June 7, 2019

ADDENDUM NO. 1

To Prospective Bidders and Others on:

TOWN OF BRIDGEWATER
ELM STREET RECONSTRUCTION PROJECT

BIDDER QUESTIONS

All prospective Bidders are hereby notified that the following questions have been asked. Answers to the questions follow:

PA Landers – 5/31/19

1. Would it be possible to supply the Cut/Fill Calculations (SF/Sq.In.) on the Cross Sections shown on Sheets 42 – 63 of 65 of the Plans?

   The Calculations would greatly accelerate, and facilitate the development of the Bids, with the possibility of producing more detailed Bidding.

   Another advantage of these Calculations may be the early reporting of any significant variances in quantities that may cause variances in the Bids.

Answer: A tabular report of the Cut and Fill quantities for Elm Street has been prepared and is attached to this addendum for bidder information. The cut-fill areas do not account for the wet basin or driveway excavations but are representative of the work shown on the cross sections. See attached PDFs.

PA Landers – 6/4/19

2. Drawing Sheet #2, Typical Road section show road construction from Station 10+64 to Station 92+50. Plans show construction to Station 95+00. Please confirm which detail/section is required for the work from Station 92+50 to 95+00 (or is this work not included in the project scope)?

Answer: The section of Elm Street between Station 92+50 to 95+00 will be reconstructed (Full Depth Pavement Type 1). In general, this section of Elm Street has no proposed sidewalk and no roadway widening. The reconstruction is proposed to occur within the existing roadway footprint.

3. Is Commonwealth Gas aware of the proposed “gas line relocations” at the proposed CBCI’s or GICI’s at Stations 13+40.3 Rt, 16+22.6 Rt, 19+02.5 Rt, 26+37.5 Rt, and 28+80 Rt? if they are aware, have they given a tentative schedule of when they can do this work, as we are dealing with an existing 6” gas line per the plans. If they are not aware of this potential relocation work, delays may result due to lack of sufficient notice to the utility company to schedule this work.

Answer: Columbia Gas has been contacted regarding potential gas line conflicts with isolated sections of the proposed drainage system. Coordination with Columbia Gas is ongoing.

4. When can we anticipate an Addenda being issued with the Boring Logs? To date, nothing has been added to the Town Web site.

Answer: Addendum 1 is issued on June 7, 2019.

PA Landers – 6/4/19

5. In the Special Provisions, Page SP-3, it is stated that Groundwater may be contaminated and may need to be Treated as hazardous material. Since the Treatment of Contaminated Groundwater is a different operation/method from normal Groundwater Pumping and cannot be ascertained for Bidding, can the Standard MassDOT Item 183.1 Treatment of Contaminated Groundwater be added for equal comparison of Bids?

Answer: The Special Provisions, page SP-3 have been revised to eliminate the sentence: "Groundwater may be contaminated and may need to be treated as hazardous material." Contaminated groundwater is not anticipated and if encountered, a change order will be considered. Item 183.1, Treatment of Contaminated Groundwater has not been added.

6. Sheet 2 of 65 of the Plans, note 7 states Drainage elevations are provided for design purposes only. The Contractor shall verify by test pit, the locations of existing utilities which may conflict with the proposed drainage design. Any Field adjustments required will be made as approved or directed by the Engineer. Only after the Contractor verifies the elevations for the constructability of the Drainage System shall any Structures be ordered.

   Item 141.1 Test Pit for Exploration has a significant Quantity of (480) CY, with the potential of increasing with the approval of the Engineer, as stated in the Special Provisions, page SP-22 under this Item 141.1.

   We are very concerned of the combined timetable required to perform the Test Pits, log their results, adjust elevations, and the production backlog of ordering and manufacturing structures, all with respect to the Project Schedule. As an estimate of time, there is a possibility of only the Test Pit operation having a duration of (8 - 10) Weeks.

   Can this time for the Test Pit operation be added to the Project Schedule?

Answer: The overall project schedule will not be increased to accommodate test pits. The original quantity for Item 141.1, Test Pit for Exploration is conservative. Upon further review, the quantity of this item has been revised. Refer to the updated Bid Tab for item 141.1

PA Landers – 6/4/19

7. Item #999.1, Material Testing, does not include any testing frequency, or type of tests required, for the various soil, aggregate, asphalt, or concrete work for the subject project. Please provide clarification of the frequency and types of tests which will be required for this project.

Answer: The special provision for Item 999.1, Material Testing has been revised to include additional detail related to testing frequency.

8. Please advise regarding the following price adjustments which are to be included under Chapter 30 project bidding, particularly if funded by federal/state funds, chapter 90 MADOT funding etc., as we see nothing in the bid documents for these items.
   Liquid asphalt
   Steel
   Cement
   Diesel fuel

Answer: Price adjustment language has been added to the Special Provisions along with Appendix D. Appendix D includes details of the various price adjustments applicable on this project.

D'Allessandro Corp – 6/4/19

9. Is it possible for the Town to forward any and all exploration tests and subsurface tests (borings, sample analyses, geotechnical reports, etc.) not already included in the bid documents to the Bidders? Article 4 of the Instructions to Bidders states that the Bidders can request this information.

Answer: Soil Boring logs for Elm Street have been included in Addendum No. 1. Refer to Appendix C. Elm Street Pavement Test Pit information has been provided in the bid documents. Refer to Appendix B in the Special Provisions. Bidders may contact the Town of Bridgewater to inquire if any additional subsurface information is available either on Elm Street or on adjacent properties.

10. When will the Town be issuing the Elm Street Soil Boring Logs (Appendix C)? It is stated that they will be released in an addendum.

Answer: Addendum 1 is issued on June 7, 2019.

D'Allessandro Corp – 6/5/19

11. How is the concrete driveway on Sheet 5 being paid for?

Answer: The concrete driveway on Sheet 5 will be paid for under Item 701.1, Cement Concrete Sidewalk at Driveways.

12. How thick must the asphalt and concrete cement sidewalks at driveways be?

Answer: Asphalt driveways, per the pavement notes, will be 3.75-inches thick. Cement concrete sidewalk at driveways will be 6-inches thick per MassDOT standards.

13. How is the transition curb on sidewalk at driveways being paid for?

Answer: Item 509.1, Granite Transition Curb for Wheelchair Ramps – Straight and Item 509.1, Granite Transition Curb for Wheelchair Ramps – Curved are used to pay for driveway transition curbs.

14. Sheet 8:
    a. There is no information for drainage structure D31a in the Drainage Structure Data Table. Can you please provide?

Answer: A revised plan is attached with this missing information.

    b. Can the stationing of the different types of guardrail sections be confirmed?

Answer: The stationing was reviewed. There is a mislabeled section of highway guard between station 35+88 and 37+50, left. The plan labels have been corrected and are included in the revised sheet. The stationing of the other guard rail locations is confirmed.

    c. What are the limits of the modified rockfill to be placed around Headwall 2?

Answer: The limits of the modified rockfill have been added to the plans. Refer to the attached revised plan.

PA Landers – 6/5/19

15. Item 120.1 Unclassified Excavation, page SP-21 of the Special Provisions states that this item includes all stumps, brush and trees not included in items 101, Clearing and Grubbing; 103, Tree Removal – Diameter Under 24-inches and 104, Tree Removal over 24-inches.

    The usual MassDOT requirements are that any Trees <9" Dia. are included for removal under Item 120.1 Unclassified Excavation. On Page SP-15, it states Clearing and Grubbing includes tree and/or stump removal of all sizes.

    Please clarify the Method of Measurement and Basis of Payment for Unclassified Excavation as it pertains to the removal of trees, shrubs, vegetation.

Answer: The survey base plan does not identify all the existing individual trees along Elm Street as many are within the existing tree line. The survey base plan uses a specific line type to depict the tree line (refer to the Legend and Abbreviations, plan sheet 2). Individual trees that are identified on the survey base plan and are labeled as "removed" will be paid for under the respective tree removal items (103 or 104). Individual trees that are within the tree line and within areas identified to be cleared and grubbed shall be removed. No separate payment shall be made for individual tree removal within clearing and grubbing limits.

16. What is the Item No., and Method of Measurement and Basis of Payment for the Cutting and Capping to Abandon Water Main?

Answer: Cutting and capping or plugging of existing abandoned water main is incidental to the various items bid. No separate payment will be made for this work.

17. What is the Thickness of Concrete and Gravel Base for the Cement Concrete Sidewalk at Driveways and Wheelchair Ramps?

Answer: Gravel borrow for driveways and wheelchair ramps shall be 8-inches thick. Cement concrete sidewalk at driveways shall be 6-inches thick. Cement concrete wheelchair ramps shall be 4-inches thick.

PA Landers – 6/6/19

18. Can the images of Wall # 1, #2, #3 be superimposed on the Cross Sections for determination of Class A Trench Excavation?

Answer: Updated cross sections will be added to the conformed plan set prior to construction.

19. It appears that in order to construct Wall #1,2, some of the excavation will extend into the existing Streams. Is it permissible to excavate in the existing Streams? What Material will be replaced in the Stream Beds? Will permanent Scour Protection be required where Wall extend into the Streams?

Answer: No permanent impacts to the wetland areas will be permitted. Any temporary work within the wetland/stream areas should be minimized. Permanent scour protection options including reuse of natural material, crushed stone or modified rockfill, will be discussed with the Town during construction the Town.

20. The Order of Conditions for the project, under item #25, lists the installation of 3' long pieces of pvc driven in to the ground at 30' o.c. at the wetland limits lines shown on the plans.
    a. Please advise size and type of PVC pipe required.
    b. Delineate on the plans where these wetland markers are required, as the plans show wetland limits markings on private property. Is this required only within the work limits for this project. Please clarify.
    c. How will this work be paid, as there is no pay item for same included in the bid schedule?

Answer: As stated in the Special Provisions, The Contractor shall be responsible for meeting all the orders for conditions attached. No separate payment will be made for complying with the Orders of Conditions, except as noted in the special provisions, but all costs in connection therewith shall be included in the unit prices bid for the various contract items.

The wetland limit delineation and materials used for delineation as described in the Order of Conditions will be coordinated with the Town Engineer after Contract award.

D'Allessandro Corp – 6/6/19

21. Is there extra work not shown on Sheet 64 for the expansion to two lanes on Elm Street at Pleasant Street? Plans show the box widening on Pleasant Street only and comparing the base plans to the alternate, it looks like Elm Street on the southbound side need to be widened more than what's on the base bid plans.

Answer: This depends on whether the Town elects to award the Add Alternate. If the Add Alternate is awarded, the roadway layout, sidewalk and curbing shown in the Base Bid will be coordinated and adjusted to match the Add Alternate curb and sidewalk layout.

22. Is the northbound sidewalk on Elm Street in the base bid being shifted to the east to accommodate the new sidewalk on Pleasant street? What is the limit of work for the add alternate sidewalk?

Answer: The answer to the first question depends on whether the Town elects to award the Add Alternate. If the Add Alternate is awarded, the sidewalk and curbing shown in the Base Bid will be coordinated and adjusted to match the Add Alternate curb and sidewalk layout. Add Alternate sidewalk is generally south of Elm Street Station 10+64.

PA Landers – 6/6/19

23. Is it permissible to have the limit of excavation for the installation of the modular block retaining walls beyond the R.O.W. or property lines? Have temporary easements been obtained for this construction?

Answer: Temporary construction easements are shown on the plans and excavation will not occur outside of these limits unless otherwise directed by the Town.

PA Landers – 6/6/19

24. In sections of the Modular Block Retaining Wall, particularly Stations 54+50 to 55+50, the Existing Wetland line is very close to the proposed wall. Will excavation of the Wetlands be allowed for installation of the Wall?

Answer: No permanent impacts to the wetland areas will be permitted. Any temporary work within the wetland areas should be minimized.

E. T. and L. Corp – 6/7/19

25. Plan and elevation drawings are provided for modular block retaining wall #1, but not for wall #2. Please provide plan and elevation drawings for modular block retaining wall #2.

Answer: Plan and elevation for wall # 2 will not be available during the bidding phase. This information will be developed an provided after the bidding phase.

26. There is no clear match line between the base bid and the alternate bid. The Add Alternate General Plan shows Elm Street being widened, which is not shown on the base bid drawings. Please clarify the extent of the base bid/alternate bid at the Pleasant Street/Elm Street Intersection.

Answer: The Elm Street widening area (west side) depicted in the Add Alternate plans is included in the Add Alternate bid quantities. If the Town elects to award the Add Alternate, the plans will be further coordinated.

27. The typical sections for Proposed Box Widening on Pleasant Street call for 3.5" of Superpave Base Course – 37.5 (SBC-37.5) Level 2, however there is no bid item for this course. Please provide an Alternate Bid Item for the Superpave Base Course.

Answer: A pay item for Base Course (SBC 37.5) has been added to the Add Alternate bid tabs.

SUPPLEMENTAL FORM FOR GENERAL BID – BASE BID

All prospective Bidders are hereby notified that the Supplemental Form for General Bid – Base Bid, pages F-11-1 to F-11-18 shall be replaced with the attached Supplemental Form for General Bid – Base Bid. Several pay items have been added and several item quantities have been revised as summarized below:

Item 141.1, Test Pit for Exploration – Quantity has been reduced

Item 151., Gravel Borrow – Quantity has been increased

Item 156. Crushed Stone – Quantity has been increased

Item 201, Catch Basin – Quantity has been increased

Item 204, Gutter Inlet – Quantity has been reduced

Item 901, 4000 PSI, 1.5 In., 565, Cement Concrete – Quantity has been reduced

Item 910., Steel Reinforcement for Structures replaced with
Item 910.1, Steel Reinforcement for Structures – Epoxy Coated – Quantity has been increased

Item 950.65, Support of Excavation – New item

Item 999.111, Control of Water – New Item

SUPPLEMENTAL FORM FOR GENERAL BID – ADD ALTERNATE BID

All prospective Bidders are hereby notified that the Supplemental Form for General Bid – Add Alternate Bid, pages F-11-19 to F-11-30 shall be replaced with the attached Supplemental Form for General Bid – Add Alternate Bid. Several pay items have been added and several item quantities have been revised as summarized below:

Item 450.32, Superpave Intermediate Course – 19.0 (SIC 19.0) – Quantity has increased

Item 450.42, Superpave Base Course – 37.5 (SBC 37.5) – New item

Item 451., HMA for Patching – Quantity has been reduced.

SPECIAL PROVISIONS

1. All prospective Bidders are hereby notified that Appendix C – Elm Street Soil Borings Logs have been added to the special provisions. Appendix C is attached.

2. Insert the attached "Price Adjustment" section into the special provisions after that last heading on page SP-14. In addition, Appendix D has been added the Special Provisions. Appendix D includes the various specifications for the various items which allow for price increases.

3. The Material Testing special provisions (Item 999.1) has been revised and is attached.

CONTRACT DRAWINGS

All prospective Bidders are hereby notified that several plan sheets in the Contract Drawings have been revised. Refer to the attached plan sheets. The plans sheets that have been revised include sheet # 3, 7, 8, 9 and 12. Changes are clouded for convenience.

Wall Plans will be changing and will be distributed in Addendum No. 2.

ADDENDUM NO. 2

Addendum No. 2 will be issued on Monday, June 10, 2019. Addendum No. 2 will include revised wall plans. Plan sheet 39 to 41 will be included.

Please sign Addendum No. 1 below to acknowledge receipt and email back to the Town of Bridgewater at Procurement@bridgewaterma.org and Timothy B. McIntosh, at VHB, Inc. at tmcintosh@vhb.com.

Name (Printed): _____

Company (Printed): _____

Signature _____ Date: _____

Earthwork Calculations

Project: \\vhb\gbl\proj\Wat-TE\14004.00 Elm St. Roadway Improv\ssheets\75% Estimate\Earthworks.xlsx

Alignment: ELM STREET BASELINE

Sample Line Group: Sample Lines - 6

Start Sta: 10+00.000

End Sta: 96+00.000

Station	Cut Area (Sq.ft.)	Fill Area (Sq.ft.)
10+00.000	0.00	0.00
10+50.000	0.00	0.00
11+00.000	53.00	0.51
11+50.000	45.47	2.90
12+00.000	41.99	1.85
12+50.000	37.00	9.61
13+00.000	38.75	0.47
13+50.000	38.35	3.09
14+00.000	39.64	1.14
14+50.000	40.85	1.15
15+00.000	43.67	0.82
15+50.000	44.36	0.42
16+00.000	41.27	3.40
16+50.000	39.08	3.07
17+00.000	37.14	2.58
17+50.000	41.44	0.85
18+00.000	48.91	0.15
18+50.000	50.65	0.16
19+00.000	49.91	0.34
19+50.000	41.62	0.70
20+00.000	38.31	1.54
20+50.000	41.34	1.54
21+00.000	44.01	0.54
21+50.000	47.72	0.23
22+00.000	47.20	0.97
22+50.000	54.94	0.00
23+00.000	60.39	0.01
23+50.000	53.52	0.10
24+00.000	47.75	0.23
24+50.000	45.62	0.59
25+00.000	48.02	0.65
25+50.000	38.25	1.28

Earthwork Calculations

Project: \\vhb\gbl\proj\Wat-TE\14004.00 Elm St. Roadway Improv\ssheets\75% Estimate\Earthworks.xlsx

Alignment: ELM STREET BASELINE

Sample Line Group: Sample Lines - 6

Start Sta: 10+00.000

End Sta: 96+00.000

Station	Cut Area (Sq.ft.)	Fill Area (Sq.ft.)
26+00.000	50.23	0.36
26+50.000	58.58	0.20
27+00.000	46.12	0.50
27+50.000	46.20	1.14
28+00.000	41.02	2.29
28+50.000	51.51	0.14
29+00.000	54.97	0.12
29+50.000	50.15	0.00
30+00.000	51.47	0.26
30+50.000	48.51	1.15
31+00.000	44.61	0.53
31+50.000	40.23	1.18
32+00.000	39.34	1.08
32+50.000	45.05	1.10
33+00.000	42.51	0.94
33+50.000	45.79	0.53
34+00.000	42.12	0.12
34+50.000	44.66	0.71
35+00.000	36.14	1.71
35+50.000	34.40	0.68
36+00.000	32.94	2.23
36+50.000	31.67	22.61
37+00.000	35.60	6.09
37+50.000	41.39	5.30
38+00.000	44.78	3.89
38+50.000	61.49	0.09
39+00.000	52.28	0.78
39+50.000	50.39	0.71
40+00.000	52.83	1.70
40+50.000	57.35	0.27
41+00.000	45.40	1.20
41+50.000	35.82	4.88

Earthwork Calculations

Project: \\vhb\gbl\proj\Wat-TE\14004.00 Elm St. Roadway Improv\ssheets\75% Estimate\Earthworks.xlsx

