adjusted for growth, lane distribution, and reliability per current AASHTO design standards.

SUMMARY OF PAVEMENT CORE RESULTS & SUBBASE CONDITIONS

Five (5) pavement cores—designated **PC-1A, PC-1B, PC-2A, PC-3A, and PC-3B**—were obtained along **Fort Hill Road** on **October 25, 2025**. Each pair of cores (1A/1B and 3A/3B) was collected within the same section to verify cross-sectional uniformity and to characterize both travel-lane and shoulder conditions.

Measured pavement thicknesses ranged from **1.0 inch to 2.5 inches**. None of the locations included an identifiable intermediate or base lift. All cores exhibited **top- and bottom-up cracking, oxidation, raveling, and interlayer bonding is not a consideration here, sense there is no intermediate course at any of the sample locations.** Subbase materials consist primarily of **gravelly sands (SW, A-1-a)** and **asphalt-rich reclaimed borrow**, generally free-draining but insufficient in thickness and density to provide structural support.

Core ID	Approx. Offset (Facing Clapp St.)	Pavement Thickness (in.)	Subbase Type / Classification	Key Observations	Trends / Comments
PC-1A	4 ft off right edge	1.0	Gravelly Sand (SW, A-1-a)	Very thin 9.5 mm mix with 3/8″ aggregate; severe fatigue and edge cracking; voids in wearing surface; no intermediate lift.	Represents original section; high oxidation and brittleness; structurally inadequate even for light traffic.
PC-1B	At crown	2.0	Gravelly Sand (SW)	Similar composition to PC-1A; no intermediate lift; top- and bottom-up cracks with surface raveling.	Thickness still below minimum design criteria; cracking extends through entire section.
PC-2A	8 ft off left edge	1.0	Silty Gravel (GM, A-1-a)	Heavy fatigue cracking; thin skim coat overlay on prior failure; moist base material.	Weakest measured section; subbase does not meet MassDOT Type B requirements; extremely low load-bearing capacity.
PC-3A	5 ft off right edge	2.5	Asphalt-rich Reclaimed Borrow / Millings	High fatigue and random cracking; asphalt-rich base retains moisture; no intermediate layer.	Moisture-sensitive section near ponded low area; instability and shear susceptibility expected under traffic.
PC-3B	4 ft off left edge	1.5	Asphalt-rich Reclaimed Borrow / Millings	Severe fatigue and edge cracking; delamination; high moisture content.	Confirms limited structural capacity across north section; subbase saturation and frost action major contributors to failure.

Key Findings

- **Pavement thicknesses** (1.0–2.5 in.) are well below MassDOT's/Industry minimum structural design requirements for any collector or residential roadway classification.
- **No intermediate or base courses** were present in any of the cores, indicating that the roadway has functioned primarily as a single wearing surface over granular material.
- The **lack of structural thickness** is the principal cause of the observed cracking, fatigue, and deformation throughout the corridor.
- Existing surface cracks are likely allowing **water infiltration into the subbase**, which can promote secondary frost-related movement and further accelerate deterioration.
- While subbase materials appear generally free-draining, their limited thickness and exposure to infiltrating moisture will contribute to **progressive degradation under repeated freeze–thaw and traffic loading.**
- At its current condition, the pavement system is **expected to deteriorate rapidly**, even under light vehicular demand, and warrants **complete structural reconstruction or full-depth reclamation** rather than surface maintenance or overlay.

SOILS LABORATORY RESULTS SUMMARY

Three (3) representative sub-base soil samples—designated **S-1**, **S-2**, and **S-3**—were collected during the Fort Hill Road field investigation to characterize the underlying granular material and evaluate its suitability as structural support for future pavement reconstruction. Testing was performed in a materials laboratory in accordance with **AASHTO T 27** (*Sieve Analysis of Fine and Coarse Aggregates*) and **AASHTO T 11** (*Material Finer than 75 µm [No. 200] Sieve by Washing*). Each sample was classified under the **Unified Soil Classification System (USCS)** and **AASHTO M 145** soil-group system to determine compliance with **MassDOT M1.03.0 Type B Gravel Borrow** requirements.

Sample ID	Core Reference / Location	USCS Classification	AASHTO Group	% Passing No. 200	Plasticity Index (PI)	Drainage Characteristics	MassDOT M1.03.0 Type B Conformance	Remarks / Observations
S-1	PC-1A / Right shoulder near East St.	Gravelly Sand (SW)	A-1-a	8.5 %	NP (visual)	Free-draining	**Conforming**	Coarse, well-graded sand with small gravel; suitable structural fill.
S-2	PC-2A / Mid-corridor 8 ft off left edge	Silty Gravel (GM)	A-1-a	11.2 %	NP (visual)	Moderately free-draining	**Marginal** (fines > 10 %)	Slightly elevated fine content; adequate drainage when blended with coarse aggregate.
S-3	PC-3A / North section near ponded area	Asphalt-rich Reclaimed Borrow / Millings (GM–SW)	A-1-b	13.4 %	NP (visual)	Moderately free-draining	**Non-conforming** (fines > 10 %)	Contains reclaimed asphalt particles; elevated binder content; may require blending or replacement.

Sieve Analysis and Spec Comparison — Sample 1A

Project: Fort Hill Road, Easthampton **Loc.:** Core 1 (4' off Rt. shoulder) **Date:** 11/01/25
Tested by: Jose Beard, E.I.T. **Methods:** AASHTO T 27, T 11, T 255
Material: Soil (Roadway subbase)

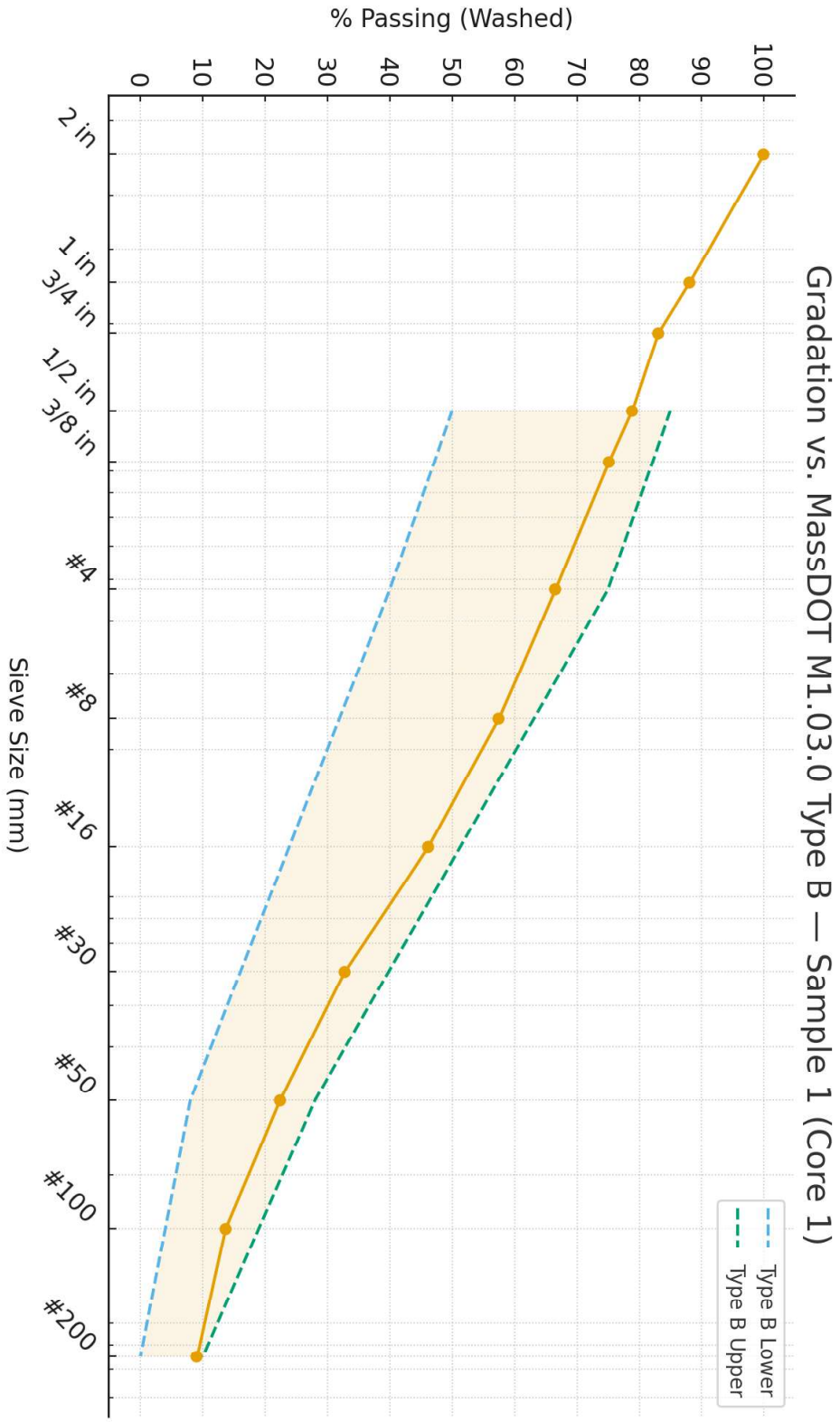
Sieve Size	% Passing (Washed)	MassDOT M1.03.0 Type B % Passing	Within Spec
2 in (50 mm)	100.0	— (not specified)	—
1 in (25 mm)	88.1	—	—
3/4 in (19 mm)	83.1	—	—
1/2 in (12.5 mm)	**78.9**	**50–85**	✅
3/8 in (9.5 mm)	75.2	—	—
#4 (4.75 mm)	**66.6**	**40–75**	✅
#8 (2.36 mm)	57.5	—	—
#16 (1.18 mm)	46.2	—	—
#30 (600 µm)	32.8	—	—
#50 (300 µm)	**22.4**	**8–28**	✅
#100 (150 µm)	13.7	—	—
#200 (75 µm)	**9.1**	**0–10**	✅