Alignment: ELM STREET BASELINE

Sample Line Group: Sample Lines - 6

Start Sta: 10+00.000

End Sta: 96+00.000

Station	Cut Area (Sq.ft.)	Fill Area (Sq.ft.)
42+00.000	37.22	1.23
42+50.000	40.69	0.83
43+00.000	46.83	0.00
43+50.000	52.49	0.00
44+00.000	57.59	0.00
44+50.000	41.41	0.99
45+00.000	46.05	1.39
45+50.000	49.06	1.03
46+00.000	65.81	2.33
46+50.000	67.74	0.48
47+00.000	68.24	0.36
47+50.000	67.90	0.66
48+00.000	64.50	0.38
48+50.000	53.79	1.70
49+00.000	59.70	0.84
49+50.000	60.29	1.02
50+00.000	59.98	0.93
50+50.000	67.68	0.85
51+00.000	65.96	1.08
51+50.000	58.81	1.35
52+00.000	51.08	2.86
52+50.000	53.23	1.92
53+00.000	56.72	2.02
53+50.000	57.76	3.05
54+00.000	62.49	2.00
54+50.000	65.80	3.90
55+00.000	61.66	3.03
55+50.000	56.76	1.10
56+00.000	57.02	1.68
56+50.000	58.97	6.33
57+00.000	57.39	11.87
57+50.000	50.88	16.03

Earthwork Calculations

Project: \\vhb\gbl\proj\Wat-TE\14004.00 Elm St. Roadway Improv\ssheets\75% Estimate\Earthworks.xlsx

Alignment: ELM STREET BASELINE

Sample Line Group: Sample Lines - 6

Start Sta: 10+00.000

End Sta: 96+00.000

Station	Cut Area (Sq.ft.)	Fill Area (Sq.ft.)
58+00.000	47.73	15.89
58+50.000	52.02	8.89
59+00.000	57.59	1.24
59+50.000	57.36	4.53
60+00.000	65.21	2.25
60+50.000	65.63	2.23
61+00.000	68.25	0.79
61+50.000	72.57	0.43
62+00.000	73.55	0.85
62+50.000	69.67	1.02
63+00.000	69.03	0.43
63+50.000	62.12	0.77
64+00.000	59.46	1.05
64+50.000	56.81	1.27
65+00.000	51.49	2.63
65+50.000	49.89	2.35
66+00.000	51.13	2.13
66+50.000	51.50	6.61
67+00.000	57.94	2.72
67+50.000	75.72	0.57
68+00.000	82.99	0.00
68+50.000	68.04	0.31
69+00.000	64.72	1.00
69+50.000	65.13	0.59
70+00.000	66.59	0.63
70+50.000	62.16	1.93
71+00.000	59.77	3.42
71+50.000	55.33	2.78
72+00.000	52.76	4.56
72+50.000	53.44	7.66
73+00.000	54.73	2.95
73+50.000	56.58	4.25

Earthwork Calculations

Project: \\vhb\gbl\proj\Wat-TE\14004.00 Elm St. Roadway Improv\ssheets\75% Estimate\Earthworks.xlsx

Alignment: ELM STREET BASELINE

Sample Line Group: Sample Lines - 6

Start Sta: 10+00.000

End Sta: 96+00.000

Station	Cut Area (Sq.ft.)	Fill Area (Sq.ft.)
74+00.000	55.87	3.98
74+50.000	50.24	5.59
75+00.000	45.86	3.25
75+50.000	35.73	3.74
76+00.000	31.13	1.36
76+50.000	35.02	0.78
77+00.000	32.32	2.08
77+50.000	33.39	7.65
78+00.000	35.89	9.40
78+50.000	39.29	1.34
79+00.000	41.14	2.99
79+50.000	42.14	2.67
80+00.000	39.36	3.98
80+50.000	35.65	5.51
81+00.000	34.73	1.66
81+50.000	33.84	0.75
82+00.000	37.41	3.73
82+50.000	40.79	1.58
83+00.000	44.34	1.37
83+50.000	47.98	0.97
84+00.000	53.38	0.97
84+50.000	52.69	0.86
85+00.000	50.18	0.93
85+50.000	50.16	1.42
86+00.000	55.26	1.31
86+50.000	53.72	0.79
87+00.000	48.68	0.94
87+50.000	52.53	1.42
88+00.000	46.26	3.00
88+50.000	38.99	3.90
89+00.000	30.50	1.76
89+50.000	31.83	3.28

Earthwork Calculations

Project: \\vhb\gbl\proj\Wat-TE\14004.00 Elm St. Roadway Improv\ssheets\75% Estimate\Earthworks.xlsx

Alignment: ELM STREET BASELINE

Sample Line Group: Sample Lines - 6

Start Sta: 10+00.000

End Sta: 96+00.000

Station	Cut Area (Sq.ft.)	Fill Area (Sq.ft.)
90+00.000	38.42	4.13
90+50.000	43.91	0.00
91+00.000	45.86	2.13
91+50.000	52.72	0.00
92+00.000	58.38	0.00
92+50.000	43.71	13.28
93+00.000	40.98	0.00
93+50.000	34.41	0.04
94+00.000	33.79	0.16
94+50.000	32.63	0.10
95+00.000	34.46	7.21
95+50.000	0.00	0.00
96+00.000	0.00	0.00
96+00.000	0.00	0.00

Supplemental Form for General Bid

Base Bid

Project: Elm Street
Location: Bridgewater, MA

Item Number	Quantity	Item with Unit Bid Price Written in Words	Unit Price Dollars	Unit Price Cents	Amount Dollars	Amount Cents
101.	0.5	CLEARING AND GRUBBING at _____ PER ACRE				
102.1	1,400	TREE TRIMMING at _____ PER FOOT				
102.51	50	INDIVIDUAL TREE PROTECTION at _____ PER EACH				
102.52	2,000	TEMPORARY TREE PROTECTION FENCE at _____ PER FOOT				
103.	20	TREE REMOVED - DIAMETER UNDER 24 INCHES at _____ PER EACH				
104.	15	TREE REMOVED - DIAMETER 24 INCHES AND OVER at _____ PER EACH				
		Carried Forward				

BASE BID
Elm Street
Bridgewater, MA

	Quantity	Item with Unit Bid Price Written in Words	Unit Price Dollars	Cents	Amount Dollars	Cents
		Brought Forward				
120.1	17,300	UNCLASSIFIED EXCAVATION at _____ PER CUBIC YARD				
121.	200	CLASS A ROCK EXCAVATION at _____ PER CUBIC YARD				
141.	1,500	CLASS A TRENCH EXCAVATION at _____ PER CUBIC YARD				
141.1	240	TEST PIT FOR EXPLORATION at _____ PER CUBIC YARD				
142.	30	CLASS B TRENCH EXCAVATION at _____ PER CUBIC YARD				
144.	100	CLASS B ROCK EXCAVATION at _____ PER CUBIC YARD				
146.	5	DRAINAGE STRUCTURE REMOVED at _____ PER EACH				
150.	200	ORDINARY BORROW at _____ PER CUBIC YARD				
		Carried Forward				

	Quantity	Item with Unit Bid Price Written in Words	Unit Price Dollars	Cents	Amount Dollars	Cents
		Brought Forward				
150.1	2,500	SPECIAL BORROW at _____ PER CUBIC YARD				
151.	10,400	GRAVEL BORROW at _____ PER CUBIC YARD				
151.01	2,800	GRAVEL BORROW - TYPE C at _____ PER CUBIC YARD				
152.7	30	PEASTONE at _____ PER TON				
156.	800	CRUSHED STONE at _____ PER TON				
170.	33,300	FINE GRADING AND COMPACTING - SUBGRADE AREA at _____ PER SQUARE YARD				
180.01	1	ENVIRONMENTAL HEALTH AND SAFETY PROGRAM at _____ PER LUMP SUM				
180.02	80	PERSONAL PROTECTION LEVEL C UPGRADE at _____ PER HOUR				
		Carried Forward				

BASE BID
Elm Street
Bridgewater, MA

	Quantity	Item with Unit Bid Price Written in Words	Unit Price Dollars	Unit Price Cents	Amount Dollars	Amount Cents
		Brought Forward				
180.03	16	LICENSED SITE PROFESSIONAL SERVICES at _____ PER HOUR				
181.11	40	DISPOSAL OF UNREGULATED SOIL at _____ PER TON				
181.12	40	DISPOSAL OF REGULATED SOIL - IN-STATE FACILITY at _____ PER TON				
181.13	300	DISPOSAL OF REGULATED SOIL - OUT-OF-STATE FACILITY at _____ PER TON				
181.14	20	DISPOSAL OF HAZARDOUS WASTE at _____ PER TON				
201.	29	CATCH BASIN at _____ PER EACH				
201.3	6	SPECIAL CATCH BASIN at _____ PER EACH				
202.	37	MANHOLE at _____ PER EACH				
		Carried Forward				

	Quantity	Item with Unit Bid Price Written in Words	Unit Price Dollars	Cents	Amount Dollars	Cents
		Brought Forward				
204.	15	GUTTER INLET at _____ PER EACH				
220.	120	DRAINAGE STRUCTURE ADJUSTED at _____ PER EACH				
220.2	10	DRAINAGE STRUCTURE REBUILT at _____ PER FOOT				
220.5	5	DRAINAGE STRUCTURE REMODELED at _____ PER EACH				
220.7	26	SANITARY STRUCTURE ADJUSTED at _____ PER EACH				
220.8	26	SANITARY STRUCTURE REMODELED at _____ PER EACH				
222.3	78	FRAME AND GRATE (OR COVER) MUNICIPAL STANDARD at _____ PER EACH				
222.31	5	FRAME AND GRATE (DOUBLE) MUNICIPAL STANDARD at _____ PER EACH				
		Carried Forward				

	Quantity	Item with Unit Bid Price Written in Words	Unit Price Dollars	Cents	Amount Dollars	Cents
		Brought Forward				
222.32	1	WALK CURB INLET at _____ PER EACH				
223.1	5	FRAME AND GRATE (OR COVER) REMOVED AND STACKED at _____ PER EACH				
227.3	30	REMOVAL OF DRAINAGE STRUCTURE SEDIMENT at _____ PER CUBIC YARD				
227.31	300	REMOVAL OF DRAINAGE PIPE SEDIMENT at _____ PER FOOT				
238.12	250	12 INCH DUCTILE IRON PIPE at _____ PER FOOT				
242.12	1	12 INCH REINFORCED CONCRETE PIPE FLARED END at _____ PER EACH				
242.15	5	15 INCH REINFORCED CONCRETE PIPE FLARED END at _____ PER EACH				
		Carried Forward				

	Quantity	Item with Unit Bid Price Written in Words	Unit Price Dollars	Cents	Amount Dollars	Cents
		Brought Forward				
244.12	4,300	12 INCH REINFORCED CONCRETE PIPE CLASS V at _____ PER FOOT				
244.15	1,000	15 INCH REINFORCED CONCRETE PIPE CLASS V at _____ PER FOOT				
258.	40	STONE FOR PIPE ENDS at _____ PER SQUARE YARD				
280.	10	HOT MIX ASPHALT WATERWAY at _____ PER SQUARE YARD				
302.06	90	6 INCH DUCTILE IRON WATER PIPE (RUBBER GASKET) at _____ PER FOOT				
309.	230	DUCTILE IRON FITTINGS FOR WATER PIPE at _____ PER POUND				
357.04	2	4 INCH GATE BOX at _____ PER EACH				
357.06	7	6 INCH GATE BOX at _____ PER EACH				
		Carried Forward				

BASE BID
Elm Street
Bridgewater, MA

	Quantity	Item with Unit Bid Price Written in Words	Unit Price Dollars	Unit Price Cents	Amount Dollars	Amount Cents
		Brought Forward				
357.08	4	8 INCH GATE BOX at _____ PER EACH				
357.12	2	12 INCH GATE BOX at _____ PER EACH				
358.	60	GATE BOX ADJUSTED at _____ PER EACH				
370.1	1	8 X 6 INCH TAPPING SLEEVE, VALVE AND BOX at _____ PER EACH				
371.06	3	6 INCH COUPLING at _____ PER EACH				
376.2	6	HYDRANT - REMOVED AND RESET at _____ PER EACH				
381.01	20	SERVICE BOX (MUNICIPAL STANDARD) at _____ PER EACH				
381.1	15	SERVICE BOX REMOVED AND RESET at _____ PER EACH				
		Carried Forward				

	Quantity	Item with Unit Bid Price Written in Words	Unit Price Dollars	Cents	Amount Dollars	Cents
		Brought Forward				
381.3	70	SERVICE BOX ADJUSTED at _____ PER EACH				
402.	2,900	DENSE GRADED CRUSHED STONE FOR SUB-BASE at _____ PER CUBIC YARD				
402.3	10	DENSE GRADED CRUSHED STONE FOR DRAINAGE at _____ PER CUBIC YARD				
440.	78,000	CALCIUM CHLORIDE FOR ROADWAY DUST CONTROL at _____ PER POUND				
443.	120	WATER FOR ROADWAY DUST CONTROL at _____ PER MEGA GALLON				
450.23	3,300	SUPERPAVE SURFACE COURSE - 12.5 (SSC - 12.5) at _____ PER TON				
450.32	4,000	SUPERPAVE INTERMEDIATE COURSE - 19.0 (SIC - 19.0) at _____ PER TON				

Carried Forward

	Quantity	Item with Unit Bid Price Written in Words	Unit Price Dollars	Cents	Amount Dollars	Cents
		Brought Forward				
451.	670	HMA FOR PATCHING at _____ PER TON				
452.	2,100	ASPHALT EMULSION FOR TACK COAT at _____ PER GALLON				
453.	10,950	HMA JOINT SEALANT at _____ PER FOOT				
472.	800	HOT MIX ASPHALT FOR MISCELLANEOUS WORK at _____ PER TON				
482.4	100	SAWCUTTING PORTLAND CEMENT CONCRETE at _____ PER FOOT				
506.	11,450	GRANITE CURB TYPE VB - STRAIGHT at _____ PER FOOT				
506.1	400	GRANITE CURB TYPE VB - CURVED at _____ PER FOOT				
509.	760	GRANITE TRANSITION CURB FOR WHEELCHAIR RAMPS - STRAIGHT at _____ PER FOOT				
		Carried Forward				

	Quantity	Item with Unit Bid Price Written in Words	Unit Price Dollars	Cents	Amount Dollars	Cents
		Brought Forward				
509.1	100	GRANITE TRANSITION CURB FOR WHEELCHAIR RAMPS - CURVED at _____ PER FOOT				
514.	19	GRANITE CURB INLET - STRAIGHT at _____ PER EACH				
514.1	4	DOUBLE GRANITE CURB INLET - STRAIGHT at _____ PER EACH				
517.	2	GRANITE CURB CORNER TYPE B at _____ PER EACH				
620.12	670	GUARDRAIL, TL-2 (SINGLE FACED) at _____ PER FOOT				
623.1	40	STEEL THRIE BEAM HIGHWAY GUARD (SINGLE FACED) at _____ PER FOOT				
627.82	6	GUARDRAIL TANGENT END TREATMENT, TL-2 at _____ PER EACH				
628.25	2	TRANSITION TO THRIE BEAM at _____ PER EACH				

Carried Forward

	Quantity	Item with Unit Bid Price Written in Words	Unit Price Dollars	Cents	Amount Dollars	Cents
		Brought Forward				
645.048	420	48 INCH CHAIN LINK FENCE (PIPE TOP RAIL) (LINE POST OPTION) at _____ PER FOOT				
670.	80	FENCE REMOVED AND RESET at _____ PER FOOT				
686.1	4,200	MODULAR BLOCK RETAINING WALL - LOCATION 1 at _____ PER SQUARE FOOT				
691.	440	BALANCE STONE WALL REMOVED AND REBUILT at _____ PER FOOT				
691.1	50	BOULDER REMOVED AND RESET at _____ PER EACH				
691.2	5	LANDSCAPE PLANTER REMOVED AND RESET at _____ PER EACH				
697.1	70	SILT SACK at _____ PER EACH				
701.1	50	CEMENT CONCRETE SIDEWALK AT DRIVEWAYS at _____ PER SQUARE YARD				
		Carried Forward				

	Quantity	Item with Unit Bid Price Written in Words	Unit Price Dollars	Cents	Amount Dollars	Cents
		Brought Forward				
701.2	90	CEMENT CONCRETE WHEELCHAIR RAMP at _____ PER SQUARE YARD				
702.	660	HOT MIX ASPHALT WALK SURFACE at _____ PER TON				
703.	550	HOT MIX ASPHALT DRIVEWAY at _____ PER TON				
715.	40	RURAL MAIL BOX REMOVED AND RESET at _____ PER EACH				
748.	1	MOBILIZATION at _____ PER LUMP SUM				
751.	850	LOAM BORROW at _____ PER CUBIC YARD				
756.	1	NPDES STORMWATER POLLUTION PREVENTION PLAN at _____ PER LUMP SUM				
765.	5,700	SEEDING at _____ PER SQUARE YARD				
		Carried Forward				

BASE BID
Elm Street
Bridgewater, MA

	Quantity	Item with Unit Bid Price Written in Words	Unit Price Dollars	Unit Price Cents	Amount Dollars	Amount Cents
		Brought Forward				
765.457	600	SEEDING - INFILTRATION BASIN BOTTOM / SWALE MIX at _____ PER SQUARE YARD				
767.121	6,450	SEDIMENT CONTROL BARRIER at _____ PER FOOT				
769.	300	PAVEMENT MILLING MULCH UNDER GUARD RAIL at _____ PER FOOT				
832.	150	WARNING-REGULATORY AND ROUTE MARKER - ALUMINUM PANEL (TYPE A) at _____ PER SQUARE FOOT				
833.5	15	DEMOUNTABLE REFLECTORIZED DELINEATOR - GUARD RAIL at _____ PER EACH				
833.7	6	DELINEATION FOR GUARD RAIL TERMINI at _____ PER EACH				
847.1	15	SIGN SUP (N/GUIDE)+RTE MKR W/1 BRKWAY POST ASSEMBLY - STEEL at _____ PER EACH				
		Carried Forward				

	Quantity	Item with Unit Bid Price Written in Words	Unit Price Dollars	Cents	Amount Dollars	Cents
		Brought Forward				
851.1	300	TRAFFIC CONES FOR TRAFFIC MANAGEMENT at _____ PER DAY				
852.	900	SAFETY SIGNING FOR TRAFFIC MANAGEMENT at _____ PER SQUARE FOOT				
853.1	10	PORTABLE BREAKAWAY BARRICADE TYPE III at _____ PER EACH				
853.2	500	TEMPORARY BARRIER (TL-2) at _____ PER FOOT				
853.21	500	TEMPORARY BARRIER REMOVED AND RESET at _____ PER FOOT				
853.41	2	TEMPORARY IMPACT ATTENUATOR FOR SHLDR, INCAPABLE OF REDIRECTION at _____ PER EACH				
853.411	4	TEMPORARY IMPACT ATTENUATOR FOR SHOULDER, INCAPABLE OF REDIRECTION, REMOVED AND RESET at _____ PER EACH				
854.016	17,200	TEMPORARY PAVING MARKINGS - 6 INCH (PAINTED) at _____ PER FOOT				
		Carried Forward				

	Quantity	Item with Unit Bid Price Written in Words	Unit Price Dollars	Unit Price Cents	Amount Dollars	Amount Cents
		Brought Forward				
854.036	1,300	TEMPORARY PAVING MARKINGS - 6 INCH (TAPE) at _____ PER FOOT				
856.12	650	PORTABLE CHANGEABLE MESSAGE SIGN at _____ PER DAY				
859.	105,800	REFLECTORIZED DRUM at _____ PER DAY				
859.1	650	REFLECTORIZED DRUMS WITH SEQUENTIAL FLASHING WARNING LIGHTS at _____ PER DAY				
866.104	17,300	4 INCH REFLECTORIZED WHITE LINE (THERMOPLASTIC) at _____ PER FOOT				
866.112	200	12 INCH REFLECTORIZED WHITE LINE (THERMOPLASTIC) at _____ PER FOOT				
867.104	17,200	4 INCH REFLECTORIZED YELLOW LINE (THERMOPLASTIC) at _____ PER FOOT				
		Carried Forward				