Moisture & Fines

- Total Moisture (T 255): **8.9 %**
- Material finer than #200 (T 11): **8.4 %** (≤ 10 %)

Interpretation (Sample 1)

- Meets **all four** Type B control sieves (½", #4, #50, #200).
- Max particle size clearly < 3", so size cap is satisfied.
- **Conclusion: Compliant** with MassDOT **M1.03.0 Type B**.


Gradation vs. MassDOT M1.03.0 Type B — Sample 1 (Core 1)
% Passing (Washed)
0
10
20
30
40
50
60
70
80
90
100
Sieve Size (mm)
2 in
1 in
3/4 in
1/2 in
3/8 in
#4
#8
#16
#30
#50
#100
#200
Type B Lower
Type B Upper

Sieve Analysis and Spec Comparison — Sample 2A

Project: Fort Hill Road, Easthampton **Loc.:** Core 2 (8' off Lt. shoulder) **Date:** 11/01/25
Tested by: Jose Beard, E.I.T. **Methods:** AASHTO T 27, T 11, T 255
Material: Soil (Roadway subbase)

Sieve Size	% Passing (Washed)	MassDOT M1.03.0 Type B % Passing	Within Spec
2 in (50 mm)	100.0	— (not specified)	—
1 in (25 mm)	98.1	—	—
3/4 in (19 mm)	94.7	—	—
1/2 in (12.5 mm)	**90.1**	**50–85**	❌ Above
3/8 in (9.5 mm)	86.7	—	—
#4 (4.75 mm)	**76.6**	**40–75**	❌ Slightly above
#8 (2.36 mm)	67.4	—	—
#16 (1.18 mm)	55.6	—	—
#30 (600 µm)	38.3	—	—
#50 (300 µm)	**22.0**	**8–28**	✅
#100 (150 µm)	**12.6**	—	—
#200 (75 µm)	**8.5**	**0–10**	✅

Moisture & Fines

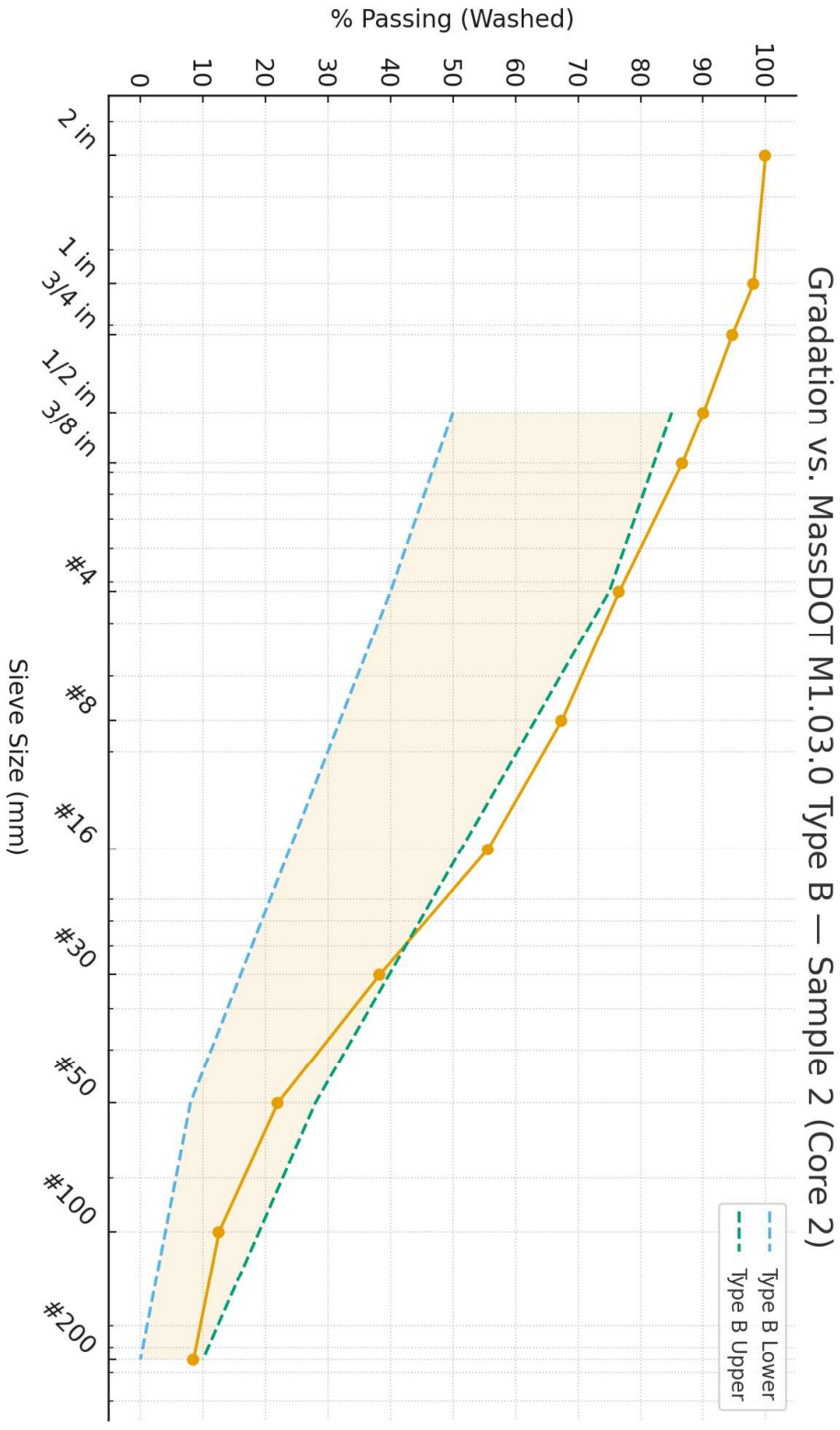
- Total Moisture (T 255): **7.4 %**
- Material finer than #200 (T 11): **6.8 %** (≤ 10 %)

Interpretation (Sample 2)

- **½" and #4 exceed** the upper Type B limits (material is slightly too fine in the coarse-sand/small-gravel range).
- #50 and #200 pass; max size < 3" is satisfied.
- **Conclusion: Not fully compliant** with **M1.03.0 Type B** due to **½" and #4**. Recommend **blending with coarser gravel** to lower % passing at ½" and #4, then recheck gradation.