BASE BID
Elm Street
Bridgewater, MA

	Quantity	Item with Unit Bid Price Written in Words	Unit Price Dollars	Unit Price Cents	Amount Dollars	Amount Cents
		Brought Forward				
874.1	1	STREET SIGN REMOVED AND RESET at _____ PER EACH				
874.4	5	TRAFFIC SIGN REMOVED AND STACKED at _____ PER EACH				
901.	70	4000 PSI, 1.5 INCH, 565 CEMENT CONCRETE at _____ PER CUBIC YARD				
904.	4	4000 PSI, 3/4 INCH, 610 CEMENT CONCRETE at _____ PER CUBIC YARD				
910.1	4,300	STEEL REINFORCEMENT FOR STRUCTURES - EPOXY COATED at _____ PER POUND				
950.65	1	SUPPORT OF EXCAVATION at _____ PER LUMP SUM				
983.	200	DUMPED RIPRAP at _____ PER TON				
986.	90	MODIFIED ROCKFILL at _____ PER TON				
		Carried Forward				

BASE BID
Elm Street
Bridgewater, MA

	Quantity	Item with Unit Bid Price Written in Words	Unit Price Dollars	Cents	Amount Dollars	Cents
		Brought Forward				
991.111	1	CONTROL OF WATER at _____ PER LUMP SUM				
999.	1	CONSTRUCTION STAKING at _____ PER LUMP SUM				
999.1	1	MATERIAL TESTING at _____ PER LUMP SUM				
999.2	1	POLICE SERVICES at Two Hundred Thousand Dollars ALLOWANCE	$200,000	00	$200,000	00
		Total				

Supplemental Form for General Bid

Add Alternate Bid

Project: Elm Street
Location: Bridgewater, MA

Item Number	Quantity	Item with Unit Bid Price Written in Words	Unit Price Dollars	Unit Price Cents	Amount Dollars	Amount Cents
101.	0.1	CLEARING AND GRUBBING at _____ PER ACRE				
102.52	400	TEMPORARY TREE PROTECTION FENCE at _____ PER FOOT				
120.1	600	UNCLASSIFIED EXCAVATION at _____ PER CUBIC YARD				
121.	10	CLASS A ROCK EXCAVATION at _____ PER CUBIC YARD				
141.	800	CLASS A TRENCH EXCAVATION at _____ PER CUBIC YARD				
141.1	40	TEST PIT FOR EXPLORATION at _____ PER CUBIC YARD				
		Carried Forward				

	Quantity	Item with Unit Bid Price Written in Words	Unit Price Dollars	Cents	Amount Dollars	Cents
		Brought Forward				
144.	10	CLASS B ROCK EXCAVATION at _____ PER CUBIC YARD				
151.	900	GRAVEL BORROW at _____ PER CUBIC YARD				
156.	300	CRUSHED STONE at _____ PER TON				
170.	2100	FINE GRADING AND COMPACTING - SUBGRADE AREA at _____ PER SQUARE YARD				
191.	40	DRIVE SAMPLE BORING at _____ PER FOOT				
191.10	80	HOLLOW STEM AUGER BORINGS at _____ PER FOOT				
191.11	10	CORE BORING at _____ PER FOOT				
193.	1	MOBILIZATION AND DISMANTLING OF BORING EQUIPMENT at _____ PER LUMP SUM				
		Carried Forward				

	Quantity	Item with Unit Bid Price Written in Words	Unit Price Dollars	Cents	Amount Dollars	Cents
		Brought Forward				
220.	20	DRAINAGE STRUCTURE ADJUSTED at _____ PER EACH				
220.2	10	DRAINAGE STRUCTURE REBUILT at _____ PER FOOT				
220.7	1	SANITARY STRUCTURE ADJUSTED at _____ PER EACH				
222.3	2	FRAME AND GRATE (OR COVER) MUNICIPAL STANDARD at _____ PER EACH				
227.3	30	REMOVAL OF DRAINAGE STRUCTURE SEDIMENT at _____ PER CUBIC YARD				
227.31	150	REMOVAL OF DRAINAGE PIPE SEDIMENT at _____ PER FOOT				
258.	40	STONE FOR PIPE ENDS at _____ PER SQUARE YARD				
357.08	2	8 INCH GATE BOX at _____ PER EACH				
		Carried Forward				

	Quantity	Item with Unit Bid Price Written in Words	Unit Price Dollars	Cents	Amount Dollars	Cents
		Brought Forward				
357.16	1	16 INCH GATE BOX at _____ PER EACH				
358.	5	GATE BOX ADJUSTED at _____ PER EACH				
402.	60	DENSE GRADED CRUSHED STONE FOR SUB-BASE at _____ PER CUBIC YARD				
415.	6000	PAVEMENT MICROMILLING at _____ PER SQUARE YARD				
440.	3300	CALCIUM CHLORIDE FOR ROADWAY DUST CONTROL at _____ PER POUND				
443.	6	WATER FOR ROADWAY DUST CONTROL at _____ PER MEGA GALLON				
450.23	830	SUPERPAVE SURFACE COURSE - 12.5 (SSC - 12.5) at _____ PER TON				

Carried Forward

	Quantity	Item with Unit Bid Price Written in Words	Unit Price Dollars	Cents	Amount Dollars	Cents
		Brought Forward				
450.32	150	SUPERPAVE INTERMEDIATE COURSE - 19.0 (SIC - 19.0) at _____ PER TON				
450.42	120	SUPERPAVE BASE COURSE - 37.5 (SBC - 37.5) at _____ PER TON				
451.	70	HMA FOR PATCHING at _____ PER TON				
452.	600	ASPHALT EMULSION FOR TACK COAT at _____ PER GALLON				
453.	3650	HMA JOINT SEALANT at _____ PER FOOT				
472.	10	HOT MIX ASPHALT FOR MISCELLANEOUS WORK at _____ PER TON				
506.	280	GRANITE CURB TYPE VB - STRAIGHT at _____ PER FOOT				
		Carried Forward				

	Quantity	Item with Unit Bid Price Written in Words	Unit Price Dollars	Cents	Amount Dollars	Cents
		Brought Forward				
506.1	110	GRANITE CURB TYPE VB - CURVED at _____ PER FOOT				
509.	40	GRANITE TRANSITION CURB FOR WHEELCHAIR RAMPS - STRAIGHT at _____ PER FOOT				
509.1	70	GRANITE TRANSITION CURB FOR WHEELCHAIR RAMPS - CURVED at _____ PER FOOT				
580.	550	CURB REMOVED AND RESET at _____ PER FOOT				
620.12	440	GUARDRAIL, TL-2 (SINGLE FACED) at _____ PER FOOT				
627.82	2	GUARDRAIL TANGENT END TREATMENT, TL-2 at _____ PER EACH				
645.048	380	48 INCH CHAIN LINK FENCE (PIPE TOP RAIL) (LINE POST OPTION) at _____ PER FOOT				
		Carried Forward				

	Quantity	Item with Unit Bid Price Written in Words	Unit Price Dollars	Cents	Amount Dollars	Cents
		Brought Forward				
686.2	3750	MODULAR BLOCK RETAINING WALL - LOCATION 2 at _____ PER SQUARE FOOT				
691.1	10	BOULDER REMOVED AND RESET at _____ PER EACH				
697.1	5	SILT SACK at _____ PER EACH				
701.2	60	CEMENT CONCRETE WHEELCHAIR RAMP at _____ PER SQUARE YARD				
702.	110	HOT MIX ASPHALT WALK SURFACE at _____ PER TON				
703.	20	HOT MIX ASPHALT DRIVEWAY at _____ PER TON				
711.	1	BOUND REMOVED AND RESET at _____ PER EACH				

Carried Forward

	Quantity	Item with Unit Bid Price Written in Words	Unit Price Dollars	Cents	Amount Dollars	Cents
		Brought Forward				
715.	1	RURAL MAIL BOX REMOVED AND RESET at _____ PER EACH				
748.	1	MOBILIZATION at _____ PER LUMP SUM				
751.	200	LOAM BORROW at _____ PER CUBIC YARD				
765.	1500	SEEDING at _____ PER SQUARE YARD				
767.121	900	SEDIMENT CONTROL BARRIER at _____ PER FOOT				
769.	650	PAVEMENT MILLING MULCH UNDER GUARD RAIL at _____ PER FOOT				
804.3	700	3 INCH ELECTRICAL CONDUIT TYPE NM - PLASTIC -(UL) at _____ PER FOOT				
811.31	12	PULL BOX 12 X 12 INCHES - SD2.031 at _____ PER EACH				
		Carried Forward				

	Quantity	Item with Unit Bid Price Written in Words	Unit Price Dollars	Cents	Amount Dollars	Cents
		Brought Forward				
815.98	40	FOOTING COST ADJUSTMENT at _____ PER FOOT				
816.01	1	TRAFFIC SIGNAL RECONSTRUCTION LOCATION NO. 1 at _____ PER LUMP SUM				
832.	60	WARNING-REGULATORY AND ROUTE MARKER - ALUMINUM PANEL (TYPE A) at _____ PER SQUARE FOOT				
833.5	7	DEMOUNTABLE REFLECTORIZED DELINEATOR - GUARD RAIL at _____ PER EACH				
833.7	2	DELINEATION FOR GUARD RAIL TERMINI at _____ PER EACH				
847.1	30	SIGN SUP (N/GUIDE)+RTE MKR W/1 BRKWAY POST ASSEMBLY - STEEL at _____ PER EACH				
851.1	150	TRAFFIC CONES FOR TRAFFIC MANAGEMENT at _____ PER DAY				
		Carried Forward				

	Quantity	Item with Unit Bid Price Written in Words	Unit Price Dollars	Cents	Amount Dollars	Cents
		Brought Forward				
852.	400	SAFETY SIGNING FOR TRAFFIC MANAGEMENT at _____ PER SQUARE FOOT				
853.1	10	PORTABLE BREAKAWAY BARRICADE TYPE III at _____ PER EACH				
853.21	500	TEMPORARY BARRIER REMOVED AND RESET at _____ PER FOOT				
853.411	2	TEMPORARY IMPACT ATTENUATOR FOR SHOULDER, INCAPABLE OF REDIRECTION, REMOVED AND RESET at _____ PER EACH				
854.016	5600	TEMPORARY PAVING MARKINGS - 6 INCH (PAINTED) at _____ PER FOOT				
854.036	800	TEMPORARY PAVING MARKINGS - 6 INCH (TAPE) at _____ PER FOOT				
856.12	400	PORTABLE CHANGEABLE MESSAGE SIGN at _____ PER DAY				
		Carried Forward				

	Quantity	Item with Unit Bid Price Written in Words	Unit Price Dollars	Cents	Amount Dollars	Cents
		Brought Forward				
859.	6800	REFLECTORIZED DRUM at _____ PER DAY				
859.1	400	REFLECTORIZED DRUMS WITH SEQUENTIAL FLASHING WARNING LIGHTS at _____ PER DAY				
864.04	200	PAVEMENT ARROWS AND LEGENDS REFLECTORIZED WHITE (THERMOPLASTIC) at _____ PER SQUARE FOOT				
866.104	2850	4 INCH REFLECTORIZED WHITE LINE (THERMOPLASTIC) at _____ PER FOOT				
866.112	450	12 INCH REFLECTORIZED WHITE LINE (THERMOPLASTIC) at _____ PER FOOT				
867.104	2000	4 INCH REFLECTORIZED YELLOW LINE (THERMOPLASTIC) at _____ PER FOOT				
867.112	150	12 INCH REFLECTORIZED YELLOW LINE (THERMOPLASTIC) at _____ PER FOOT				
		Carried Forward				

ADD ALTERNTE BID
Elm Street
Bridgewater, MA

	Quantity	Item with Unit Bid Price Written in Words	Unit Price Dollars	Cents	Amount Dollars	Cents
		Brought Forward				
874.2	8	TRAFFIC SIGN REMOVED AND RESET at _____ PER EACH				
874.4	3	TRAFFIC SIGN REMOVED AND STACKED at _____ PER EACH				
986.	180	MODIFIED ROCKFILL at _____ PER TON				
999.	1	CONSTRUCTION STAKING at _____ PER LUMP SUM				
999.1	1	MATERIAL TESTING at _____ PER LUMP SUM				
999.2	1	POLICE SERVICES at _____Eighty Thousand Dollars_____ ALLOWANCE	$80,000	00	$80,000	00
		Total				

ITEM 950.65 SUPPORT OF EXCAVATION LUMP SUM

The work under this item shall conform to the relevant provisions of Sections 140 and 950 of the Standard Specifications and the following:

The work shall include the design, furnishing, installation and removal of temporary support of excavation for construction of proposed headwalls (2 locations) and retaining wall (1 location) on Elm Street as shown on the plans and as directed by the Engineer. Temporary support of excavation is required to minimize impacts to the adjacent roadway, minimize impacts to wetland areas and protect existing utilities during construction of the headwalls and retaining wall.

The Engineer's approval of the Support of Excavation Plan will be general in character and shall not relieve the Contractor from the responsibility for the adequacy of the design, materials and workmanship of the stabilization to safely support the trench walls.

For the purpose of this specification, the temporary excavation support system shall be any type of adequately designed earth support system that satisfies the design criteria outlined within this section. Dewatering methods are to be included in the selection and design of the temporary braced excavation system.

All materials used for this excavation support, whether new or used, shall be sound and free from strength impairing defects. New steel sheeting (if used) shall conform to the applicable provisions of Section 950 and the requirements of AASHTO M202.

Before starting excavation, the Contractor shall prepare and submit to the Engineer for approval, a Support of Excavation Plan. The submittal shall include drawings and calculations for the proposed temporary braced excavation system, stamped by a Professional Engineer registered in the Commonwealth of Massachusetts. The temporary excavation support system shall be designed according to the following criteria:

1. The braced excavation system shall be designed to resist the flows, saturated soil, water elevation of the adjacent wetland area and stream in order for all elements to be constructed in the dry.

2. The Contractor shall make his own evaluation of existing conditions and facilities, and of the effects of the proposed excavation support system and construction methods, and shall provide in his design for all loads and methods necessary to permit construction of the proposed headwalls and retaining walls in the dry while maintaining public safety and protecting completed work (and all third party property) from damage caused by his operations.

3. The Contractor should be aware that ledge may be encountered during excavation.

4. No element of the support system shall be spliced unless approved by the Engineer.

The proposed excavation support system must be constructed within the existing Right-of-Way and/or easements. Access to all abutting properties must be maintained.

The Contractor shall accurately locate all utility lines and structures to ensure that the proposed braced excavation system will not interfere with them.

Project conditions

Existing Utilities: The Contractor shall not interrupt utilities serving facilities occupied by the Town or others unless permitted in writing by Engineer and then only after arranging to provide temporary utility services according to requirements indicated.

A geotechnical report has been prepared for this Project and is included within these bid documents for information only. The opinions expressed in this report are those of the design geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by the design geotechnical engineer. The Town will not be responsible for interpretations or conclusions drawn from this data.

1. The Contractor shall make additional test borings and conduct other exploratory operations if necessary for design and construction of excavation support and protection.

2. The geotechnical report is provided within these bid documents for review by the Contractor.

Method of Measurement and Basis of Payment

The work to be done under this item shall all labor, materials, equipment and all incidental costs required to complete the work.

Item 950.65, Support of Excavation shall be measured as one lump sum for all locations.

Item 950.65, Support of Excavation shall be paid for at the contract unit price per lump sum, which price shall include all labor, material, transportation, equipment, tools, disposal fees necessary or incidentals to complete the work as specified above, as shown on the Plans and/or as required.

Payment will be made in installments with 50% paid upon satisfactory installation, and the remaining 50% paid upon satisfactory removal.

ITEM 999.1 MATERIAL TESTING LUMP SUM

The work under this item shall conform to the relevant provisions of Sections 150, 400 and 901 of the Standard Specifications and the following:

The Contractor shall secure the services of an independent full-service testing agency specializing in testing, inspection of construction materials and practices. The testing agency shall provide testing of the borrow materials, base and sub-base, hot mix asphalt (HMA) pavements, and concrete foundations to document conformance with the specifications.

Testing shall include, but is not limited to, the following:

Shop Drawing Approval of Borrow Materials (gravel borrow, special borrow and dense graded crushed stone) - Samples, sieve analysis and proctor results shall be provided for all materials to be used on the project. This information will be submitted as part of the Shop Drawings for said materials.

Controlled Fills – Tests for compaction of Gravel Borrow, Special Borrow and Dense Graded Crushed Stone, the materials shall be field-tested utilizing a nuclear densometer (ASTM D2922) or Sand Cone Method (ASTM D1556). These tests shall confirm that the minimum required compaction has been reached prior to placing additional fill above the tested material. Compaction tests for each material shall occur at a minimum of every 500 feet as measured along the roadway construction baseline. Locations of the compaction tests for each material shall be determined by the Engineer.

HMA pavements (for Item 450) – Job mix formula and tests for temperature, thickness and bulk density using a nuclear densometer. These tests shall confirm that HMA material is being placed within MassDOT's standard requirements and that the minimum required compaction has been reached prior to completion of rolling/back rolling. Compaction tests for each pavement lift shall occur at a minimum of every 250 feet as measured along the roadway construction baseline until compaction criteria is satisfied.

Concrete foundations (for traffic signal mast arm foundations) – MCIB and ACI certified technicians shall perform standard slump, temperature, and air content tests during the placement of concrete for each of the proposed mast arm foundations. The technicians shall also fabricate five (5) test cylinders for compressive strength tests. Test cylinders shall be transported to a concrete laboratory and stored in a curing room until compressive strength tests are performed at seven (7) days, fourteen (14) days and twenty-eight (28) days. Tests shall confirm that a minimum of 90% compressive strength has been achieved before loading the mast arm foundations with traffic signal equipment.

Method of Measurement

Material Testing shall be measured as one lump sum and shall include all testing required for the duration of the project.

Basis of Payment

Material Testing will be paid for at the Contract unit price per lump sum, which price shall include all labor, materials, equipment and incidental costs

required to complete the work. The first 35 percent payment shall be made upon completion of the first testing performed for controlled fills. A second 35 percent payment shall be made upon completion of the first testing performed for HMA pavements. The final 30 percent payment shall be made upon completion of all testing, and submittal of acceptable results.

ITEM 991.111 **CONTROL OF WATER** **LUMP SUM**

The work under this item shall conform to the relevant provisions of Section 7.02 of the Standard Specifications and the following:

The work shall consist of the control of water for construction of proposed headwalls (2 locations) and one retaining wall on Elm Street as shown on the plans. The work shall include the furnishing, installation, operation, maintenance, and removal of the water control system required for the construction of the proposed culvert headwalls in the dry. The Water Control System shall be capable of both preventing flow through the constructed works and the lowering of the water table to an elevation below the bottom of foundation, as determined by the Engineer and as shown on the plans.

The Contractor shall install and maintain temporary measures for the containment of the stream flow, the collection of siltation and debris due to construction activities and the maintenance of drainage through the drainage system upstream and downstream during the construction period. Temporary control measures shall include, but not be limited to, the use of sandbags, stone dikes and dams, sediment basins, crushed stone, paved or unpaved waterways and other devices or methods which meet the requirements of this section and the approval of the Engineer.

The use of earthen berms in the stream is prohibited.

The Contractor shall determine the status and field verify the location of all underground utilities located in the vicinity of the proposed work area before excavating for the headwalls.

The Contractor shall be responsible for the removal and legal disposal of all temporary structures or devices off the site, the regrading, loaming and seeding of disturbed areas, replacement of stone for erosion control and other incidental work required, as directed by the Engineer.

The Contractor shall submit a Schedule of Operations defining and detailing the methods for control of water and type of installation to be used to the Engineer for approval prior to construction.

Attention is further directed to the requirements of the Conservation Commission's Order of Conditions included in these Special Provisions.

Control of water will be paid for at the Contract lump sum price, which price shall include all labor, materials, equipment and incidental costs required to complete this work.

Appendix C – Elm Street Soil Boring Logs

LGCI
Lahlaf Geotechnical Consulting, Inc.

GEOTECHNICAL REPORT
PROPOSED HEADWALLS AND RETAINING WALL
BRIDGEWATER, MASSACHUSETTS

LGCI Project No. 1906
June 6, 2019

Prepared for:

VANASSE HANGEN BRUSTLIN, INC.
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P.O. Box 9151
Watertown, MA 02471-9151
Phone: (617) 924-1770
Fax: (617) 924-2286

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Prepared by:

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Principal Engineer

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1. PROJECT INFORMATION

1.1 Project Authorization

This report presents the results of subsurface explorations and a geotechnical evaluation performed by Lahlaf Geotechnical Consulting, Inc. (LGCI) for the proposed Headwalls and Retaining Wall in Bridgewater, Massachusetts. We performed our services in general accordance with our proposal No. 19032 dated March 27, 2019 and in accordance with the terms and conditions of the Subconsultant Authorization from Vanasse Hangen Brustlin, Inc. (VHB) dated March 28, 2019. Our services were authorized by Mr. Mark E. Shamon of VHB by signing our Subconsultant Authorization on April 26, 2019.

1.2 Purpose and Scope of Services

The purpose of our services is to explore the subsurface conditions at the proposed headwalls, retaining wall, and detention basin, and to provide foundation design and construction recommendations for the proposed headwalls and retaining wall.

To date, LGCI has performed the following services:

- Marked the boring locations in the field.
- Engaged a drilling subcontractor to advance six (6) borings. Our drilling subcontractor contacted Dig Safe Systems, Inc. (Dig Safe) and the Town of Bridgewater to clear the boring locations for utilities, and applied for and obtained a street opening permit from the Town of Bridgewater. Our drilling subcontractor also coordinated with a police detail.
- Provided a geotechnical engineer at the site to coordinate and observe borings and collect soil samples and prepare field logs. Our field engineer also performed hand probes near the boring locations.
- Submitted two (2) soil samples to a laboratory for grain-size analyses.
- Prepared this geotechnical report containing the results of our subsurface exploration and our foundation design and construction recommendations.

Our scope did not include preparing specifications, performing contract document review, or providing construction services. LGCI would be pleased to perform these services when needed. Recommendations for stormwater management, erosion control, pavement design, and detailed cost or quantity estimates were not included in our scope of work.

LGCI did not perform environmental services for this project. LGCI did not perform an assessment to evaluate the presence or absence of hazardous or toxic materials above or below the ground surface at or around the site. Any statement about the color, odor, or the presence of

suspicious materials included in our boring logs or report were made by LGCI for information only and to support our geotechnical services. No environmental recommendations and/or opinions are included in this report.

1.3 Site Description

Our understanding of the existing conditions is based on our field observations, our discussions with Vanasse Hangen Brustlin, Inc. (VHB), and on the following drawings:

- "Plan and Profile of Elm Street in the Town of Bridgewater, Plymouth County, 75% Design Progress Set," (Site Plan) prepared by Vanasse Hangen Brustlin, Inc. (VHB), dated March 5, 2019, and emailed to LGCI by VHB on March 13, 2019.

- "Plan of Topographic Survey of Elm Street, in the Town of Bridgewater, as ordered by the Massachusetts Department of Transportation, Highway Division," (Topographic Plan) prepared by VHB, dated November 3, 2019, and e-mailed to LGCI by VHB on May 29, 2019.

Based on the Site Plan, the site consists of the stretch of Elm Street that extends in the north-south direction from Sta. 10+50 to Sta. 95+00, i.e., between just south of Sophia Lane (north of Pleasant Street) and Scotland Street in Bridgewater, Massachusetts as shown in Figure 1. This stretch of Elm Street is a 2-way roadway with one lane in each direction and is lined by residential and commercial properties.

The portions of Elm Street that are the focus of this report are as follows:

- Between Sta. 36+00 and Sta. 38+00 near a proposed reinforced concrete pipe (RCP) culvert). A 12-inch concrete masonry (CMP) pipe crosses Elm Street at a high skew angle and channels the water from a small stream across Elm Street. Based on the Topographic Plan, the existing grade on Elm Street near the CMP pipe ranges between El. 67.5 and El. 68, and the invert of the CMP pipe is at El. 61.47. The inlet of the CMP pipe is located at approximately Sta. 36+50, about 9.5 feet away from the existing edge of pavement. The outlet for the CMP pipe is located at approximately Sta. 37+80, about 7.3 feet away from the existing edge of pavement. Utility pole No. 18 is located about 9.5 feet away from the existing outlet of the CMP pipe.
- Between Sta. 52+00 and Sta. 56+00 near proposed retaining wall. Based on the Topographic Plan, the existing grade ranges between El. 63 and El. 64 near the proposed retaining wall between approximate Sta. 52+00 and Sta. 56+00. Wetlands are located on either side of the Elm Street between these stations. Also, four (4) utility poles (Nos. road 29 to 32) are located on the eastern side of Elm Street between these stations.
- Between Sta. 93+00 and 94+00 near proposed detention basin. Based on the Topographic Plan, the existing grade in the general area of the proposed detention basin ranges between El. 61 and El. 62.

1.4 Project Description

Our understanding of the proposed construction is based on our field observations, our discussions with VHB, and on the following drawings:

- "Retaining Wall Details, Elm Street, Bridgewater," (Wall Details) (sheets 39 to 49 of 62), prepared by VHB and provided to LGCI by VHB via e-mail on June 6, 2019.

We understand that VHB has been engaged by the Town of Bridgewater to design improvements to Elm Street in Bridgewater, Massachusetts. We understand that as part of the improvements, two headwalls will be constructed near Sta. 36+50 and near Sta. 37+50, a retaining wall between Sta. 52+00 and Sta. 56+00, and a detention basin between Sta. 93+00 and 94+00.

We understand that the proposed retaining wall and headwalls will be offset about 5 feet from the edge of the existing roadway.

Based on the Wall Details, the proposed RCP pipe (culvert) will have an inlet and outlet at El. 62.1 and El. 61.5, respectively. The headwalls of the proposed culvert will also have drain outlets at El. 63 and El. 63.2. We understand that the bottom of the proposed headwall footing on the western side (Wall 1) will be at El 59.5 and the top of the proposed headwall will range up to El. 68, i.e., the proposed headwall (Wall 1) will have a total height of about 8.5 feet. The bottom of the proposed headwall footing on the eastern side (Wall 2) will be at El 58.5 and the top of the proposed headwall will range up to El. 66, i.e., the proposed headwall (Wall 2) will have a total height of about 7.5 feet.

Based on the Wall Details, the proposed retaining wall between Sta. 52+00 and Sta. 56+00 (Wall 3) will consist of modular block and will have a top of wall that ranges between El. 64.48 and El. 64.68. The grade in front of the proposed wall will range between El. 59.07 and El. 64.17. The total exposed height of the proposed wall will range up to about 4.5 feet.

Based on the Site Plan referenced in Section 1.3, the proposed detention basin will range down to El. 57 from about El. 61.

1.5 Elevation Datum and Station Numbers

We understand that the elevations contained in the drawings of the proposed construction provided to us by VHB are referenced with respect to the North American Vertical Datum (NAVD) of 1988 and are in feet. Station numbers are in feet.

2. SITE AND SUBSURFACE CONDITIONS

2.1 Surficial Geology

LGCI reviewed the following surficial geological map: "Surficial Geologic Map of the Taunton Quadrangle, Massachusetts," prepared by Stone, J.R. and DiGiacomo-Cohen, M.L. for U.S. Geological Survey, 2018, Scientific Investigation Map 3402, Quadrangle 129.

The surficial geologic map indicates that the natural soils in the general vicinity of the site consist of coarse deposits, fine deposits, and swamp deposits. The coarse deposits are comprised of gravel deposits, sand and gravel deposits and sand deposits. The gravel deposits may contain cobbles and boulders. Fine layers may contain very fine sand, silt, and cay. The fine deposits include very fine sand, silt, and clay that occur as well sorted thin layers of alternating silt and clay (varves). The swamp deposits consist of organic muck and peat and contain minor amounts of sand, silt, and clay.

The surficial geologic map of the site is shown in Figure 2.

2.2 LGCI's Borings and Hand Probes

LGCI marked the boring locations in the field and our drilling subcontractor notified Dig Safe and the Town of Bridgewater for utility clearance prior to performing the borings at the site.

LGCI engaged Northern Drill Service, Inc. of Northborough, Massachusetts to advance six (6) borings (B-1 to B-6) at the site between May 13 and May 16, 2019. An LGCI engineer observed and logged the borings in the field. The borings were advanced with a Diedrich D-25 mobile drill rig using drive and wash techniques with a 4-inch casing.

The borings extended to depths ranging between 26 and 49.3 feet beneath the ground surface. The drilling subcontractor performed Standard Penetration Tests (SPT) and obtained split spoon samples with a safety hammer semi-continuously or at five-foot intervals as noted in the boring logs in general accordance with ASTM D-1586. Unless notified otherwise, we will dispose of the soil samples after three months.

Upon completion, the boreholes were backfilled with drill cuttings and gravel, and the ground surface was restored in paved areas with asphalt cold patch.

The borings were advanced from the street level. To explore the subsurface conditions in the top few feet near the bottom of the roadway embankments, the LGCI field engineer performed six (6) hand probes. The probes were generally advanced using a hand auger near the locations of the borings.

Appendix A contains LGCI's boring logs, and Figures 3A, 3B and 3C show the boring and hand probe locations. Appendix B contains the logs of our hand probes and Table 1 contains a summary of the LGCI's borings and hand probes.

2.3 Subsurface Conditions

The subsurface description in this report is based on a limited number of explorations and is intended to highlight the major soil strata encountered during our explorations. The subsurface conditions are known only at the actual exploration locations. Variations may occur and should be expected between exploration locations. The exploration logs represent conditions that we observed at the time of our explorations and were edited, as appropriate, based on the results of the laboratory test data and inspection of the soil samples in the laboratory. The strata boundaries shown in our exploration logs are based on our interpretations and the actual transition may be gradual. Graphic soil symbols are for illustration only.

The soil strata encountered in the borings and hand probes were as follows, starting at the ground surface:

Asphalt – Asphalt was encountered at the ground surface in all borings. The asphalt was 3 inches to 6 inches thick.

Forest Mat/Topsoil/Subsoil – A layer of forest mat was encountered at the ground surface in hand probe P-1. This layer was 0.3 feet thick. A layer of surficial organic soil (topsoil and subsoil) was encountered at the ground surface in hand probes P-2 to P-4 and below the forest mat in hand probe P-1. This layer was 1.5 to 3 feet thick.

Fill – A layer of fill was encountered underneath the asphalt in all borings. The fill extended to depths of 2.9 feet to 7.5 feet beneath the ground surface. The soil samples in the fill layer were generally described as poorly graded sand, silty sand, poorly graded gravel, and silty gravel. The fines content in the fill ranged between 5 and 40 percent. The fill contained traces of organic soil, peat, and roots.

The standard penetration tests (SPT) N-values in the fill ranged between 7 and 50 blows per foot (bpf) with most values lower than 20 bpf, indicating mostly loose to medium dense material.

Peat – A layer of buried organic soil and peat was encountered beneath the fill in borings B-1, B-4, and B-5. The peat extended to depths of 4 to 6 feet beneath the ground surface

Sand – A layer of sand was encountered at the ground surface in hand probes P-5 to P-6, and beneath the asphalt, topsoil/subsoil, peat, or fill in all remaining borings and hand probes. The sand extended to depths of 19 to 25.4 feet below the ground surface. The samples in this layer were mostly described as silty sand and occasionally as poorly graded sand, well graded gravel, and silty gravel. The fines content in this layer ranged up to 40 percent fines. In a few samples

the fines content was higher and the samples were described as silt. A silt layer was encountered within the sand layer in borings B-1 and B-6.

The SPT N-values in this layer ranged between 7 bpf and more than 100 bpf, with most values lower than 50 bpf, indicating mostly loose sand to dense sand.

Weathered Rock – Weathered rock was encountered beneath the sand layer in all borings. The weathered rock extended to the termination depths of the borings. The samples in this layer were mostly broke into a soil matrix consisting mostly of silt with sand, sandy silt, silty sand, and silty sand. Split spoon refusal was generally encountered in most samples in this layer.

2.4 Groundwater

Groundwater was observed in borings B-1 to B-4 at depths ranging between 2.9 and 6 feet beneath the ground surface.

The groundwater levels measured during drilling are based on observations made shortly after the completion of the explorations. Note that water was introduced into the boreholes to maintain a stable borehole, and the groundwater levels noted in the boring logs may not represent the actual groundwater level, as additional time may be required for the groundwater levels to stabilize. The groundwater levels presented in this report only represent the conditions encountered at the time and location of the explorations. Seasonal fluctuation should be anticipated.

2.5 Laboratory Test Data

LGCI submitted two (2) samples for laboratory testing. The results are summarized in the table below. The laboratory data sheets are included in Appendix C.

Boring No.	Sample No.	Stratum	Sample depth (ft.)	Percent Gravel	Percent Sand	Percent Fines
B-5	S3 Bot. 6”	Nat. Sand	4.3 – 6.3 (Bot. 6”)	0	96.0	4
B-6	S3	Fill	4.3 – 6.3 (Top 6”)	16.0	81.3	2.7

3. EVALUATION AND RECOMMENDATIONS

3.1 General

Based on our understanding of the planned improvements, our observation of the borings, and the results of our laboratory testing, there are a few issues that we would like to highlight for consideration and discussion.

- The existing fill, the buried organic soil, and peat are not suitable to support the proposed headwalls and retaining walls. These materials should be entirely removed from under the proposed footings and the grades should be restored with Gravel Borrow to the bottom of the proposed headwall and retaining wall footings. We anticipate that the removal will extend to depths of up 7.5 feet beneath the existing ground surface.

- After the existing fill and organic soil/peat are removed, the proposed headwalls and retaining wall should be supported on shallow footings bearing in the Gravel Borrow.

- Temporary support of excavation (SOE) systems will be required during the construction of the proposed headwalls and retaining wall, especially where the excavations are in proximity of utility poles.

- Groundwater control operations will be required during the excavations for footings.

Foundations should be designed in accordance with AASHTO LRFD Bridge Design Specifications, 8th Edition, published in 2017 with the latest revisions (AASHTO-8).

3.2 Bearing Resistance and Settlement

- We estimated the nominal bearing resistance, q_n, for the wall based on assumed footing sizes ranging between 4 and 7 feet, an embedment depth of 4 feet, and a bearing subgrade in the natural sand or on Gravel Borrow placed directly on top of the natural sand. Using the reduced friction angle of 34 degrees for the sand layer near the proposed headwalls and retaining wall, we estimated the nominal resistance (in ksf) as a function of the width of the footings, B, in feet, as follows:

  $q_n = 3.7*B - 2.7$ (kips) (see last bullet about settlement controlled bearing resistance below)

- The factored bearing resistance, q_R, should be calculated by multiplying the nominal resistance, q_n, by the appropriate resistance factor, φ_b. The resistance factors should be as follows:

Service Limit State	1.0 (AASHTO 8, Section 10.5.5.1)
Extreme Limit State	1.0 (AASHTO 8, Section 10.5.5.3)
Strength Limit State	0.55 for Headwalls (AASHTO 8, Section 11.5.7)
	0.45 for Modular Wall (AASHTO 8, Section 11.5.7)

- Foundations should be placed at a minimum depth of 4 feet below the final grade to provide adequate frost cover protection. A deeper embedment depth should be provided, if needed, to protect the footings against scour along the stream for the proposed headwalls.

- If soft or loose pockets of soil are encountered at the subgrade, the soft or loose soils should be removed and the foundation should be placed at a lower elevation on firm soil, or the resulting excavation should be backfilled with Gravel Borrow (MassDOT M1.03.0, Type b) or crushed stone.

- We estimated the settlement of the proposed headwalls and retaining wall using a Young's Modulus of 6 kips per square inch (ksi) in the natural sand. We estimated the settlement for various widths of the proposed footings. To limit the settlement of the proposed headwalls and retaining wall to less than one (1) inch, the factored bearing resistance should be less than 4.4 ksf, i.e., the design factored bearing resistance should be the value calculated using the q_n value shown in the expression above (first bullet of this Section) or 4.4 ksf, whichever is less. We anticipate that the differential settlement of the wall will be ¾ inch or less over a distance of 25 feet.

3.3 Overall Stability

LGCI did not perform slope stability analyses. Due to the low exposed heights of the proposed headwalls and retaining wall and assuming that the organic soil and peat are removed from under the proposed headwalls and retaining wall over a distance of at least 2 feet beyond the limits of the proposed footings on both sides, we anticipate that the factor of safety for global stability for failure surfaces that encompass the proposed headwalls and retaining wall will be 1.5 or higher.

Slope stability analyses should be performed if the actual headwall and/or retaining wall geometry is changed.

3.4 Seismic Design

3.4.1 Seismic Parameters

In accordance with AASHTO-8, Section 3.10, the seismic criteria are as follows:

- Site Class: D
- Peak Ground Acceleration (PGA): 0.064g
- Spectral Response Acceleration at short period (S_s): 0.133g

- Spectral Response Acceleration at 1 sec. (S_1): 0.035g
- Site Factor F_{pga} (Table 3.10.3.2-1): 1.6
- Site Coefficient F_a (Table 3.10.3.2-2): 1.6
- Site Coefficient F_v (Table 3.10.3.2-3): 2.4
- Adjusted Peak Ground Acceleration, A_s: 0.102g
- Adjusted Spectral Response S_{DS}: 0.213g
- Adjusted Spectral Responses S_{D1}: 0.084g

Based on the boring information, we believe the site soils are in general not susceptible to liquefaction.

3.4.2 Seismic Design Criteria

Also, in accordance with AASHTO Guide Specifications for LRFD Seismic Bridge Design, the site is a Seismic Design Category (SDC) A. According to the MassDOT Bridge Manual (2013), Section 3.4.6.1, a seismic analysis is not required for SDC A.

3.5 Lateral Pressures for Wall Design

Lateral earth pressures recommended for design of the proposed headwalls and retaining wall are provided in the section below.