Notes

- MassDOT's Type B gradation controls only **four sieves** (½", #4, #50, #200) and sets a **3" max stone size**; other sieves shown are informational only for your samples


Gradation vs. MassDOT M1.03.0 Type B — Sample 2 (Core 2)
% Passing (Washed)
0
10
20
30
40
50
60
70
80
90
100
Sieve Size (mm)
2 in
1 in
3/4 in
1/2 in
3/8 in
#4
#8
#16
#30
#50
#100
#200
Type B Lower
Type B Upper

AASHTO Classification: A-1-a / A-2-4 borderline
(Predominantly A-1-a)

Summary Table

Sample	% Passing #200	Approx % Passing #40	Plasticity	AASHTO Group	Remarks
1 – Core	9.1 %	~28 %	NP	A-1-a	Clean, well-graded gravelly sand with low fines
2 – Core	8.5 %	~38 %	NP	A-1-b	Slightly finer fraction, still good borrow quality

Interpretation

The tested materials are **predominantly granular**, non-plastic, and capable of moderate drainage.

- **S-1** represents the most desirable condition—well-graded, clean, and fully conforming to Type B Gravel Borrow.
- **S-2** contains slightly more fines but remains serviceable if blended with coarser aggregate.
- **S-3** shows evidence of **asphalt-rich reclaimed material**, which reduces internal friction and may trap moisture if reused without correction.

Overall, the samples confirm that the existing sub-base is **coarse and largely free-draining**, though not uniformly compliant with MassDOT gradation limits. No significant clay or plastic fines were detected, supporting favorable frost-resistance potential once reconstructed with adequate thickness and cross-slope.

Sample 3A – Core Location 3 (RAP/Millings)
Test Type: HMA Asphalt Content and Extracted Aggregate Gradation
Test Methods: AASHTO T 110, TP 53, T 30
Date: 11/01/2025 **Tested By:** Jose Beard #1315m
Material Source: In-place bituminous millings currently being used as **subbase**

Summary of Results

Parameter	Result
Moisture Content (T 110)	4.8 %
Percent PG Binder (Ignition Oven)	4.6 %
Elapsed Time	35 min
Extracted Aggregate Gradation (% Passing):	
3/4 in (19 mm)	100.0 %
1/2 in (12.5 mm)	99.3 %
3/8 in (9.5 mm)	98.4 %
#4 (4.75 mm)	79.1 %
#8 (2.36 mm)	61.5 %
#16 (1.18 mm)	49.6 %
#30 (600 µm)	38.5 %
#50 (300 µm)	27.0 %
#100 (150 µm)	13.4 %
#200 (75 µm)	7.1 %

Purpose of Test / Reason for Sampling

This test was conducted to **evaluate the reclaimed asphalt pavement (RAP) material currently being reused as a subbase** under new pavement.
The ignition oven test was used to determine the **residual asphalt binder content (4.6%)** and the **underlying aggregate gradation**, ensuring that the material provides sufficient drainage, stability, and compaction characteristics for subbase use.

RAP-based subbase materials can vary widely in asphalt content and gradation, which directly affect their mechanical performance and ability to function as a stable, free-draining layer.

Observations and Concerns Regarding Asphalt-Rich Subbase

Although the extracted aggregate gradation and fines content (7.1% passing #200) appear within reasonable limits, the **asphalt binder content of 4.6%** suggests that the material is **relatively asphalt-**

rich for subbase use.

This condition can result in several performance concerns:

- **Reduced Drainage Capacity:** Excess binder can clog aggregate voids, trapping water and reducing the subbase's ability to drain.
- **Loss of Structural Stiffness:** When binder levels are high, the layer can deform under load rather than distribute stresses evenly and is prone to slippage.
- **Inconsistent Compaction:** Coated aggregates may resist interlock, causing variable densities and local instability.
- **Thermal Softening:** During warm weather or hot-mix paving above the layer, asphalt-rich material can soften and move under compaction loads.

Recommended Measures to Address Asphalt-Rich Subbase Conditions

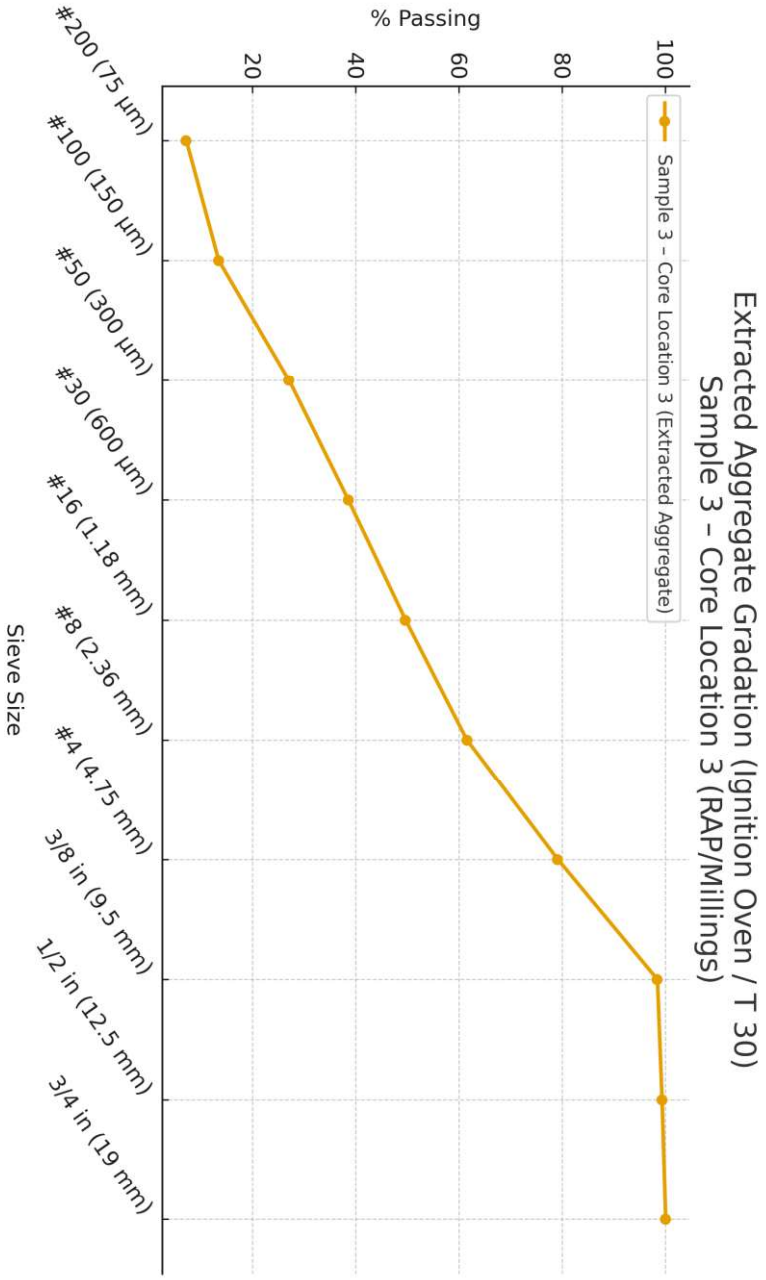
To mitigate these issues and ensure acceptable long-term performance, the following corrective actions are recommended:

1. **Blending with Granular Borrow:**
   Mix the RAP with a clean, well-graded granular material (such as MassDOT M1.03.0 Type b or M1.02.1 Gravel Borrow) to reduce overall binder content and restore proper drainage and stiffness.
   - A **blending ratio of 60–70% RAP with 30–40% clean granular borrow** often yields a suitable subbase gradation.
   - Field verification through gradation and moisture-density testing is advised after blending.
2. **Scarifying and Aerating Before Placement:**
   Scarify compacted RAP material and expose it to air to **oxidize excess binder films**, improving interlock and reducing tackiness prior to final compaction.
3. **Control of Lift Thickness and Compaction:**
   - Limit each lift of RAP subbase to **≤ 8 inches compacted thickness**.
   - Use a vibratory roller with adequate energy to achieve target density without over-compaction (which can cause binder migration).
   - Confirm compaction through **nuclear density or proof rolling** to detect soft spots.
4. **Drainage Layer Verification:**
   Install edge drains or ensure that the subbase has adequate cross-slope and permeability to prevent water retention in areas where the asphaltic binder may limit infiltration.
5. **Monitor Performance Before Paving:**
   Observe the surface behavior after compaction and prior to paving. If the subbase appears **plastic, shiny, or exhibits pumping under load**, additional granular blending or partial replacement is recommended.