Coefficient of Active Earth Pressure, K_A:	0.29
Coefficient of At-Rest Earth Pressure, K_o:	0.47
Friction Angle between Backfill and Back of Wall, δ:	10 degrees
Total Unit Weight, γ:	125 pcf
Buoyant Unit Weight γ':	62.6 pcf

Note: The coefficient of active pressure value is based on Coulomb's equation using an internal friction angle for the backfill, ϕ, of 32 degrees and a friction angle between the backfill and the structure, δ, of 10 degrees. The coefficients of active and at-rest earth pressure are provided for wall backfill with a horizontal surface (non-sloping backfill) on the active side of the proposed headwalls and retaining wall.

- In accordance with MassDOT's LRFD Bridge Manual (2013) Section 3.1.6, and for cantilever walls not founded on rock or piles with a total height less than 16 feet, or spread-footing supported gravity walls, the coefficient of lateral earth pressure should be calculated using the following equation: $0.5*(K_A + K_o)$.

- In accordance with Section 3.3.1 of MassDOT's LRFD Bridge Manual (2013), the passive earth pressures should be neglected in front of the walls in determining local wall stability (overturning, sliding, and bearing pressures).

- In accordance with AASHTO-8, Section 3.4.1, for the Strength Limit State, a load factor of 1.5 should be applied to the lateral earth pressure.

- We recommend placing free-draining material (Gravel Borrow, MassDOT M1.03.0, Type b) within the 3 feet immediately behind the wall. We recommend providing weep holes in the walls to promote drainage.

- Assuming that the footings for the proposed headwalls are cast in place, we recommend an angle of friction ϕ_f of 30 degrees between the bottom of the footing and the native sand or Gravel Borrow, and 37 degrees between the bottom of the footing and crushed stone. Per AASHTO Table 11.5.7-1, a resistance factor of 1.0 should be used for cast in place walls. A resistance factor of 0.9, in accordance with Table 10.5.5.2.2.-1, should be used for prefabricated modular walls for the shear resistance between the bottom of the footing and the crushed stone or sand.

4. CONSTRUCTION CONSIDERATIONS

4.1 Subgrade Preparation

- The existing asphalt, topsoil/subsoil, existing fill, buried organic material, peat, abandoned utilities, and other below-ground structures should be entirely removed from under the proposed headwalls and retaining wall before the start of foundation work, and should be replaced with Gravel Borrow to the bottom of the proposed walls. The removal should extend beyond the footprint of the retaining walls a distance equal to the thickness of the Gravel Borrow placed beneath the bottom of the proposed walls or a minimum of 2 feet on all sides.

- We recommend using a smooth-edged bucket to reduce the potential for disturbance when excavating the last few inches of material.

- The subgrade of the proposed footings, in granular soils, should be compacted with a dynamic vibratory compactor imparting a minimum of 4 kips of force to the subgrade.

- Should boulders be encountered at the footing subgrade, the boulders should be removed, and the resulting excavation should be backfilled with compacted Gravel Borrow.

- To reduce the potential of increasing lateral pressures on the retaining walls, fill placed within 3 feet of the wall should be compacted using a small plate compactor imparting a maximum dynamic effort of 4 kips. The fill within 3 feet of the walls should be placed in maximum 8-inch loose lifts.

- Loose or soft soils identified during the compaction of footing subgrades should be excavated to a suitable bearing stratum as determined by the representative of LGCI. Grades should be restored by backfilling with Gravel Borrow (MHD M1.03.0, Type b) or crushed stone.

- When crushed stone is required in the drawings or it is used for the convenience of the contractor, it should be wrapped in a geotextile fabric for separation except where introduction of the geotextile promotes sliding. A geotextile should not be placed between the bottoms of the headwall and retaining wall footings and crushed stone.

- An LGCI representative should observe the exposed subgrades prior to fill and concrete placement to verify that the exposed bearing materials are suitable for the design soil bearing pressure. If soft or loose pockets are encountered in the footing excavations, the soft or loose materials should be removed, and the bottom of the footing should be placed at a lower elevation on firm soil, or the resulting excavation should be backfilled with Structural Fill, or crushed stone wrapped in a filter fabric.

4.2 Subgrade Protection

The onsite fill and natural sand are frost susceptible. If construction takes place during freezing weather, special measures should be taken to prevent the subgrade from freezing. Such measures should include the use of heat blankets or excavating the final six inches of soil just before pouring concrete. Footings should be backfilled as soon as possible after footing construction. Soil used as backfill should be free of frozen material, as should the ground on which it is placed. Filling operations should be halted during freezing weather.

Materials with high fines content are typically difficult to handle when wet as they are sensitive to moisture content variations. Subgrade support capacities may deteriorate when such soils become wet and/or disturbed. The contractor should keep exposed subgrades properly drained and free of ponded water. Subgrades should be protected from machine and foot traffic to reduce disturbance.

4.3 Fill Materials

Fill placed beneath the wall foundations and bridge should meet the gradation and compaction requirements of Gravel Borrow (MassDOT M1.03.0, Type b).

Materials to be used as fill should first be tested for compliance with the applicable gradation specifications.

4.4 Reuse of Onsite Materials

Based on our field observations and the results of the grain-size analyses, we do not anticipate that the site soils will meet the gradation requirements of Gravel Borrow. However, some of the onsite material may be improved by adding and blending granular material or crushed stone. Should the contractor encounter materials potentially suitable for reuse during earthwork operations, the contractor should avoid mixing the reusable soils with fine-grained and/or organic soils. The soils to be reused should be excavated and stockpiled separately for compliance testing.

Soils with 20 percent or greater fines content are generally very sensitive to moisture content variations and are susceptible to frost. Such soils are very difficult to compact at moisture contents that are much higher or much lower than the optimum moisture content determined from the laboratory compaction test. Therefore, strict moisture control should be implemented during compaction of onsite soils with fines content of 20 percent or greater. The contractor should be prepared to remove and replace such soils if pumping occurs.

Materials to be used as fill should first be tested for compliance with the applicable gradation specifications.

4.5 Groundwater Control Procedures

Based on the groundwater levels encountered in our explorations, we anticipate that groundwater control procedures will be needed during the excavation for the proposed footings and removal of existing fill and organic soil. We anticipate that filtered sump pumps installed in pits located at least three feet below the bottom of the excavation may be sufficient to handle surface runoff that may enter the excavation during wet weather. Due to the relatively permeable soil encountered in the borings, we anticipate that groundwater control will require multiple sump pumps. The contractor should also be prepared to use crushed stone to stabilize the bottom of the excavation in areas where upward flow occurs in the excavation.

The contractor should be permitted to employ whatever commonly accepted means and practices are necessary to maintain the groundwater level below the bottom of the excavation, and to maintain a dry excavation during wet weather, including installing a cutoff to stop water from the brook. Groundwater levels should be maintained at a minimum of 1-foot below the bottom of excavations during construction. Placement of reinforcing steel or concrete in standing water should not be permitted.

To reduce the potential for sinkholes developing over sump pump pits after the sump pumps are removed, the crushed stone placed in the sump pump pits should be wrapped in a geotextile fabric. Alternatively, the crushed stone should be entirely removed after the sump pump is no longer in use and the sump pump pit should be restored with suitable backfill.

4.6 Temporary Excavations

Depending on the construction sequence, a support of excavation (SOE) system will be required along the roadway to maintain traffic and/or to support the adjacent utility poles in proximity of excavations.

All excavations to receive human traffic should be constructed in accordance with the OSHA guidelines.

The site soils should generally be considered Type “C” and should have a maximum allowable slope of 1.5 Horizontal to 1 Vertical (1.5H:1V) for excavations less than 20 feet deep. Deeper excavations, if needed, should have shoring designed by a professional engineer.

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of the excavation sides and bottom.

5. RECOMMENDATIONS FOR FUTURE WORK

We recommend engaging LGCI to perform the following services:

- Assist VHB in responding to MassDOT comments.
- Review the geotechnical aspects of contractor submittals.
- Provide a field representative during construction to observe the subgrades of foundations.

6. REPORT LIMITATIONS

Our analysis and recommendations are based on project information provided to us at the time of this report. If changes to the type, size, and location of the proposed structures or to the site grading are made, the recommendations contained in this report shall not be considered valid unless the changes are reviewed and the conclusions and recommendations modified in writing by LGCI. LGCI cannot accept responsibility for designs based on our recommendations unless we are engaged to review the final plans and specifications to determine whether any changes in the project affect the validity of our recommendations and whether our recommendations have been properly implemented in the design.

It is not part of our scope to perform a more detailed site history; therefore, we have not explored for or researched the locations of buried utilities or other structures in the area of the proposed construction. Our scope did not include environmental services or services related to moisture, mold, or other biological contaminates in or around the site.

The recommendations in this report are based in part on the data obtained from the subsurface explorations. The nature and extent of variations between explorations may not become evident until construction. If variations from anticipated conditions are encountered, it may be necessary to revise the recommendations in this report. We cannot accept responsibility for designs based on recommendations in this report unless we are engaged to 1) make site visits during construction to check that the subsurface conditions exposed during construction are in general conformance with our design assumptions and 2) ascertain that, in general, the work is being performed in compliance with the contract documents.

Our report has been prepared in accordance with generally accepted engineering practices and in accordance with the terms and conditions set forth in our agreement. No other warranty, expressed or implied, is made. This report has been prepared for the exclusive use of Vanasse Hangen Brustlin, Inc. for the specific application to the proposed headwalls and retaining wall in Bridgewater, Massachusetts as conceived at this time.

7. REFERENCES

In addition to the references included in the text of the report, we used the following references:

American Association of State Highway and Transportation Officials (2017), "AASHTO LRFD Bridge Design Specifications," 8th Edition, Washington, D.C.

American Association of State Highway and Transportation Officials (2011), "AASHTO Guide Specifications for LRFD Seismic Bridge Design 2nd Edition," with 2012 and 2014 Interim Revisions.

Massachusetts Highway Department, Highway Division (2013), "LRFS Bridge Manual."

Massachusetts Highway Department (1988), "Standard Specifications for Highways and Bridges."

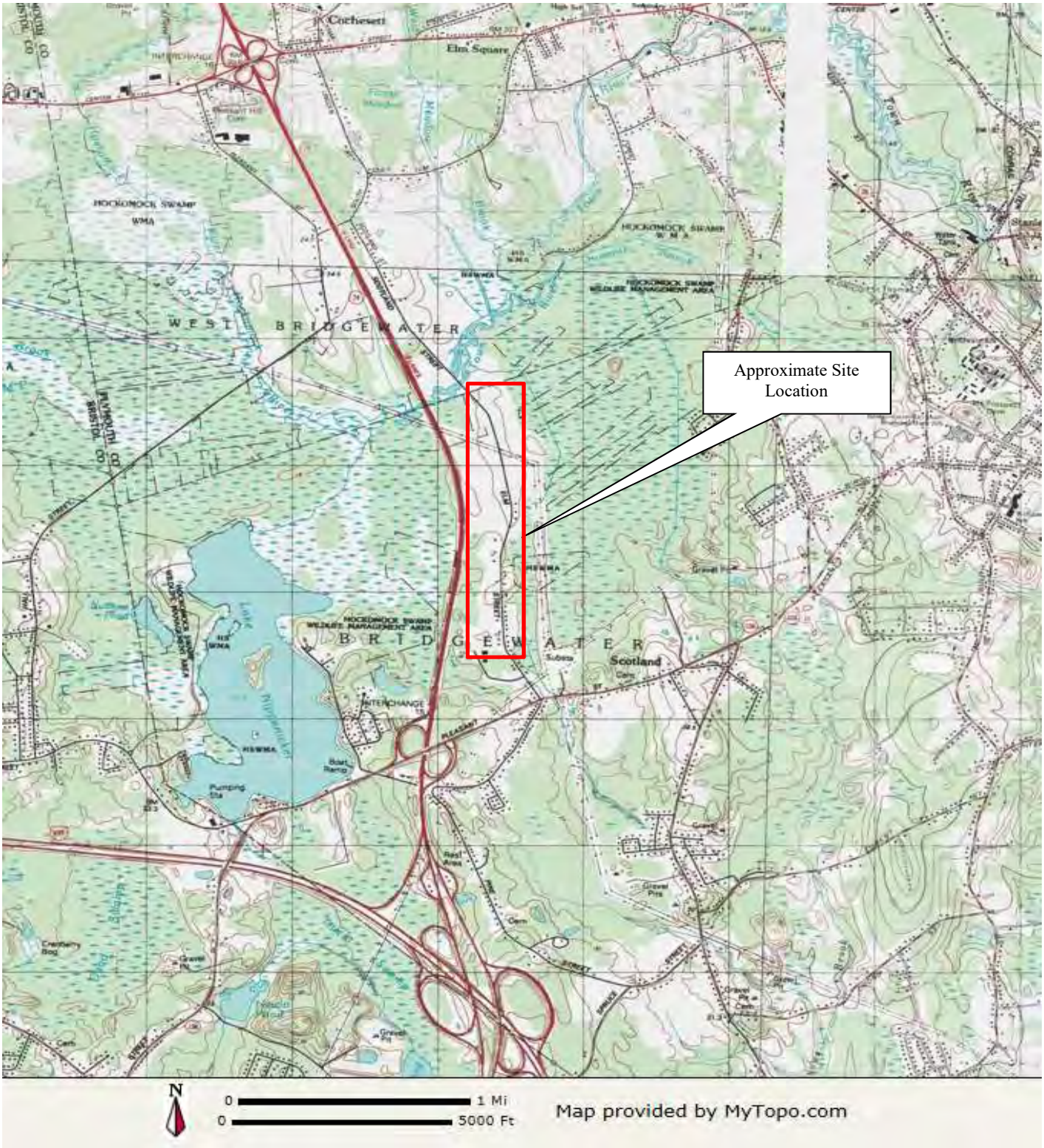
Massachusetts Highway Department (2014), "Interim supplemental Specification."

US Geological Survey, Bridgewater, MA Topo Map from http://mapserver.mytopo.com.

Table 1 - Summary of LGCI's Borings and Probes
Proposed Headwalls and Retaining Wall
Bridgewater, MA
LGCI Project No. 1906

Boring No.	Ground Surface Elevation (ft.)[1]	Groundwater Depth / El. (ft.)[2]	Bottom of Asphalt Depth / El. (ft.)	Bottom of Topsoil / Forest Mat Depth / El. (ft.)	Bottom of Fill Depth / El. (ft.)	Bottom of Peat Depth / El. (ft.)	Bottom of Sand[3] Depth / El. (ft.)	Bottom of Boring Depth / El. (ft.)
B-1	68.0	5.0 / 63.0	0.3 / 67.7	- / -	4.6 / 63.4	6.0 / 62.0	25.4 / 42.6	31.0 / 37.0
B-2	67.0	6.0 / 61.0	0.5 / 66.5	- / -	4.3 / 62.7	- / -	20.5 / 46.5	49.3 / 17.7
B-3	63.0	2.9 / 60.1	0.5 / 62.5	- / -	6.0 / 57.0	- / -	19.0 / 44.0	29.4 / 33.6
B-4	63.0	2.9 / 60.1	0.3 / 62.7	- / -	2.9 / 60.1	4.0 / 59.0	19.0 / 44.0	39.3 / 23.7
B-5	63.0	- / -	0.3 / 62.7	- / -	2.9 / 60.1	4.6 / 58.4	19.0 / 44.0	29.3 / 33.7
B-6	61.5	- / -	0.3 / 61.2	- / -	7.5 / 54.0	- / -	19.0 / 42.5	26.0 / 35.5
P-1	65.5	- / -	- / -	2.1 / 63.4	- / -	- / -	-[4] / -	3.0 / 62.5
P-2	66.5	- / -	- / -	1.5 / 65.0	- / -	- / -	-[4] / -	2.8 / 63.7
P-3	61.5	- / -	- / -	1.8 / 59.7	- / -	- / -	-[4] / -	4.5 / 57.0
P-4	60.5	- / -	- / -	3.0 / 57.5	- / -	- / -	-[4] / -	3.5 / 57.0
P-5	61.5	- / -	- / -	- / -	- / -	- / -	-[4] / -	3.7 / 57.8
P-6	60.0	- / -	- / -	- / -	- / -	- / -	-[4] / -	2.5 / 57.5

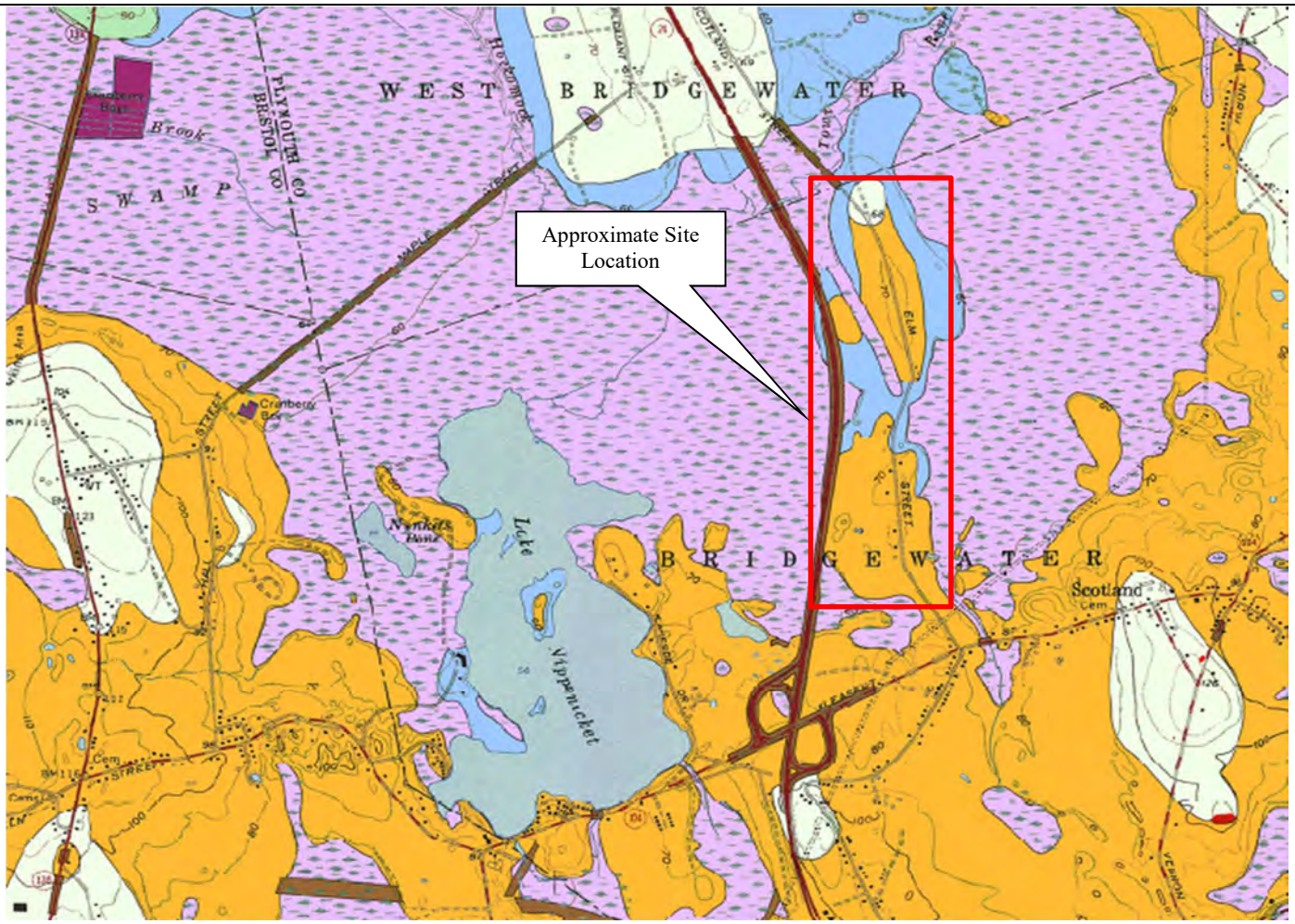
1. The ground surface elevation was interpolated to the nearest 1/2 foot from drawing titled: "Massachusetts Department of Transportation Plan of Topographic Survey of Elm Street in the Town of Bridgewater as Ordered by the Massachusetts Department of Transportation, Highway Division," prepared by Vanasse Hangen Brustlin, Inc. (VHB) on November 3, 2017 and e-mailed to LGCI on May 29, 2019.
2. "-" means layer not encountered.
3. Weathered rock was encountered beneath the sand layer in all borings and extended to the boring termination depths.
4. The hand probes terminated in the sand layer.



Contour Intervals: 3 meters

Figure based on USGS topographic map of Bridgewater, MA obtained from www.mytopo.com/maps

Client:	Project:		
Vanasse Hangen Brustlin, Inc.	Proposed Headwalls and Retaining Wall	Figure 1 – Site Location Map	
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Bridgewater, MA	LGCI Project No.: 1906	Date: June 2019



N

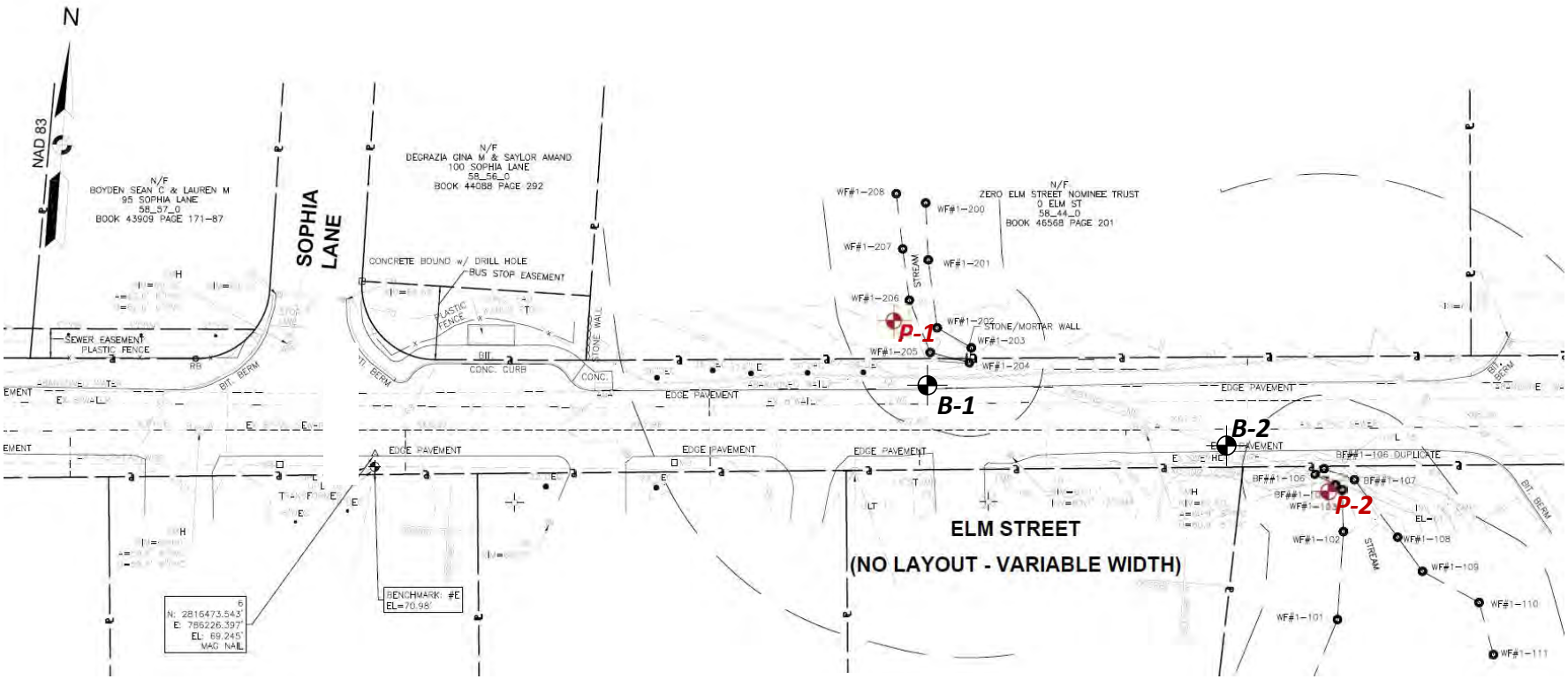
Coarse deposits consist of *gravel deposits*, *sand and gravel deposits*, and *sand deposits*, not differentiated in this report. *Gravel deposits* are composed of at least 50 percent gravel-size clasts; cobbles and boulders predominate; minor amounts of sand occur within gravel beds, and sand comprises a few separate layers. Gravel layers generally are poorly sorted, and bedding commonly is distorted and faulted due to postdepositional collapse related to melting of ice. *Sand and gravel deposits* occur as mixtures of gravel and sand within individual layers and as layers of sand alternating with layers of gravel. Sand and gravel layers generally range between 25 and 50 percent gravel particles and between 50 and 75 percent sand particles. Layers are well sorted to poorly sorted; bedding may be distorted and faulted due to postdepositional collapse. *Sand deposits* are composed mainly of very coarse to fine sand, commonly in well-sorted layers. Coarser layers may contain up to 25 percent gravel particles, generally granules and pebbles; finer layers may contain some very fine sand, silt, and clay

Fine deposits include very fine sand, silt, and clay that occur as well-sorted, thin layers of alternating silt and clay (varves), or as thicker layers of very fine sand and silt. Very fine to fine sand commonly occurs at the surface of these lake-bottom deposits and grades downward into rhythmically bedded silt and clay varves. In some places on the lake-bottom surface of glacial Lake Hitchcock (in the Connecticut Valley lowland) and glacial Lake Narragansett (in southeastern Massachusetts), fine deposits are overlain by as much as 30 ft of fine to medium sand, deposited as the lake level lowered or the lake shallowed; this sand has not been mapped separately. Locally, this map unit may include areas underlain by fine sand

Swamp deposits—Organic muck and peat that contain minor amounts of sand, silt, and clay, are stratified and poorly sorted, and occur in swamps and freshwater marshes, in kettle depressions, or in poorly drained areas. Unit is shown only where deposits are estimated to be at least 3 ft thick; most deposits are less than 10 ft thick. Swamp deposits overlie glacial deposits or bedrock. They locally overlie glacial till even where they occur within thin glacial meltwater deposits

Figure based on map titled: "Surficial Geologic Map of the Taunton Quadrangle, Massachusetts," prepared by Stone, J.R. and DiGiacomo-Cohen, M.L. for U.S. Geological Survey, 2018, Scientific Investigation Map 3402, Quadrangle 129-Taunton.

Client:	Project:	Figure 2 – Surficial Geologic Map	
Vanasse Hangen Brustlin, Inc.	Proposed Headwall and Retaining Wall		
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Bridgewater, MA	LGCI Project No.: 1906	Date: June 2019



Approximate Scale (feet)

0 20 50 100

SCALE: 1" = 20'

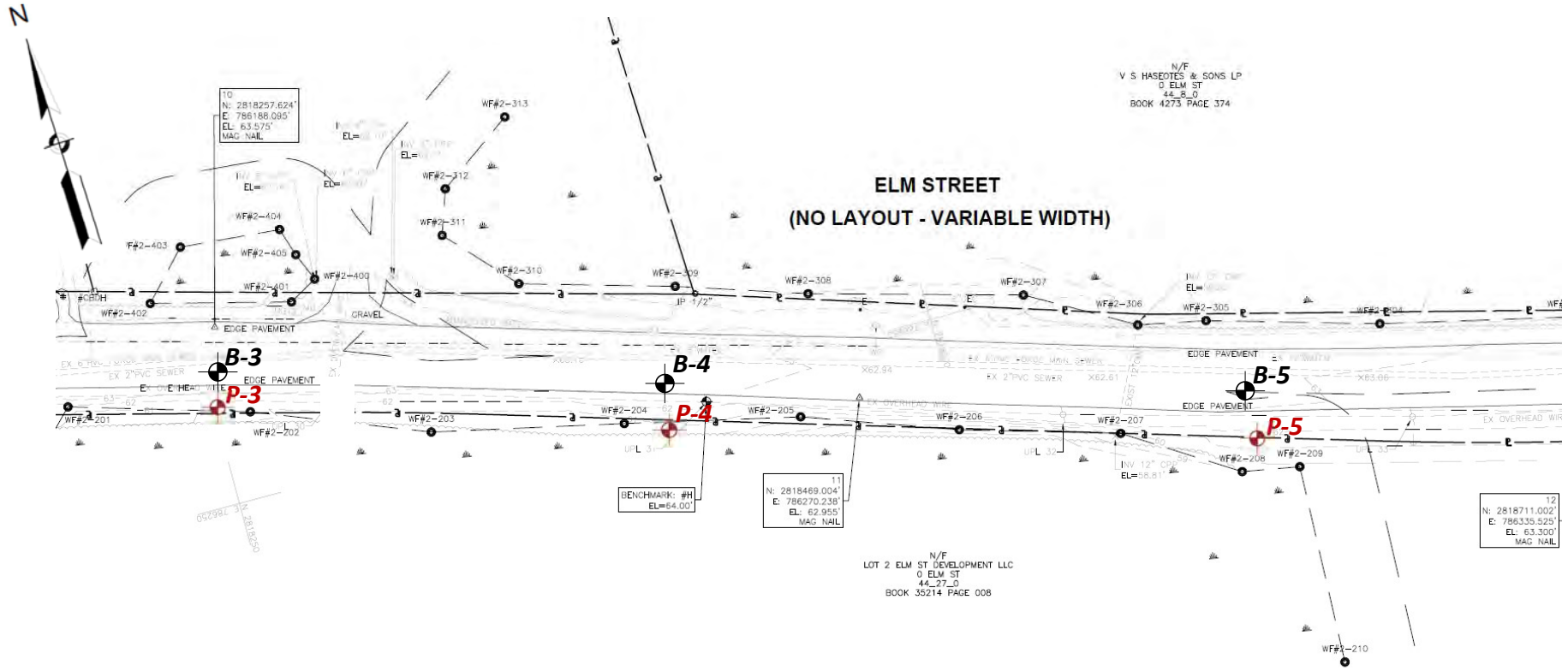
Legend:

Approximate location of boring advanced by Northern Drill Service Inc., of Northborough, MA between May 13 and 16, 2019 and observed by LGCI.

Approximate location of probe performed by LGCI on May 15 and 16, 2019.

Note:
Figure based on drawing titled: "Plan of Topographic Survey of Elm Street in the Town of Bridgewater," prepared by Vanasse Hangen Brustlin, Inc. (VHB), dated November 3, 2017, and provided to LGCI by VHB via e-mail on May 29, 2019.

Client: Vanasse Hangen Brustlin, Inc.	Project: Proposed Headwalls and Retaining Wall	Figure 3A – Boring and Probe Location Plan – B-1 and B-2	
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Bridgewater, MA	LGCI Project No.: 1906	Date: June 2019



Approximate Scale (feet)

0 20 50 100

SCALE: 1" = 20'

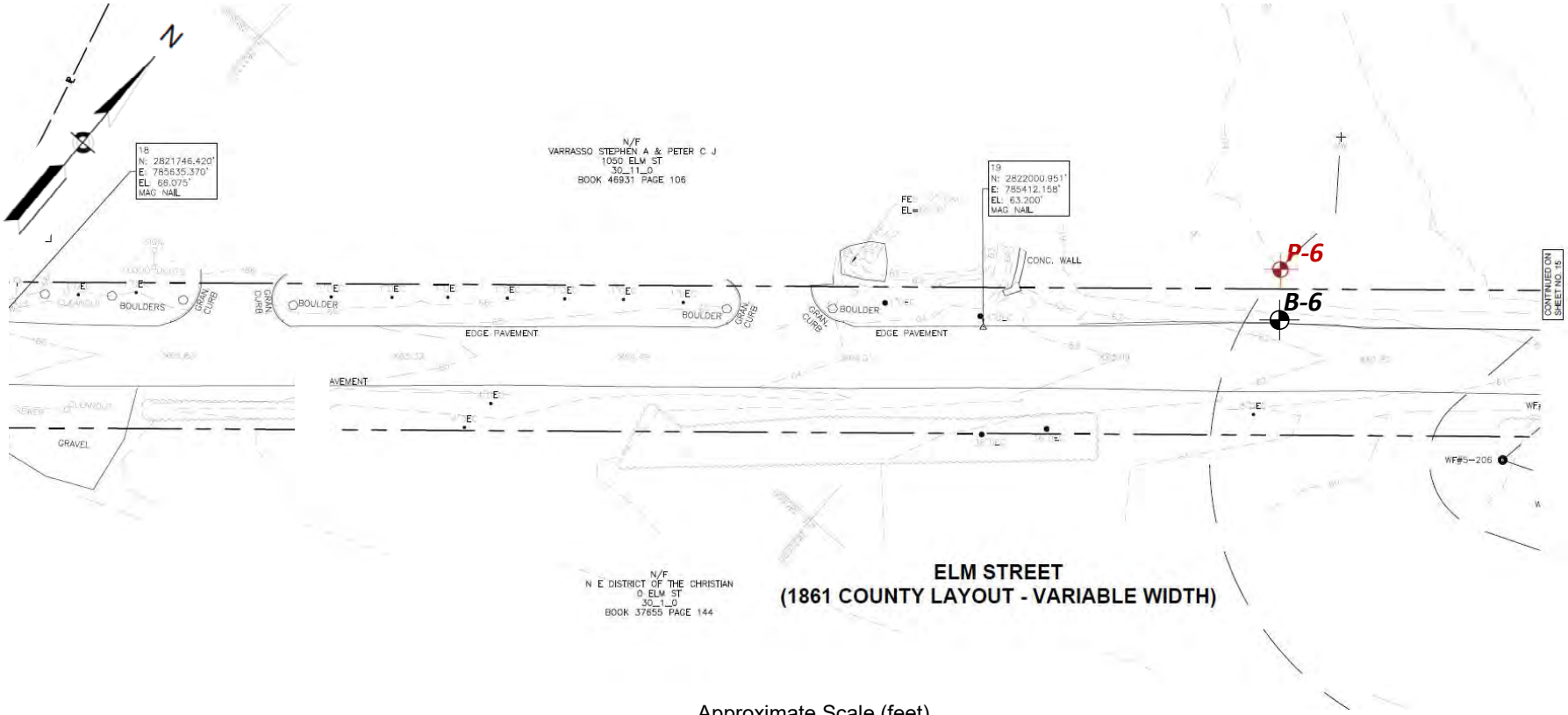
Legend:

Approximate location of boring advanced by Northern Drill Service Inc., of Northborough, MA between May 13 and 16, 2019 and observed by LGCI.

Approximate location of probe performed by LGCI between May 15 and 16, 2019.

Note:
Figure based on drawing titled: "Plan of Topographic Survey of Elm Street in the Town of Bridgewater," prepared by Vanasse Hangen Brustlin, Inc. (VHB), dated November 3, 2017, and provided to LGCI by VHB via e-mail on May 29, 2019.

Client: Vanasse Hangen Brustlin, Inc.	Project: Proposed Headwalls and Retaining Wall	Figure 3B – Boring and Probe Location Plan – B-3 to B-5	
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Bridgewater, MA	LGCI Project No.: 1906	Date: June 2019



Approximate Scale (feet)

0 20 50 100

SCALE: 1" = 20'

Legend:

Approximate location of boring advanced by Northern Drill Service Inc., of Northborough, MA between May 13 and 16, 2019 and observed by LGCI.

Approximate location of probe performed by LGCI on May 15 and 16, 2019.

Note:
Figure based on drawing titled: "Plan of Topographic Survey of Elm Street in the Town of Bridgewater," prepared by Vanasse Hangen Brustlin, Inc. (VHB), dated November 3, 2017, and provided to LGCI by VHB via e-mail on May 29, 2019.

Client: Vanasse Hangen Brustlin, Inc.	Project: Proposed Headwalls and Retaining Wall	Figure 3C – Boring and Probe Location Plan – B-6	
LGCI Lahlaf Geotechnical Consulting, Inc.	Project Location: Bridgewater, MA	LGCI Project No.: 1906	Date: June 2019

Appendix A – Boring Logs

BORING LOG

LGCI Lahlaf Geotechnical Consulting, Inc.

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Proposed Headwalls and Retaining Wall
LGCI PROJECT NUMBER: 1906
PROJECT LOCATION: Bridgewater, MA

DATE STARTED: 5/13/19 **DATE COMPLETED:** 5/13/19
BORING LOCATION: At Sta. 36+45 on Elm St. Southbound side
COORDINATES: NA
SURFACE EI.: 68.0 ft. (see note 1) **TOTAL DEPTH:** 31 ft.
WEATHER: Cloudy / 50's
GROUNDWATER LEVELS:
DURING DRILLING: -
AT END OF DRILLING: -
OTHER: 5.0 ft. / El. 63.0 ft.

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Justin Stevens
DRILLING METHOD: Drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Diedrich D-25
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: HA **CHECKED BY:** AML

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0.3	S1	9-8-6-5 (14)	24/10		Asphalt	0.3	
								67.7	S1 - Silty GRAVEL with Sand (GM), fine, subrounded to angular, 30-35% fines, 25-30% fine to medium sand, asphalt, trace of organic soil, brown, wet
	65.0	2.3	S2	2-3-5-6 (8)	24/8		Fill		S2 - Silty SAND with Gravel (SM), fine to medium, trace coarse, 30-35% fines, 15-20% subrounded angular gravel, trace of organic soil and peat, roots, brown, wet
		4.3	S3	12-24-7-5 (31)	24/12			4.6	S3 - Top 4": Silty SAND (SM), fine, trace medium, 20-25% fines, trace roots, trace of organic soil, dark brown, wet
5							Peat	63.5	Bot 8": Peat (Pt), 25-30% fine sand, dark brown, wet
		6.3	S4	4-4-11-15 (15)	24/11			6.0	
	60.0	8.3	S5	10-9-11-13 (20)	24/13			62.0	S4 - Top 7": Silty SAND (SM), fine, trace medium, 15-20% fines, light brown, wet Bot 4": Poorly Graded SAND with Silt (SP-SM), fine, 10-15% fines, light brown, with orange, moist S5 - Poorly Graded Sand with Silt (SP-SM), fine to medium, trace coarse, 5-10% fines, light brown, wet
10		10.3					Sand		
	55.0								
		14	S6	3-4-6-8 (10)	24/16			14.0	
15							Silt	54.0	S6 - SILT with Sand (ML), slightly plastic, 25-30% fine sand, gray, wet
		16							
	50.0								
		19	S7	14-27-19-14 (46)	24/13			19.0	
20							Sand	49.0	S7 - Silty SAND with Gravel (SM), fine to coarse, 15-20% fines, ~15% subrounded angular gravel, reddish brown, wet
		21							
	45.0								
		24		16-29-21-21					S8 - Top 5": Silty SAND (SM), fine, trace medium, 15-20% fines, light brown, moist
25									

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest 1/2 foot from drawing titled: "Massachusetts Department of Transportation Plan of Topographic Survey of Elm Street in the Town of Bridgewater as Ordered by the Massachusetts Department of Transportation, Highway Division," prepared by Vanasse Hangen Brustlin, Inc. (VHB) on November 3, 2017 and e-mailed to LGCI on May 29, 2019.