Conclusion

The recovered RAP material shows gradation characteristics typical of dense-graded asphalt millings and can serve as a **structurally competent subbase** provided it is properly blended, compacted, and moisture-controlled.

However, due to its **relatively high asphalt content**, direct use without modification could lead to drainage and deformation issues. Implementing the above measures will help ensure that the subbase performs as intended and maintains stability under pavement loading.



OBSERVATIONS & DESIGN CONSIDERATIONS

1) **Structural Reality (What the Cores Tell Us)**

- **Thickness is the primary deficiency.** The pavement cores revealed total HMA thicknesses of only **1.0–2.5 inches**, with **no intermediate or base course**. This limited structure is fundamentally inadequate even for light local traffic.
- **Subbase is generally serviceable.** Laboratory results and field observations confirm that the existing subbase materials (SW, GM, A-1-a classifications) are **granular, non-plastic, and largely free-draining**, making them suitable for reuse through reclamation. Localized asphalt-rich conditions near **PC-3A/3B** will require deeper reclamation and limited aggregate blending.
- **Cracking is structural.** Pavement failures are load-induced rather than surface defects. The thin section lacks flexural capacity, allowing cracking that permits water infiltration and accelerates deterioration. Frost movement is a **secondary effect** driven by moisture intrusion through existing cracks.

---

2) **Milling vs. Reclamation — Feasibility**

What They Are

- **Conventional Milling:** Removes only the upper 1.5–2 inches of asphalt using a cold planer, leaving the existing base untouched. This method is appropriate only when sufficient structure remains below the milled surface.
- **Full-Depth Reclamation (FDR):** A reclaimer pulverizes the entire asphalt layer and several inches of the underlying granular base—typically 6–10 inches total—to create a **new, blended base**. The pulverized material is then graded, moisture-conditioned, and compacted in place to form a uniform structural foundation.

Why Milling Is Not Viable Here

- **Insufficient material to mill.** With less than 2 inches of asphalt, milling would likely cause **blowouts, delamination, or full removal** of the pavement.
- **Retains existing weakness.** Milling would leave an **unbound, variable base** that already shows poor support and would continue to fail.
- **No geometric correction.** Milling cannot restore cross-slope, improve edge support, or address drainage paths.
- **Short service life.** Any overlay placed on a milled surface here would reflect existing cracks and fail prematurely.

Why Full-Depth Reclamation Fits

- A thin HMA surface allows efficient pulverization and blending of the asphalt and top granular base to create a **uniform 8–10 inch reclaimed layer**.
- FDR provides a **structural reset** while retaining nearly all material on site, eliminating costly export/import.
- **No elevation constraints** exist; grades can be raised slightly (≈ 1–1.5 inches) to improve drainage without affecting driveways or shoulders.

---

3) **Reclaimed Base — Depth Strategy, Blending, and Field Controls**

Why Go Deeper

- **Dilutes asphalt-rich zones:** Increasing depth pulls more clean granular material into the mix, lowering residual binder content and improving shear strength.
- **Uniform structure:** Deeper reclamation captures the variability between cores, producing a stable, consistent platform.
- **On-site blending stock:** The additional in-situ gravel provides correction material for binder-heavy areas near **PC-3A/3B**, minimizing import needs.

Target Reclaim Depth

Corridor Area	**Target Depth (in.)**	**Notes**
General corridor (PC-1A/B, PC-2A)	8 in.	Clean granular base; standard reclamation depth.
North segment (PC-3A/B)	10 in.	Increases gravel fraction, reduces asphalt-rich material.

Blending Strategy (Especially Near PC-3A/3B)

- Pre-place **10–20 % clean ¾-inch crushed stone** ahead of the reclaimer.
- Make **two passes** for full incorporation in binder-heavy areas.
- If reclaimed material remains tacky or binder-rich, **trim 1–2 inches** from the top and backfill with clean granular material.
- **Moisture control:** Condition to **optimum ± 2 %** before compaction; aerate if shoving occurs.
- **Proof-roll:** Use a loaded truck or roller; reject areas with pumping or weaving.

Quick Acceptance Criteria

- Texture: Uniform, non-tacky, well-graded.
- Proof-roll: No visible deflection or pumping.
- Shape: Cross-slope ≈ 2 %.
- Compaction: ≥ 98 % of modified Proctor (or 100 % standard), verified daily.
- Edge: Reclaimed base extends **≥ 6–8 inches** beyond the finished pavement width.

Localized Plan for PC-3A/3B

- Reclaim to **10 inches**; add ~15 % clean stone.
- Make two reclaimer passes, proof-roll, and, if needed, trim top 1–2 inches of binder-rich mix.
- Slightly **raise finished grade (~1–1.5 in.)** to promote positive runoff toward vegetated swales.

---

4) Proposed Structural Stack (No HMA Base Course)

Traffic volumes and functional class allow use of a finer surface mix that improves finish quality and aesthetics. The following **MassDOT-approved 75G Level 2 mixes** (PG64-28 binder) are recommended:

Layer	Material	Thickness (in.)	Purpose / Notes
Wearing Course	9.5 mm HMA, 75G Level 2, PG64S-28	1.5 – 2.0	Finer gradation yields smoother appearance and tighter texture; ideal for local collectors; readily available from MassDOT-approved suppliers.
Intermediate / Binder Course	19.0 mm HMA, 75G Level 2, PG64S-28	3.0 - 3.5	Provides primary structural strength and shear resistance.
Reclaimed Base	Pulverized HMA + granular subbase	8 – 10	Uniform foundation, compacted and proof-rolled; depth adjusted per asphalt-rich content.

This structure delivers **4.5–5.5 inches of new HMA** over a reclaimed base, providing sufficient stiffness for the projected 1–2 million ESAL design and meeting perpetual-pavement objectives.

---

5) Edge Durability & Shoulder Strategy

- Extend the **intermediate course 6–8 inches wider** than the wearing surface to create a stiff edge beam that reduces shoulder cracking from moisture or settlement.
- Install **1–2 feet of dense-graded shoulder gravel** flush with the pavement edge to support lateral confinement and shed runoff.
- Re-establish a **2 % cross-slope** across the corridor for consistent sheet flow.

---

6) Drainage Approach (Keep It Simple, Protect Water Quality)

- Maintain existing **open drainage** (sheet flow and vegetated swales) with minor regrading to eliminate ponding.
- Clean or replace **driveway culverts** where needed to restore conveyance.
- Avoid new closed piping systems—open swales promote infiltration and **natural water-quality treatment**.
- Where flow direction must be controlled, consider **low asphalt berms with periodic weep gaps** rather than continuous curbing.

---

7) Construction QA/QC Focus

- **Depth control:** Verify reclamation depth daily; spot-core early to confirm blend uniformity.
- **Asphalt-rich control:** Blend with clean stone where binder content is high; avoid "balling" material.
- **Compaction:** Compact reclaimed base to specification; proof-roll acceptance required before paving.
- **Bond/density:** Confirm tack rates, compaction, and joint adhesion on both lifts.
- **Elevation tie-ins:** Ensure smooth transitions at drives and mailboxes; prevent drop-offs at edges.

---

8) Perpetual Pavement Maintenance Path

Once reconstructed, Fort Hill Road will function as a **perpetual pavement**, where only the 9.5 mm surface layer requires renewal approximately every 15–20 years. The reclaimed base and intermediate layer remain intact, drastically reducing lifecycle cost and maintenance frequency.

---

9) Decision Summary (What Drives the Recommendation)

- **Root cause:** Inadequate structural thickness throughout corridor.
- **Do not mill:** Pavement too thin—risk of blowout and early failure.
- **Reclaim deeply (8–10 in.), blend, and grade:** Build a uniform foundation using existing material; apply a **two-lift 75G Level 2 PG64-28 HMA system** (9.5 mm + 19.0 mm).
- **Maintain open vegetated drainage:** Cost-efficient and environmentally beneficial.
- **Strict QA/QC:** Ensures consistent reclaimed base and long-term structural performance.

RECOMMENDED SCOPE OF WORK / RECONSTRUCTION APPROACH

Field and laboratory data confirm that the existing pavement system along **Fort Hill Road** is **structurally deficient throughout its length**, with total HMA thicknesses of only **1.0–2.5 inches** and no intermediate or base layers. The underlying subbase materials are generally **granular, free-draining, and suitable for reuse**, though some localized asphalt-rich zones were identified near the northern segment (PC-3A/3B).