LGCI
Lahlaf Geotechnical Consulting, Inc.

BORING LOG

B-1
PAGE 2 OF 2

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Proposed Headwalls and Retaining Wall
LGCI PROJECT NUMBER: 1906
PROJECT LOCATION: Bridgewater, MA

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Material Description
		24	S8	(50)	24/15		Depth El.(ft.) 25.4	Bot 10": Well Graded GRAVEL with Silt and Sand (GW-GM), fine, angular, ~15% fines, ~20% fine sand, foliated, gray, moist (possible weathered rock)
		26					42.6	
	40.0						Weathered Rock	
		29						
30			S9	6-27-31-28 (58)	24/10			S9 - Silty SAND with Gravel (SM), fine to coarse, ~15% fines, ~15% angular gravel, gray, moist, foliated (possible weathered rock)
		31					31.0	
								Bottom of borehole at 31.0 feet. Backfilled with drill cuttings and 1.5 bags of gravel. Restored ground surface with cold patch asphalt.
	35.0							
35								
	30.0							
40								
	25.0							
45								
	20.0							
50								
	15.0							
55								
	10.0							
60								

BORING LOG

B-2
PAGE 1 OF 2

LGCI Lahlaf Geotechnical Consulting, Inc.

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Proposed Headwalls and Retaining Wall
LGCI PROJECT NUMBER: 1906
PROJECT LOCATION: Bridgewater, MA

DATE STARTED: 5/13/19 **DATE COMPLETED:** 5/13/19
BORING LOCATION: At Sta. 37+75 on Elm St. Northbound side
COORDINATES: NA
SURFACE El.: 67.0 ft. (see note 1) **TOTAL DEPTH:** 49.3 ft.
WEATHER: Cloudy / 50's
GROUNDWATER LEVELS:
DURING DRILLING: -
AT END OF DRILLING: -
OTHER: 6.0 ft. / El. 61.0 ft.

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Justin Stevens
DRILLING METHOD: Drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Diedrich D-25
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: HA **CHECKED BY:** AML

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
							Asphalt	0.5	
		0.5							S1 - Top 5": Silty SAND (SM), fine to coarse, 35-40% fines, asphalt, gray, wet Bot 5": Silty SAND (SM), fine to medium, trace coarse, 25-30% fines, trace of organic soil, brown, wet (possible buried subsoil)
	65.0	2	S1	12-10-10	18/10		Fill		
			S2	9-6-7-6 (13)	24/3				S2 - Silty SAND (SM), fine to medium, trace coarse, 25-30% fines ~15% angular gravel, trace of organic soil, brown, wet
		4				1		4.3	REMARK 1: Drill chattering at ~ 4'
5			S3	3-1-6-20 (7)	24/8				S3 - Top 3": Silty SAND (SM), fine to medium, trace coarse, 25-30% fines, brown, wet Bot 5": Silty SAND with Gravel (SM), fine to medium, trace coarse, 25-30% fines, ~15% angular gravel, brown / gray, wet
		6				2			REMARK 2: Drill chattering at 6'
	60.0		S4	30-52-77-100/5" (129)	23/12				S4 - Top 5": Silty SAND with Gravel (SM), fine to medium, trace coarse, 20-25% fines, ~35% angular gravel, brown / gray, wet
		7.9 8							Bot 7": Silty SAND with Gravel (SM), fine to coarse, 20-25% fines, 20-25% subrounded angular gravel, brown, wet
			S5	22-35-30-21 (65)	24/7				S5 - Silty SAND with Gravel, fine to coarse, 25-30% fines, ~35% subangular gravel, orange, wet
10		10							
						3			REMARK 3: Drill chattering at 11'
	55.0						Sand		
		14 14.3	S6	100/3"	3/3	4			S6 - Poorly Graded SAND with Silt (SP-SM), fine to medium, trace coarse, 10-15% fines, gray, wet REMARK 4: Drill chattering at 14.3'
15									
	50.0								
		19							S7 - Top 4": Silty GRAVEL with Sand (GM), fine to coarse, hard, angular, 20-25% fines, 15-20% medium sand, gray, wet Mid 4": Silty SAND with Gravel (SM), fine to medium, trace coarse, 30-40% fines, ~20% angular gravel, gray / brown, wet
20			S7	21-21-31-56 (52)	24/12				
		21				5		20.5	Bot 4": Silty GRAVEL with Sand (GM), fine to coarse, subangular, 30-40% fines, 20-25% fine to medium sand, gray / brown, wet, foliated (possible, weathered rock) REMARK 5: 3" casing refusal and drill chattering at 20.5', possible top of weathered rock
	45.0						Weathered Rock		
		24 24.3	S8	100/3"	3/3				S8 - Sandy SILT with Gravel (ML), non-plastic, 30-35% fine sand, 15-20% subangular gravel, gray, wet
25									

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest 1/2 foot from drawing titled: "Massachusetts Department of Transportation Plan of Topographic Survey of Elm Street in the Town of Bridgewater as Ordered by the Massachusetts Department of Transportation, Highway Division," prepared by Vanasse Hangen Brustlin, Inc. (VHB) on November 3, 2017 and e-mailed to LGCI on May 29, 2019.

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Lahlaf Geotechnical Consulting, Inc.

BORING LOG

B-2
PAGE 2 OF 2

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Proposed Headwalls and Retaining Wall
LGCI PROJECT NUMBER: 1906
PROJECT LOCATION: Bridgewater, MA

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Material Description
	40.0							
		29 / 29.1	S9	100/1"	1/1			S9 - SILT with Sand (ML), non-plastic, hard, 10-15% fine sand, gray, wet
30								
	35.0							
		34 / 34.2	S10	100/2"	2/2			S10 - Silty SAND with Gravel (SM), fine, ~20% fines, ~20% angular gravel, foliated, gray, wet (weathered rock)
35								
	30.0						Weathered Rock	
		39 / 39.3	S11	100/3"	3/3			S11 - Similar to S10
40								
	25.0							
		44 / 44.3	S12	100/3"	3/2			S12 - Similar to S10
45								
	20.0							
		49.3 / 49.6	S13	100/4"	4/4			S13 - Similar to S10 Bottom of borehole at 49.3 feet. Backfilled with drill cuttings and 7 bags of gravel. Restored ground surface with cold patch asphalt.
50								
	15.0							
55								
	10.0							
60								

Depth El.(ft.) 49.3

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BORING LOG

B-3
PAGE 1 OF 2

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Proposed Headwalls and Retaining Wall
LGCI PROJECT NUMBER: 1906
PROJECT LOCATION: Bridgewater, MA

DATE STARTED: 5/15/19 **DATE COMPLETED:** 5/15/19
BORING LOCATION: At Sta. 36+45 on Elm St. Northbound side
COORDINATES: NA
SURFACE EI.: 63.0 ft. (see note 1) **TOTAL DEPTH:** 29.4 ft.
WEATHER: Sunny / 60's
GROUNDWATER LEVELS:
DURING DRILLING: -
AT END OF DRILLING: -
OTHER: 2.9 ft. / El. 60.1 ft.

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Justin Stevens
DRILLING METHOD: Drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Diedrich D-25
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: HA **CHECKED BY:** AML

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
							Asphalt	0.5	
		0.5	S1	34-29-21	18/13		Fill		S1 - Silty SAND with Gravel (SM), fine to medium, trace coarse, 15-20% fines, ~15% subangular gravel, asphalt, brown, moist
	60.0	2	S2	10-12-6-5 (18)	24/6				S2 - Top 5": Poorly Graded GRAVEL with Silt and Sand (GP-GM), fine gravel, 5-10% fines, 20-25% fine sand, black, wet (▼) Bot 6": Silty SAND (SM), fine to medium, trace coarse, 15-20% fines, 10-15% subangular gravel, trace asphalt, trace of organic soil, brown, moist
5		4	S3	5-7-7-7 (14)	24/4				S3 - Silty GRAVEL with Sand (GM), fine to medium gravel, 15-20% fines, 30-35% fine to medium sand, light brown, wet
		6	S4	10-9-9-10 (18)	24/12			6.0	
	55.0	8					Sand		S4 - Sandy SILT (ML), non plastic, ~30% fine sand, light brown with orange streaks throughout, moist
10		9	S5	13-20-49-54 (69)	24/11				S5 - Poorly Graded SAND with Silt and Gravel (SP-SM), fine to medium, trace coarse, 5-10% fines, 35-40% angular gravel, light brown, wet
		11				1			REMARK 1: 4" casing refusal and drill chattering at 12'
	50.0								
		14	S6	13-28-44-32 (72)	24/8	2			REMARK 2: Drill chattering at ~ 14' S6 - Silty SAND with Gravel (SM), fine to medium, 15-20% fines, 35-40% angular gravel, light brown, wet
15		16							
	45.0								
		19	S7	22-36-19-100/4" (55)	22/3	3		19.0	REMARK 3: 3" casing refusal and drill chattering at ~ 19' S7 - Silty SAND (SM), fine, trace medium, trace coarse, ~20% fines, gray, wet, foliated (possible weathered rock)
20		20.8					Weathered Rock		
	40.0								
		24	S8	100/4"	4/4				S8 - Similar to S7
25		24.3							

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest 1/2 foot from drawing titled: "Massachusetts Department of Transportation Plan of Topographic Survey of Elm Street in the Town of Bridgewater as Ordered by the Massachusetts Department of Transportation, Highway Division," prepared by Vanasse Hangen Brustlin, Inc. (VHB) on November 3, 2017 and e-mailed to LGCI on May 29, 2019.

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BORING LOG

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PAGE 2 OF 2

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Proposed Headwalls and Retaining Wall
LGCI PROJECT NUMBER: 1906
PROJECT LOCATION: Bridgewater, MA

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
	35.0						Weathered Rock		
		29 – 29.4	S9	100/5"	5/2			29.4	S9 - Similar to S7
30									Bottom of borehole at 29.4 feet. Backfilled with drill cuttings and 1 bag of gravel. Restored ground surface with cold patch asphalt.
	30.0								
35									
	25.0								
40									
	20.0								
45									
	15.0								
50									
	10.0								
55									
	5.0								
60									

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BORING LOG

B-4
PAGE 1 OF 2

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Proposed Headwalls and Retaining Wall
LGCI PROJECT NUMBER: 1906
PROJECT LOCATION: Bridgewater, MA

DATE STARTED: 5/15/19 **DATE COMPLETED:** 5/15/19
BORING LOCATION: At Sta. 53+95 on Elm St. Northbound side
COORDINATES: NA
SURFACE El.: 63.0 ft. (see note 1) **TOTAL DEPTH:** 39.3 ft.
WEATHER: Sunny / 60's
GROUNDWATER LEVELS:
DURING DRILLING: -
AT END OF DRILLING: -
OTHER: 2.9 ft. / El. 60.1 ft.

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Justin Stevens
DRILLING METHOD: Drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Diedrich D-25
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: HA **CHECKED BY:** AML

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Material Description
		0.3	S1	20-16-14-9 (30)	24/14		Asphalt / Fill	S1 - Top 3": Silty SAND with Gravel (SM), fine to coarse 15-20% fines, ~10-15% subangular gravel, asphalt, trace of organic soil, brown, moist Bot 11": Silty SAND (SM), fine to coarse, 20-25% fines, ~5-10% subangular gravel, trace of organic soil, brown, moist
	60.0	2.3	S2	6-3-2-1 (5)	24/13		Peat	S2 - Top 6": Poorly Graded GRAVEL with Silt (GP-GM), fine to coarse gravel, 5-10% fines, 10-15% fine sand, black, wet Mid 6": Silty SAND (SM), fine, trace medium, 15-20% fines, trace roots, light brown, wet Bot 2": PEAT (PT), non-fibrous, black, moist
5		4.3	S3	5-10-12-15 (22)	24/15		Sand	S3 - Poorly Graded SAND with Silt (SP-SM), fine, ~15% fines, light brown, wet
		6.3	S4	10-14-23-21 (37)	24/10			S4 - Top 3": Similar to S3 Bot 7": Poorly Graded SAND (SP), fine to coarse, <5% fines, light brown, wet
	55.0	8.3				1		REMARK 1: Drill chattering at ~ 8.5'
		9	S5	11-13-13-12 (26)	24/10	2		S5 - Top 2": SILT (ML), ~10% fine sand, light brown / gray, wet Bot 8": Silty GRAVEL with Sand (GM), subangular, fine, 25-30% fines, ~30% fine sand, gray, wet REMARK 2: Drill chattering at ~ 10'
10		11						
	50.0	14	S6	11-17-30-19 (47)	24/9	3		S6 - Silty SAND (SM), fine to medium, trace coarse, 15-20% fines, ~5% angular gravel, light brown / gray with rust throughout, wet REMARK 3: 4" casing refusal and drill chattering at ~ 14.5'
15		16						
	45.0	19	S7	31-100/5"	11/7	4	Weathered Rock	REMARK 4: 3" casing refusal and drill chattering at ~19' S7 - Silty SAND with Gravel (SM), fine, ~15% fines, ~15% fine gravel, gray, wet, foliated (possible weathered rock)
20		19.9						
	40.0	24	S8	100/3"	3/3			S8 - Similar to S7
25		24.3						

Depth El.(ft.): 0.3; 2.9; 4.0; 19.0

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest 1/2 foot from drawing titled: "Massachusetts Department of Transportation Plan of Topographic Survey of Elm Street in the Town of Bridgewater as Ordered by the Massachusetts Department of Transportation, Highway Division," prepared by Vanasse Hangen Brustlin, Inc. (VHB) on November 3, 2017 and e-mailed to LGCI on May 29, 2019.

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BORING LOG

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PAGE 2 OF 2

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Proposed Headwalls and Retaining Wall
LGCI PROJECT NUMBER: 1906
PROJECT LOCATION: Bridgewater, MA

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
30	35.0	29 – 29.3	S9	100/3"	3/3		Weathered Rock		S9 - Similar to S7
35	30.0	34 – 34.3	S10	100/3"	3/1				S10 - Similar to S7, slightly plastic fines
40	25.0	39 – 39.3	S11	100/3"	3/3			39.3	S11 - Similar to S7 Bottom of borehole at 39.3 feet. Backfilled with drill cuttings and 3.5 bags of gravel. Restored ground surface with cold patch asphalt.
45	20.0								
50	15.0								
55	10.0								
60	5.0								

BORING LOG

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PAGE 1 OF 2

LGCI Lahlaf Geotechnical Consulting, Inc.

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Proposed Headwalls and Retaining Wall
LGCI PROJECT NUMBER: 1906
PROJECT LOCATION: Bridgewater, MA

DATE STARTED: 5/16/19 **DATE COMPLETED:** 5/16/19
BORING LOCATION: At Sta. 55+90 on Elm St. Northbound side
COORDINATES: NA
SURFACE El.: 63.0 ft. (see note 1) **TOTAL DEPTH:** 29.3 ft.
WEATHER: Sunny / 70's
GROUNDWATER LEVELS:
DURING DRILLING: -
AT END OF DRILLING: -
OTHER: -

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Justin Stevens
DRILLING METHOD: Drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Diedrich D-25
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: HA **CHECKED BY:** AML

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0.3					Asphalt	0.3	
			S1	25-15-7-4 (22)	24/14		Fill		S1 - Silty SAND with Gravel (SM), fine to medium, trace coarse, 15-20% fines, ~15% subangular gravel, brown, moist
		2.3						2.9	S2 - Top 8": Silty GRAVEL with Sand (GM), fine to medium gravel, 15-20% fines, 20-25% fine to medium sand, black, wet
	60.0		S2	8-7-2-2 (9)	24/13		Peat		Mid 3": Silty SAND (SM), fine, trace medium, 20-25% fines, ~10% subangular gravel, trace of organic soil, brown, wet (buried topsoil)
		4.3						4.6	Bot 2": PEAT (PT), non-fibrous, black, wet
5			S3	3-8-8-7 (16)	24/15				S3 - Top 7": Silty SAND (SM), fine, trace medium, 20-25% fines, brown, wet
		6.3							Bot 6": Poorly Graded SAND (SP), fine, <5% fines, light brown, wet
			S4	10-15-16-13 (31)	24/13				S4 - Top 7": Silty SAND (SM), fine, ~40% fines, light brown, wet
	55.0								Bot 8": Silty SAND (SM), fine, trace medium, ~20% fines, ~10-15% angular gravel, gray, wet
		8.3							
		9	S5	3-7-7-11 (14)	24/9				S5 - Poorly Graded SAND (SP), fine to medium, <5% fines, gray, wet
10		11				1	Sand		REMARK 1: Drill chattering at ~ 12'
	50.0								
		14	S6	10-7-3-5 (10)	24/0				S6 - No Recovery - rock in tip of split spoon
15		16							
	45.0					2			REMARK 2: Drill chattering at ~ 18'
		19				3		19.0	REMARK 3: 4" casing refusal and drill chattering at ~ 19', possible top of weathered rock
20			S7	57-28-17-25 (45)	24/9				S7 - SILT with Sand (ML), plastic, hard, 25-30% fine sand, gray, wet, foliated (possible weathered rock)
		21				4	Weathered Rock		REMARK 4: Drill chattering at ~ 21.5'
	40.0								
		24	S8	33-100/3"	9/5				S8 - Similar to S7
25		24.8							

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest 1/2 foot from drawing titled: "Massachusetts Department of Transportation Plan of Topographic Survey of Elm Street in the Town of Bridgewater as Ordered by the Massachusetts Department of Transportation, Highway Division," prepared by Vanasse Hangen Brustlin, Inc. (VHB) on November 3, 2017 and e-mailed to LGCI on May 29, 2019.

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BORING LOG

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PAGE 2 OF 2

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Proposed Headwalls and Retaining Wall
LGCI PROJECT NUMBER: 1906
PROJECT LOCATION: Bridgewater, MA

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
	35.0						Weathered Rock		
30		29 – 29.2	S9	100/2"	2/1			29.3	S9 - Similar to S7 Bottom of borehole at 29.3 feet. Backfilled with drill cuttings and 3 bags of gravel. Restored ground surface with cold patch asphalt.
	30.0								
35									
	25.0								
40									
	20.0								
45									
	15.0								
50									
	10.0								
55									
	5.0								
60									

BORING LOG

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PAGE 1 OF 2

LGCI Lahlaf Geotechnical Consulting, Inc.