Given these findings, the most appropriate and sustainable rehabilitation method is **Full-Depth Reclamation (FDR)**, followed by construction of a **two-lift hot-mix asphalt (HMA)** pavement system. This process addresses structural and drainage deficiencies while maintaining material on site, avoiding unnecessary excavation, and achieving a **perpetual pavement** framework that will only require surface renewals over time.

Full-Depth Reclamation (Preferred)

Process Summary

1. **Reclamation and Base Preparation**
    - Pulverize the existing HMA and upper granular base to a depth of **8–10 inches**, using 8-10 inches as the corridor standard and **10 inches in the asphalt-rich northern section (PC-3A/3B)**.
    - Blend reclaimed material with in-situ gravel and, where necessary, add **10–20% clean ¾″ stone** to correct binder-heavy zones.
    - Grade the reclaimed base to re-establish a **2.0% cross-slope** and compact to specification (**≥ 95% modified Proctor**).
    - Conduct **proof-roll testing** using a loaded truck to verify uniform support and identify soft areas for re-blending.
2. **HMA Pavement Placement**
    - **Intermediate Course:**
        - 19.0 mm HMA, **75G Level 2**, **PG64-28** binder.
        - **Minimum 3.0 inches** compacted thickness.
        - Extended **6–8 inches wider** than the wearing surface on each side to create a stiff edge beam.
    - **Wearing Course:**
        - 9.5 mm HMA, **75G Level 2**, **PG64-28** binder.
        - **1.5–2.0 inches** compacted thickness.
    - **Total New HMA: 4.5–5.0 inches** compacted over reclaimed base.
3. **Edge and Shoulder Restoration**
    - Backfill pavement edges with **1–2 feet of dense-graded shoulder gravel**, compacted flush with the pavement surface.
    - Restore vegetated side slopes as needed to promote sheet flow and stability.

Resulting Structural Section

Layer	Material / Mix	Thickness (in.)	Design Function
Wearing Course	9.5 mm 75G Level 2 (PG64-28)	1.5 – 2.0	Smooth, durable surface providing friction and water shedding.
Intermediate Course	19.0 mm 75G Level 2 (PG64-28)	≥ 3.0	Structural layer distributing wheel loads and shear.
Reclaimed Base	Blended HMA + Granular Subbase	8 – 10	Uniform, compacted foundation supporting upper layers.
Subgrade	Existing prepared soil	As required	Bearing support; locally improved as needed.

Typical Paving and Transition Considerations

Driveway Aprons and Transitions

- Review each **driveway apron and side street tie-in** to confirm elevation compatibility with the new pavement profile.
- Where grades create a high lip or mismatch, **cutbacks or minor apron reconstruction** may be required to ensure smooth transitions and drainage away from private property.
- At aprons constructed in concrete or pavers, evaluate whether partial removal or adjustment is needed to achieve appropriate joint alignment and elevation.

Cross-Slope and Grading

- During fine grading, confirm a consistent **2.0 % crown** and restore proper shoulder profiles to promote sheet flow.
- In low-lying areas (particularly near **PC-3A/3B**), a slight **grade raise** is recommended to improve positive drainage and eliminate ponding.

Tack Coat Application

- Apply a **uniform tack coat** between the **intermediate** and **wearing** courses prior to paving.
- The tack ensures **bonding between lifts**, allowing the two layers to behave as a single structural unit and preventing **slippage or delamination** under braking or turning loads.
- Target tack rates should meet **MassDOT M3.11.07** (approx. 0.05–0.10 gal/SY residual asphalt) and be visually verified before placing the next lift.

Compaction and QA/QC

- Use appropriate rollers for the mix temperature and layer thickness.
- Verify **density, joint adhesion, and surface tolerance** daily.
- Maintain field documentation of **reclaimed depth, moisture/density data, tack rates, and proof-roll acceptance**.
- Compact to 92.5-97% of the Max Theoretical Density

Curb, Shoulder, and Edge Work

- Re-establish shoulders flush with pavement; stabilize and seed disturbed areas.
- Where flow direction or edge control is needed, consider **low asphalt berms with weep gaps** to retain open drainage characteristics while guiding runoff.
- Where present, adjust or reinstall any **catch basins, water boxes, or manholes** to the new finish grade.

Drainage and Water-Quality Considerations

- Maintain existing **open drainage system** (sheet flow and vegetated swales).
- Avoid introducing new closed-pipe infrastructure unless required, as open swales enhance **infiltration and pollutant removal**.
- **Clean and regrade driveway culverts** to restore capacity and prevent localized flooding.
- Coordinate drainage improvements with future **stormwater management planning** to ensure compliance with MS4 and DEP guidance.

Key Construction Controls

- **Depth Verification:** Daily checks confirming 8–10 in. reclamation depth.
- **Blend Uniformity:** Adjust aggregate addition as needed in asphalt-rich areas.
- **Proof-Roll Acceptance:** No deflection or pumping under loaded truck.
- **Compaction:** Achieve target density and moisture conditions before paving.
- **Bond Integrity:** Ensure proper tack application between all lifts.
- **Elevation Tie-ins:** Confirm driveway and utility structure adjustments prior to final paving.

Summary Recommendation

The existing pavement lacks structural capacity and cannot support further overlays. **Full-Depth Reclamation (FDR)** to a depth of **8–10 inches**, followed by placement of a **two-lift, 75G Level 2 HMA system (PG64-28 binder)** totaling **4.5–5.0 inches**, is the recommended reconstruction method for Fort Hill Road.

This process will:

- Reuse existing materials to reduce costs and environmental impact.
- Improve cross-slope, edge stability, and drainage without altering overall roadway character.
- Provide a **long-life, perpetual pavement structure** with routine surface renewals every 15–20 years rather than full reconstruction.

In summary:
Reclaim, grade, and repave—do not mill.
Full-Depth Reclamation provides the most **structurally sound, economical, and sustainable** solution for the Fort Hill Road corridor.

CLOSING / IMPLEMENTATION & NEXT STEPS

1) Purpose and Implementation Path

This pavement evaluation and reconstruction strategy establishes a **clear, data-supported foundation** for the rehabilitation of **Fort Hill Road** in Easthampton, Massachusetts.
The recommendations presented herein are intended to guide **McClure Engineering**, as the Engineer of Record, and the **Town of Easthampton** through final design, bidding, and construction-phase implementation.

The findings confirm that the existing pavement structure is **uniformly deficient in thickness** and cannot be economically or effectively restored by milling or overlays.
Implementation of **Full-Depth Reclamation (FDR)** with a **two-lift HMA system** is therefore the most appropriate and sustainable reconstruction method for the corridor.

2) Coordination with McClure Engineering

As the project advances into design development, the following coordination items may be incorporated into McClure Engineering's design documents and specifications:

- **Design Drawings:**
  - Identify exact reclamation depths (8–10 in.) and transition areas (PC-3A/3B zone).
  - Include proposed edge-of-pavement elevations reflecting the finished-grade raise.
  - Depict shoulder reconstruction, berms (if needed), and cross-slope geometry (target 2.0%).
- **Technical Specifications:**
  - Include reclamation, moisture/density, and proof-roll acceptance criteria.
  - Require MassDOT 75G Level 2 mix designs (PG64S-28 binder) with a minimum 3.0 in. intermediate lift and 1.5–2.0 in. surface lift.
  - Specify tack coat rate and inspection requirements between lifts (MassDOT M3.11.07).
  - Include surface tolerance, joint adhesion, and density testing requirements.
- **Permitting and Environmental:**
  - Confirm that proposed grading and drainage improvements remain within the existing right-of-way and do not alter off-site drainage patterns.
  - Maintain open drainage and vegetated swales to ensure compliance with **MS4 and DEP stormwater guidelines**.

3) Construction Sequencing

1. **Reclamation and Proof-Roll:**
   - Pulverize and blend existing material; perform initial compaction and proof-roll to confirm stability.
   - Address any localized soft or binder-rich areas by re-blending or trimming with imported stone.
2. **Fine Grading and Cross-Slope Establishment:**
   - Shape reclaimed base to achieve a uniform 2% crown and match edge elevations.

- Review all driveway tie-ins; adjust aprons or perform cutbacks where necessary for proper transitions.

3. **Paving Operations:**
   - Place **intermediate (19.0 mm 75G Level 2, PG64-28)** at a **minimum of 3.0 inches** compacted thickness.
   - Apply **uniform tack coat** between lifts to ensure interlayer bond and structural continuity.
   - Place **wearing (9.5 mm 75G Level 2, PG64-28)** at **1.5–2.0 inches**, ensuring smooth transition to drives and intersecting roadways.
   - Verify compaction and joint density through daily QC testing.
4. **Shoulder and Edge Restoration:**
   - Install and compact **1–2 ft of dense-graded shoulder gravel**, graded flush with the finished pavement.
   - Stabilize disturbed shoulders with topsoil and seed immediately following construction.
5. **Drainage and Finishing Work:**
   - Clean and replace driveway culverts as necessary.
   - Verify that runoff is directed to vegetated swales; add berms with weep gaps only where required to control flow direction.
   - Conduct final walkthrough to confirm grade uniformity, shoulder tie-ins, and edge stability.

6. Quality Assurance / Quality Control (QA/QC)

Successful reclamation and paving depend on strict adherence to **field verification and QC testing** throughout construction.
The following checkpoints are recommended:

Activity	*QC/QA Verification*
Reclamation Depth	Daily field verification (target 8–10 in.)
Base Uniformity	Visual inspection for asphalt-rich zones; re-blend or add aggregate as needed
Moisture / Density	Field compaction tests per lift; proof-roll confirmation
Tack Coat	Verify application rate (MassDOT M3.11.07); coverage must be continuous and uniform
HMA Compaction	Field density testing (core or nuclear gauge) for each lift
Longitudinal Joints	Visual and adhesive inspection; ensure proper overlap and sealing
Surface Smoothness	Straightedge or profilograph tolerance check before acceptance
Drainage / Cross-Slope	Spot-level verification (target 2.0%)
Documentation	Daily reports on weather, tonnage, density, and inspection results

4) Lifecycle and Maintenance

Once reconstructed, Fort Hill Road will function as a **perpetual pavement system**, meaning that:

- The reclaimed base and intermediate course will remain intact indefinitely.
- Only the surface lift (9.5 mm mix) will require **mill-and-overlay renewal every 15–20 years**.
- Routine maintenance should focus on **surface sealing, crack management, and culvert cleaning** rather than structural rehabilitation.

This approach reduces long-term costs, environmental impact, and traffic disruption, providing the Town with a **stable, low-maintenance roadway system**.

5) Next Steps

To advance this project toward implementation:

1. **Finalize Design Development:**
    - McClure Engineering to prepare 100% design drawings and specifications incorporating this FDR-based structure, elevations, and paving sequence.
2. **Coordinate Funding and Scheduling:**
    - The Town of Easthampton to identify construction funding and coordinate with project partners on bid timing.
3. **Bid and Preconstruction Coordination:**
    - Hold a preconstruction meeting with the selected contractor, FERN CORP, and McClure Engineering to confirm sequence, QC testing expectations, and inspection roles.
4. **Construction Oversight:**
    - FERN CORP to provide **field observation and materials testing services** for compaction, density, and tack coat verification.
5. **Post-Construction Review:**
    - Conduct an as-built evaluation and document verification testing to establish the baseline for future performance monitoring.

Conclusion

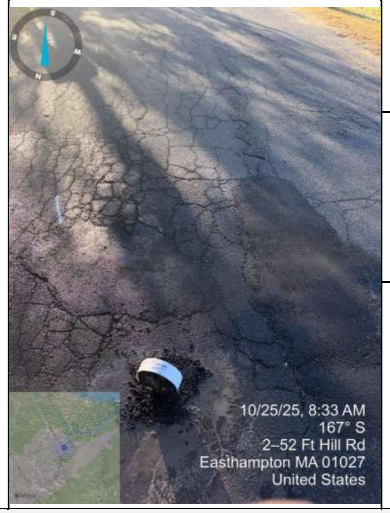
The Fort Hill Road pavement reconstruction will transition the corridor from a failing, maintenance-intensive surface to a **durable, perpetual pavement** designed for long-term serviceability.
By employing **Full-Depth Reclamation (8–10 inches)** and a **two-lift 75G Level 2 HMA system (PG64-28 binder, 4.5–5.0 inches total)**, the Town will achieve a cost-effective, resilient, and environmentally responsible roadway improvement.

FERN CORP recommends that the Town of Easthampton and McClure Engineering consider this scope of work as the basis for further design development, contingent upon budget availability and final review and concurrence by the Engineer of Record (McClure Engineering).

This recommendation is provided for planning and technical guidance only and does not represent final design approval. It also does not evaluate or address permitting requirements, environmental resource area impacts, or other regulatory considerations that may arise during design review or construction permitting.

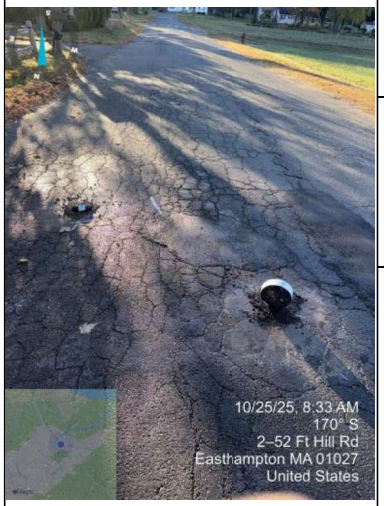
Upon concurrence by the EOR and confirmation of available funding, this scope may be advanced to final design and bidding to ensure that construction execution aligns with the intended engineering objectives and long-term performance goals for the Fort Hill Road corridor.

CORE LOG

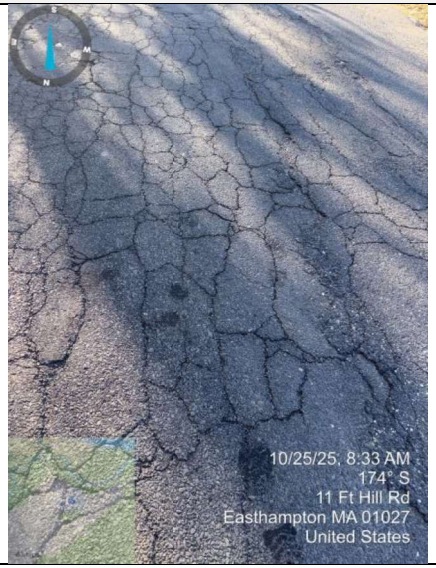
PC1A	PRE-CORE CONDITION	COURSE	THICK (INCH)	CATEGORY / USCS	CORE PHOTO	SAMPLE OBSERVATIONS
HSQ See Rendering for Approx. Location 4' Off Right edge		HMA Wearing Surface	1.0"	PAVEMENT 1.0"		Signs Of Pavement Distress: Yes CORE Taken on Crack: Yes CORE Taken @ Patch Interface: No
		HMA Intermediate Course(s)	` ` ` ` `			Top-Down Cracking: ☒
						Bottom-Up Cracking: ☒
						Evident Voids in Core: Yes - Wearing Surface Only
						Surface Interlayer Bond: N/A
		Aggregate Base (Soil)	10"+	- GRAVELY SAND-SW		Soil Does Not Meet Structural Fill-Considered Free Draining
						AASHTO Soil Classification: A-1-a
						Base Layer Excavatable: Yes

FIELD OBSERVATIONS

COMMENTS:	LOCATION PHOTO	CONSIDERTIONS	FHWA DISTRESS ID	
1. This core was taken along an area exhibiting significant fatigue cracking, approximately 4 feet off the right edge of the roadway while facing Clapp Street. The pavement thickness at this location was very thin with no intermediate layer, and the mix appeared to be a 9.5 mm surface course containing 3/8" stone aggregate. The sampled material and corresponding test results are included in the subsequent pages of this report. Laboratory analysis indicates the underlying material is slightly out of specification compared to MassDOT Gravel Borrow standards but is sufficiently close to be considered a suitable, free-draining structural subbase material, classified as A-1-a under AASHTO soil classification.		☐Bus Stop	☒Fatigue	High
		☐Development Impacts (Trucks)	☐Transverse	N/A
			☐Longitudinal	N/A
		☐Trucks > Cat 8 Commuting	☐Block	N/A
			☒Edge	High
		☐Intersection w/Stop Condition	☐Wheel Path	N/A
			☒Random	High
		☐Tree Obstacles	☐Joint	N/A
		☐Other: Bike lane	☒Patches	Low
		☐ Bus Lane	☒ Raveling/ Delamination	Low
		Notes: There is no intermediate layer in pavement cross-section.		

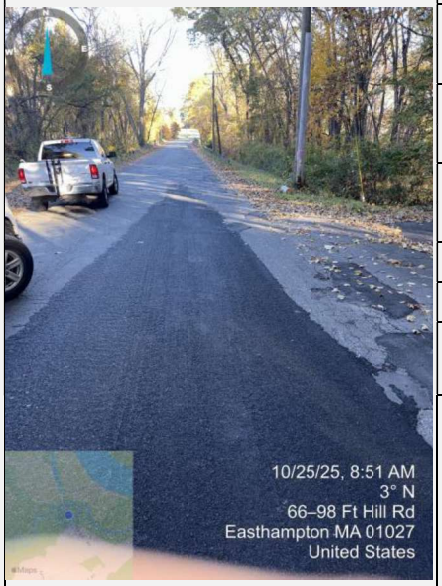
PC1B	PRE-CORE CONDITION	COURSE	THICK (INCH)	CATEGORY / USCS	CORE PHOTO	SAMPLE OBSERVATIONS
HSQ See Rendering for Approx. Location Crown		HMA Wearing Surface	2.0"	PAVEMENT 2.0"		Signs Of Pavement Distress: Yes CORE Taken on Crack: Yes CORE Taken @ Patch Interface: No
		HMA Intermediate Course(s) Maybe Cold Mix	` ` ` ` `			Top-Down Cracking: ☒
						Bottom-Up Cracking: ☒
						Evident Voids in Core: Yes - Wearing Surface Only
						Surface Interlayer Bond: N/A
		Aggregate Base (Soil)	10"+	- GRAVELY SAND-SW		Visual Classification Performed (See Comments)
						AASHTO Soil Classification: N/A
						Base Layer Excavatable: Yes

FIELD OBSERVATIONS

COMMENTS:	LOCATION PHOTO	CONSIDERTIONS	FHWA DISTRESS ID	
1. This core was taken at the crown of the roadway and exhibited approximately 2 inches of wearing surface, appearing to be a 9.5 mm mix with 3/8" stone aggregate. The gravel subbase was consistent with that observed in Core No. 1A. All other observations remain applicable—specifically, the pavement thickness was insufficient, and the area exhibited significant fatigue cracking. The subbase material is anticipated to be suitable as a free-draining structural subbase. This core was taken in line with Core No. 1A to provide a cross-sectional indication of pavement thickness and confirm that the reduced depth was not limited to the shoulders. The total pavement section thickness at this location was approximately 1.5 inches.		☐Bus Stop	☒Fatigue	High
		☐Development Impacts (Trucks)	☐Transverse	N/A
			☐Longitudinal	N/A
		☐Trucks > Cat 8 Commuting	☐Block	N/A
			☐Edge	N/A
		☐Intersection w/Stop Condition	☐Wheel Path	N/A
			☒Random	High
		☐Tree Obstacles	☐Joint	N/A
		☐Other: Bike lane	☒Patches	Moderate
		☐ Bus Lane	☒ Raveling/ Delamination	Low
		Notes: There is no intermediate layer in pavement cross-section.		

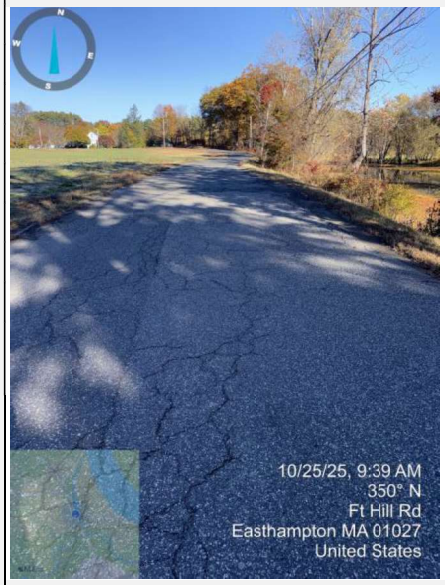
PC2A	PRE-CORE CONDITION	COURSE	THICK (INCH)	CATEGORY / USCS	CORE PHOTO	SAMPLE OBSERVATIONS
HSQ See Rendering for Approx. Location 8’ off right edge		HMA Wearing Surface	1.0"	PAVEMENT 1.0"		Signs Of Pavement Distress: Yes CORE Taken on Crack: No CORE Taken @ Patch Interface: No
		HMA Intermediate Course(s) Maybe Cold Mix	` ` ` ` `			Top-Down Cracking: ☒
						Bottom-Up Cracking: ☒
						Evident Voids in Core: Yes - Wearing Surface Only
						Surface Interlayer Bond: N/A
		Aggregate Base (Soil)	10"+	- SILITY GRAVEL-GM		Soil Does Not Meet Structural Fill-Considered Free Draining
						AASHTO Soil Classification: A-1-b
						Base Layer Excavatable: Yes

FIELD OBSERVATIONS

COMMENTS:	LOCATION PHOTO	CONSIDERTIONS	FHWA DISTRESS ID	
1. This core was taken approximately 8 feet off the left edge of pavement while facing Clapp Street. A corresponding soil sample was obtained from this location, with results generally consistent with those observed in Core No. 1A. The area exhibited heavy fatigue cracking, and a thin skim coat of asphalt—likely placed to patch a prior pavement failure—was observed in the adjacent right lane. The pavement thickness at this location was approximately 1 inch, which is insufficient to withstand typical traffic loading and has contributed to the observed cracking and surface distress. The detailed laboratory results of the soil sample are provided in the subsequent sections of this report. 2. Although the original project scope included obtaining three total cores, the project team elected to take additional cores at Locations 1 and 3 to better understand the cross-sectional thickness and uniformity at those sites. Only one core was taken at Location 2, as pavement conditions and thickness were expected to be consistent across the section.		☐Bus Stop	☒Fatigue	High
		☐Development Impacts (Trucks)	☐Transverse	N/A
			☐Longitudinal	N/A
		☐Trucks > Cat 8 Commuting	☐Block	N/A
			☒Edge	High
		☐Intersection w/Stop Condition	☐Wheel Path	N/A
			☒Random	High
		☐Tree Obstacles	☐Joint	N/A
		☐Other: Bike lane	☒Patches	High
		☐ Bus Lane	☒ Raveling/ Delamination	Moderate
		Notes: There is no intermediate layer in pavement cross-section.		

PC3A	PRE-CORE CONDITION	COURSE	THICK (INCH)	CATEGORY / USCS	CORE PHOTO	SAMPLE OBSERVATIONS
HSQ See Rendering for Approx. Location 5' off right edge		HMA Wearing Surface	2.5"	PAVEMENT 2.5"		Signs Of Pavement Distress: Yes CORE Taken on Crack: Yes CORE Taken @ Patch Interface: No
		HMA Intermediate Course(s) Maybe Cold Mix	` ` ` ` `			Top-Down Cracking: ☒
						Bottom-Up Cracking: ☒
						Evident Voids in Core: Yes - Wearing Surface Only
						Surface Interlayer Bond: N/A
						Sampled & Tested-asphalt rich material
						AASHTO Soil Classification: N/A
		Aggregate Base (Soil)	8"+	- ASPHALT COMPOSITE MATERAIL		Base Layer Excavatable: Yes

FIELD OBSERVATIONS

COMMENTS:	LOCATION PHOTO	CONSIDERTIONS	FHWA DISTRESS ID	
1. This core was taken approximately 5 feet off the right shoulder while facing Clapp Street. The area exhibited the same random and fatigue cracking noted in prior locations. A corresponding soil sample was obtained from this location. The material appeared to consist of an asphalt-rich reclaimed borrow or millings. Laboratory testing of the soil sample was performed, and the results are provided in the subsequent section of this report. The pavement thickness at this location was approximately 2½ inches, which is insufficient to adequately support traffic loading, even under relatively light vehicle demands.		☐Bus Stop	☒Fatigue	High
		☐Development Impacts (Trucks)	☐Transverse	N/A
			☐Longitudinal	N/A
		☐Trucks > Cat 8 Commuting	☐Block	N/A
			☒Edge	High
		☐Intersection w/Stop Condition	☐Wheel Path	N/A
			☒Random	High
		☐Tree Obstacles	☐Joint	N/A
		☐Other: Bike lane	☐Patches	N/A
		☐ Bus Lane	☒ Raveling/ Delamination	Moderate
		Notes: There is no intermediate layer in pavement cross-section.		

PC3B	PRE-CORE CONDITION	COURSE	THICK (INCH)	CATEGORY / USCS	CORE PHOTO	SAMPLE OBSERVATIONS
HSQ See Rendering for Approx. Location 4' off left edge		HMA Wearing Surface	1.50"	PAVEMENT 1.50"		Signs Of Pavement Distress: Yes CORE Taken on Crack: Yes CORE Taken @ Patch Interface: Yes
		HMA Intermediate Course(s) Maybe Cold Mix	` ` ` ` `			Top-Down Cracking: ☒
						Bottom-Up Cracking: ☒
						Evident Voids in Core: Yes - Wearing Surface Only
						Surface Interlayer Bond: N/A
		Aggregate Base (Soil)	8"+	- ASPHALT COMPOSITE MATERAIL		Visual Classification Performed (See Comments)
						AASHTO Soil Classification: N/A
						Base Layer Excavatable: Yes

FIELD OBSERVATIONS

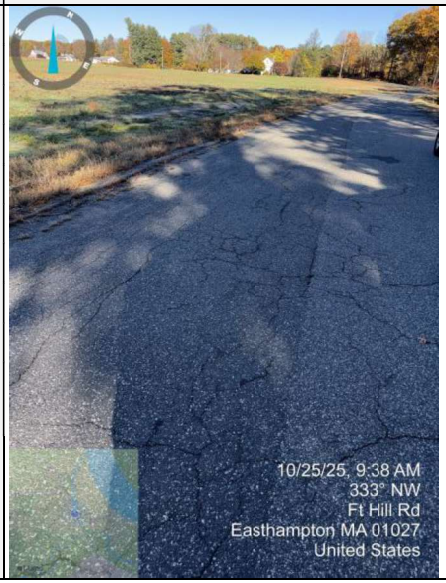
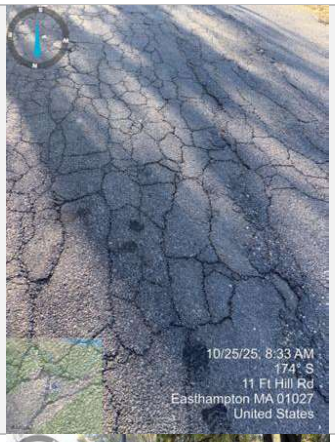
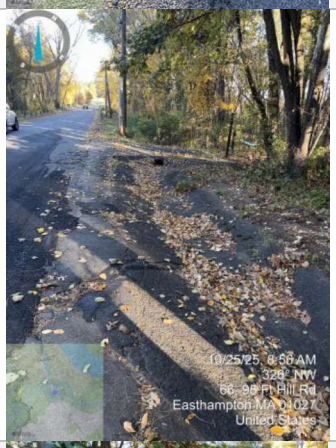
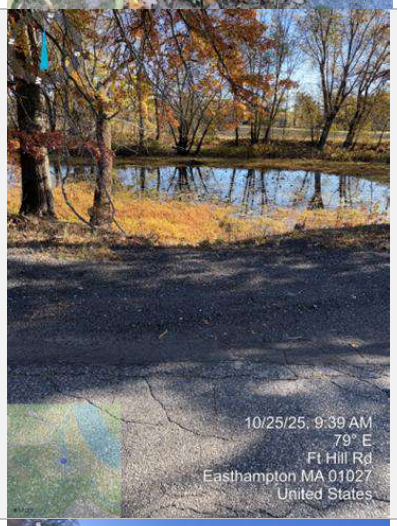
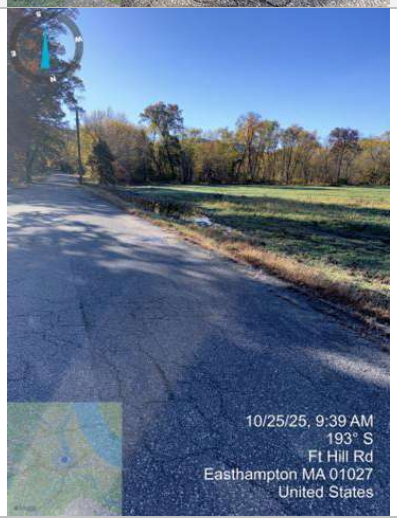
COMMENTS:	LOCATION PHOTO	CONSIDERTIONS	FHWA DISTRESS ID	
1. This core was taken approximately 4 feet off the left shoulder while facing Clapp Street. The soil subbase material appeared consistent with that observed in Core No. 3A, consisting of an asphalt-rich reclaimed borrow or millings. The area exhibited significant fatigue cracking, largely attributable to the insufficient pavement thickness of approximately 1½ inches, which is inadequate to support even light vehicle loading. The observed subsurface conditions further confirm the limited structural capacity of this section.		☐Bus Stop	☒Fatigue	High
		☐Development Impacts (Trucks)	☐Transverse	N/A
			☐Longitudinal	N/A
		☐Trucks > Cat 8 Commuting	☐Block	N/A
			☒Edge	High
		☐Intersection w/Stop Condition	☐Wheel Path	N/A
			☒Random	High
		☐Tree Obstacles	☐Joint	N/A
		☐Other: Bike lane	☐Patches	N/A
		☐ Bus Lane	☒ Raveling/ Delamination	Moderate
		Notes: There is no intermediate layer in pavement cross-section.		

Photo Log – Fort Hill Road, Easthampton, MA

Photo ID	Date Taken	Direction	Location Description	Observed Conditions	File Name
1	10/25/25	174° S	11 Ft Hill Rd	Extensive alligator cracking and surface oxidation	
2	10/25/25	3° N	66–98 Ft Hill Rd	Patch section with transition joint and prior overlay evident	
3	10/25/25	326° NW	66–98 Ft Hill Rd	Shoulder area showing open paved drainage swale extending beneath a driveway apron into a culvert pipe.	

4	10/25/25	187° S	66–98 Ft Hill Rd	Failing edge drainage path, undermined shoulder with vegetation encroachment	
5	10/25/25	350° N	Ft Hill Rd	General cracking and moderate surface distress near pond	
6	10/25/25	79° E	Ft Hill Rd	Pavement edge deterioration adjacent to pond embankment	

7	10/25/25	211° SW	Ft Hill Rd	Severe alligator cracking and surface fatigue (Typ.)		
8	10/25/25	311° NW	Ft Hill Rd	Intersection approach to residential drive; oxidation and raveling		

Photo Captions:

1. Representative surface distress consistent with fatigue cracking and oxidation. Reflects general condition at southern section.
2. Overlay transition joint observed with moderate wear; typical of prior maintenance zones.
3. Open paved drainage swale visible along shoulder, extending beneath a driveway apron where it connects to a subsurface pipe. Indicates functional but aged surface drainage feature requiring maintenance.
4. Vegetation encroachment and undermined shoulder drainage path evident along south-facing slope.
5. Severe cracking and surface distress near pond area;
6. Edge distress adjacent to pond embankment and elsewhere with surface oxidation; indicative of moisture infiltration.
7. Severe alligator cracking and surface fatigue consistent.
8. Residential intersection approach showing surface oxidation and early raveling; consistent with moderate to heavy distress.

In closing, thank you for the opportunity to assist with this complex project. My team and I are eager to discuss our findings further and support ongoing collaboration under your leadership. Please don't hesitate to reach out for additional information or clarification. We remain committed to contributing to the successful completion of this endeavor.

DISCLAIMER: This document is not a Geotechnical Report. It represents a nonbinding opinion based on currently available results, intended to provide limited insights and guidance. The information is time-sensitive and may change. The design and evaluations rely on submitted data, with potential inaccuracies arising from variations in existing conditions or design changes. Conclusions are based on professional experience and standardized testing for specific locations. This document is not a definitive design, and discrepancies may emerge during construction. No responsibility is accepted for designs based on this report's recommendations, and no expressed or implied warranty is provided. Prepared exclusively for the party named on the cover.

END