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Proposed Headwalls and Retaining Wall
LGCI PROJECT NUMBER: 1906
PROJECT LOCATION: Bridgewater, MA

DATE STARTED: 5/16/19 **DATE COMPLETED:** 5/16/19
BORING LOCATION: At Sta. 93+20 on Elm St. Southbound side
COORDINATES: NA
SURFACE El.: 61.5 ft. (see note 1) **TOTAL DEPTH:** 26 ft.
WEATHER: Sunny / 70's
GROUNDWATER LEVELS:
DURING DRILLING: -
AT END OF DRILLING: -
OTHER: 3.3 ft. / El. 58.2 ft.

DRILLING SUBCONTRACTOR: Northern Drill Service, Inc.
DRILLING FOREMAN: Justin Stevens
DRILLING METHOD: Drive and wash with 4-inch casing
DRILL RIG TYPE/MODEL: Diedrich D-25
HAMMER TYPE: Automatic
HAMMER WEIGHT: 140 lb. **HAMMER DROP:** 30 in.
SPLIT SPOON DIA.: 1.375 in. I.D., 2 in. O.D.
CORE BARREL SIZE: NA
LOGGED BY: HA **CHECKED BY:** AML

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0.3					Asphalt	0.3	
	60.0		S1	6-6-1-1 (7)	24/3				S1 - Silty SAND with Gravel (SM), fine to medium, trace coarse, 15-20% fines, ~20-25% angular gravel, brown, moist
		2.3	S2	3-4-10-12 (14)	24/6		Fill		S2 - Silty SAND (SM), fine to medium, 15-20% fines, trace of organic soil, brown, moist
5		4.3	S3	8-10-11-13 (21)	24/14				S3 - Top 6": Poorly Graded SAND (SP), fine, <5% fines, 10-15% fine gravel, light brown, wet Bot 8": Poorly Graded SAND with Silt and Gravel (SP-SM), fine to medium, trace coarse, ~15-20% subangular gravel, light brown, wet
	55.0	6.3	S4	17-18-24-22 (42)	24/14				S4 - Top 12": Poorly Graded SAND with Silt and Gravel (SP), fine to coarse, ~5% fines, ~15-20% subangular gravel, light brown, wet
		8.3						7.5	Bot 2": Silty SAND (SM), fine to medium, 20-25% fines, ~5% subrounded gravel, trace of organic soil, roots, gray / brown, wet (buried topsoil)
		9				1			REMARK 1: Switching to 3" casing at 9'
10			S5	4-5-8-10 (13)	24/6		Sand		S5 - Silty SAND (SM), fine, trace medium, ~30% slightly plastic fines, 5-10% subangular gravel, gray, wet
	50.0	11							
						2			REMARK 2: Drill chattering at ~ 13'
		14						14.0	
15			S6	17-20-16-39 (36)	24/8				S6 - Sandy SILT (ML), non-plastic, 35-40% fine sand, gray, wet, foliated (possible weathered rock)
	45.0	16					Silt		
						3			REMARK 3: Drill chattering at ~ 17'
								19.0	
		19	S7	16-27-100/5"	17/12	4			S7 - SILT with Sand (ML), plastic, 15-20% fine sand, gray, wet, foliated, (possible weathered rock)
20		20.4							REMARK 4: 3" casing refusal at 19.5'
	40.0						Weathered Rock		
		24							S8 - Similar to S7
25				35-30-52-88					

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest 1/2 foot from drawing titled: "Massachusetts Department of Transportation Plan of Topographic Survey of Elm Street in the Town of Bridgewater as Ordered by the Massachusetts Department of Transportation, Highway Division," prepared by Vanasse Hangen Brustlin, Inc. (VHB) on November 3, 2017 and e-mailed to LGCI on May 29, 2019.

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BORING LOG

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PAGE 2 OF 2

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Proposed Headwalls and Retaining Wall
LGCI PROJECT NUMBER: 1906
PROJECT LOCATION: Bridgewater, MA

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Blow Counts (N Value)	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		24							
		26	S8	(82)	24/20		Weathered Rock	26.0	
	35.0								Bottom of borehole at 26.0 feet. Backfilled with drill cuttings and 5 bags of gravel. Restored ground surface with cold patch asphalt.
30	30.0								
35	25.0								
40	20.0								
45	15.0								
50	10.0								
55	5.0								
60									

Appendix B – Hand Probe Logs

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PROBE LOG

P-1
PAGE 1 OF 1

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Proposed Headwalls and Retaining Wall
LGCI PROJECT NUMBER: 1906
PROJECT LOCATION: Bridgewater, MA

DATE STARTED: 5/15/19 **DATE COMPLETED:** 5/15/19
BORING LOCATION: 10' to the left of B-1 and 21.6' behind B-1
COORDINATES: NA
SURFACE El.: 65.5 ft. (see note 1) **TOTAL DEPTH:** 3 ft.
WEATHER: Sunny / 60's
GROUNDWATER LEVELS:
DURING DRILLING: -
AT END OF DRILLING: Not Encountered
OTHER: -

DRILLING SUBCONTRACTOR:
DRILLING FOREMAN:
DRILLING METHOD: Hand Probe
DRILL RIG TYPE/MODEL:
HAMMER TYPE: NA
HAMMER WEIGHT: NA **HAMMER DROP:** NA
GEOPROBE CASING DIA.: 1.375 in. I.D., 2 in. O.D.
GEOPROBE LINER DIA.: NA
LOGGED BY: HA **CHECKED BY:** AML

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
0	65.0	0.3	T1 T2			Forest Mat Topsoil	0.3 65.2	T1 - Forest Mat, fibrous, ~15-20% fine sand, roots, leaves, black, moist T2 - Organic Soil (OL), roots, black, wet (topsoil)
		2.1	T3			Sand	2.1 3.0	T3 - Silty SAND (SM), fine, trace medium, 10-15% organic fines, light brown with black, wet
								Bottom of borehole at 3.0 feet.
5	60.0							
10	55.0							
15	50.0							
20	45.0							
25								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest 1/2 foot from drawing titled: "Massachusetts Department of Transportation Plan of Topographic Survey of Elm Street in the Town of Bridgewater as Ordered by the Massachusetts Department of Transportation, Highway Division," prepared by Vanasse Hangen Brustlin, Inc. (VHB) on November 3, 2017 and e-mailed to LGCI on May 29, 2019.

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PROBE LOG

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Proposed Headwalls and Retaining Wall
LGCI PROJECT NUMBER: 1906
PROJECT LOCATION: Bridgewater, MA

DATE STARTED: 5/16/19 **DATE COMPLETED:** 5/16/19
BORING LOCATION: 38' to the right of B-2 and 11.8' behind B-2
COORDINATES: NA
SURFACE El.: 66.5 ft. (see note 1) **TOTAL DEPTH:** 2.8 ft.
WEATHER: Sunny / 70's
GROUNDWATER LEVELS:
DURING DRILLING: -
AT END OF DRILLING: Not Encountered
OTHER: -

DRILLING SUBCONTRACTOR:
DRILLING FOREMAN:
DRILLING METHOD: Hand Probe
DRILL RIG TYPE/MODEL:
HAMMER TYPE: NA
HAMMER WEIGHT: NA **HAMMER DROP:** NA
GEOPROBE CASING DIA.: 1.375 in. I.D., 2 in. O.D.
GEOPROBE LINER DIA.: NA
LOGGED BY: HA **CHECKED BY:** AML

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
	65.0	0	T1			Topsoil	1.5	T1 - Organic Soil (OL), (Topsoil), fibrous, 35-40% fine sand, roots, odor, black, wet
		1.5	T2			Sand	65.0 / 2.8	T2 - Silty SAND (SM), fine, trace medium, 15-20% fines, trace organic soil, light brown, wet
5	60.0							Bottom of borehole at 2.8 feet.
10	55.0							
15	50.0							
20	45.0							
25								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest 1/2 foot from drawing titled: "Massachusetts Department of Transportation Plan of Topographic Survey of Elm Street in the Town of Bridgewater as Ordered by the Massachusetts Department of Transportation, Highway Division," prepared by Vanasse Hangen Brustlin, Inc. (VHB) on November 3, 2017 and e-mailed to LGCI on May 29, 2019.

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PROBE LOG

P-3
PAGE 1 OF 1

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Proposed Headwalls and Retaining Wall
LGCI PROJECT NUMBER: 1906
PROJECT LOCATION: Bridgewater, MA

DATE STARTED: 5/15/19 **DATE COMPLETED:** 5/15/19
BORING LOCATION: 7' behind B-3
COORDINATES: NA
SURFACE El.: 61.5 ft. (see note 1) **TOTAL DEPTH:** 4.5 ft.
WEATHER: Sunny / 60's
GROUNDWATER LEVELS:
DURING DRILLING: -
AT END OF DRILLING: Not Encountered
OTHER: -

DRILLING SUBCONTRACTOR:
DRILLING FOREMAN:
DRILLING METHOD: Hand Probe
DRILL RIG TYPE/MODEL:
HAMMER TYPE: NA
HAMMER WEIGHT: NA **HAMMER DROP:** NA
GEOPROBE CASING DIA.: 1.375 in. I.D., 2 in. O.D.
GEOPROBE LINER DIA.: NA
LOGGED BY: HA **CHECKED BY:** AML

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0	T1			Topsoil		T1 - Organic Soil (OL), (Topsoil), roots, black, wet
	60.0	1	T2					T2 - Silty SAND (SM), fine, trace medium, 30-35% organic fines, roots, light brown, wet (subsoil)
		1.8	T3				1.8 59.7	T3 - Silty SAND (SM), fine, 15-20% fines, trace organic soil, light brown, wet
						Sand		
		3.8	T4				4.5	T4 - Poorly Graded SAND with Silt (SP-SM), fine to medium, 5-10% fines, light brown, wet
5								Bottom of borehole at 4.5 feet.
	55.0							
10								
	50.0							
15								
	45.0							
20								
	40.0							
25								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest 1/2 foot from drawing titled: "Massachusetts Department of Transportation Plan of Topographic Survey of Elm Street in the Town of Bridgewater as Ordered by the Massachusetts Department of Transportation, Highway Division," prepared by Vanasse Hangen Brustlin, Inc. (VHB) on November 3, 2017 and e-mailed to LGCI on May 29, 2019.

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PROBE LOG

P-4
PAGE 1 OF 1

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Proposed Headwalls and Retaining Wall
LGCI PROJECT NUMBER: 1906
PROJECT LOCATION: Bridgewater, MA

DATE STARTED: 5/15/19 **DATE COMPLETED:** 5/15/19
BORING LOCATION: 6.4' behind B-4
COORDINATES: NA
SURFACE El.: 60.5 ft. (see note 1) **TOTAL DEPTH:** 3.5 ft.
WEATHER: Sunny / 60's
GROUNDWATER LEVELS:
DURING DRILLING: -
AT END OF DRILLING: Not Encountered
OTHER: -

DRILLING SUBCONTRACTOR:
DRILLING FOREMAN:
DRILLING METHOD: Hand Probe
DRILL RIG TYPE/MODEL:
HAMMER TYPE: NA
HAMMER WEIGHT: NA **HAMMER DROP:** NA
GEOPROBE CASING DIA.: 1.375 in. I.D., 2 in. O.D.
GEOPROBE LINER DIA.: NA
LOGGED BY: HA **CHECKED BY:** AML

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
	60.0	0	T1			Topsoil		T1 - Organic Soil (OL), 20-25% fine to medium sand, trace coarse sand, roots, trace gravel, black, moist (topsoil)
		1.5	T2					T2 - Similar to T1
		2	T3					T3 - Similar to T1
		3	T4				3.0	
						Sand	3.5	T4 - Poorly Graded SAND with Silt (SP-SM), fine to medium, trace coarse, 10-15% fines, trace subangular gravel, light brown, wet
								Bottom of borehole at 3.5 feet.
5	55.0							
10	50.0							
15	45.0							
20	40.0							
25								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest 1/2 foot from drawing titled: "Massachusetts Department of Transportation Plan of Topographic Survey of Elm Street in the Town of Bridgewater as Ordered by the Massachusetts Department of Transportation, Highway Division," prepared by Vanasse Hangen Brustlin, Inc. (VHB) on November 3, 2017 and e-mailed to LGCI on May 29, 2019.

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Lahlaf Geotechnical Consulting, Inc.

PROBE LOG

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Proposed Headwalls and Retaining Wall
LGCI PROJECT NUMBER: 1906
PROJECT LOCATION: Bridgewater, MA

DATE STARTED: 5/16/19 **DATE COMPLETED:** 5/16/19
BORING LOCATION: 16' behind B-5
COORDINATES: NA
SURFACE El.: 61.5 ft. (see note 1) **TOTAL DEPTH:** 3.7 ft.
WEATHER: Sunny / 70's
GROUNDWATER LEVELS:
DURING DRILLING: -
AT END OF DRILLING: Not Encountered
OTHER: -

DRILLING SUBCONTRACTOR:
DRILLING FOREMAN:
DRILLING METHOD: Hand Probe
DRILL RIG TYPE/MODEL:
HAMMER TYPE: NA
HAMMER WEIGHT: NA **HAMMER DROP:** NA
GEOPROBE CASING DIA.: 1.375 in. I.D., 2 in. O.D.
GEOPROBE LINER DIA.: NA
LOGGED BY: HA **CHECKED BY:** AML

Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0	T1			Sand		T1 - Silty SAND (SM), fine to medium, trace coarse, 35-40% fines, ~5-10% subrounded gravel, roots, grass, moist
	60.0	1.5	T2				1.4	
		2	T3			Silt	60.1	T2 - Silty SAND with Gravel (SM), fine to medium, trace coarse, 25-30% fines, ~35-40% subrounded gravel, trace roots, brown, wet T3 - Organic Soil (OL), 25-30% fine sand, 10-15% subangular gravel, roots, wet
		3	T4				3.2	
						Sand	3.7	T4 - Poorly Graded SAND with Silt (SP-SM), fine, 10-15% fines, organic soil, throughout, light brown, wet
5								Bottom of borehole at 3.7 feet.
	55.0							
10								
	50.0							
15								
	45.0							
20								
	40.0							
25								

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest 1/2 foot from drawing titled: "Massachusetts Department of Transportation Plan of Topographic Survey of Elm Street in the Town of Bridgewater as Ordered by the Massachusetts Department of Transportation, Highway Division," prepared by Vanasse Hangen Brustlin, Inc. (VHB) on November 3, 2017 and e-mailed to LGCI on May 29, 2019.

LGCI
Lahlaf Geotechnical Consulting, Inc.

PROBE LOG

CLIENT: Vanasse Hangen Brustlin, Inc.
PROJECT NAME: Proposed Headwalls and Retaining Wall
LGCI PROJECT NUMBER: 1906
PROJECT LOCATION: Bridgewater, MA

DATE STARTED: 5/16/19 **DATE COMPLETED:** 5/16/19
BORING LOCATION: 15.5' behind pavement and 89.3' to the left of existing retaining wall
COORDINATES: NA
SURFACE El.: 60.0 ft. (see note 1) **TOTAL DEPTH:** 2.5 ft.
WEATHER: Sunny / 70's
GROUNDWATER LEVELS:
DURING DRILLING: -
AT END OF DRILLING: Not Encountered
OTHER: -

DRILLING SUBCONTRACTOR:
DRILLING FOREMAN:
DRILLING METHOD: Hand Probe
DRILL RIG TYPE/MODEL:
HAMMER TYPE: NA
HAMMER WEIGHT: NA **HAMMER DROP:** NA
GEOPROBE CASING DIA.: 1.375 in. I.D., 2 in. O.D.
GEOPROBE LINER DIA.: NA
LOGGED BY: HA **CHECKED BY:** AML

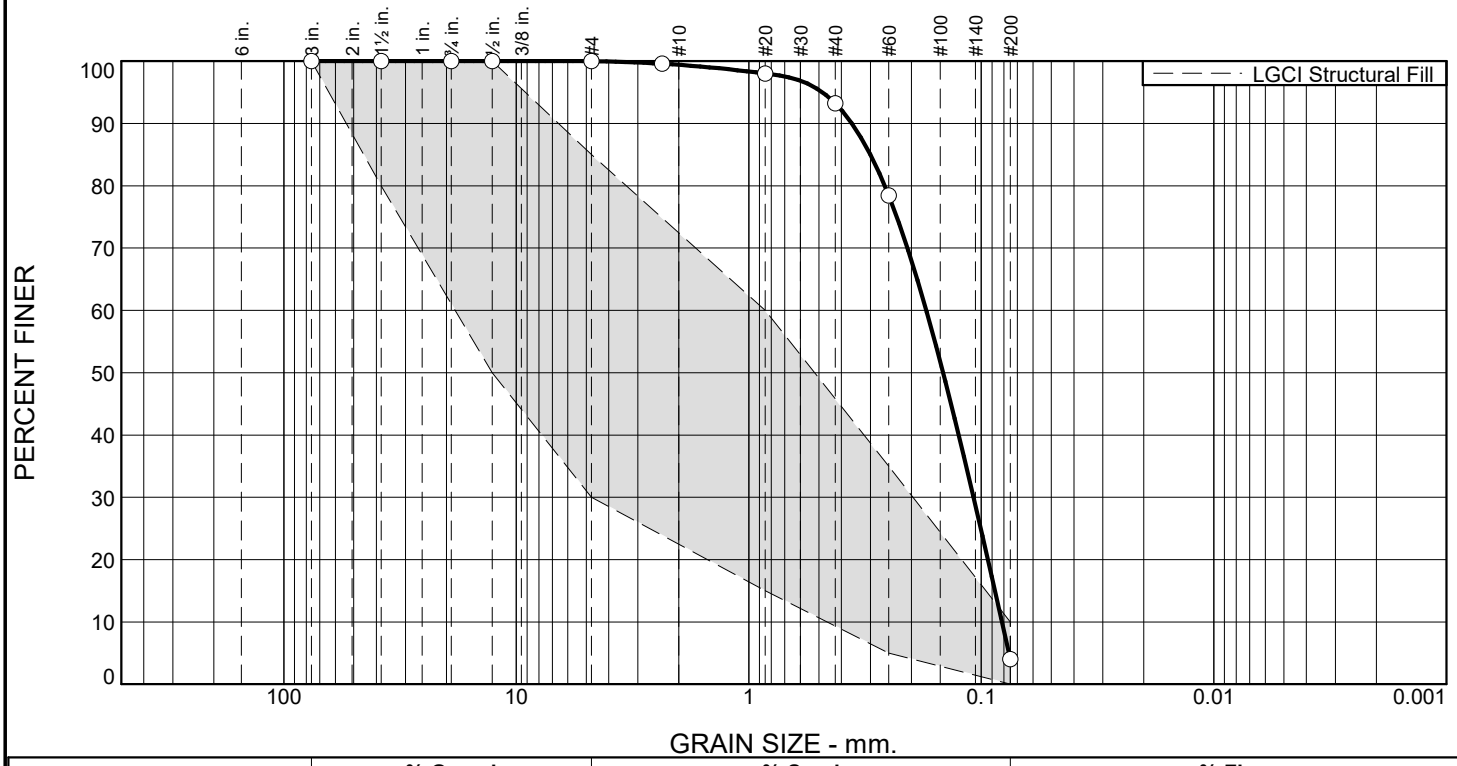
Depth (ft.)	El. (ft.)	Sample Interval (ft.)	Sample Number	Pen./Rec. (in.)	Remark	Strata	Depth El.(ft.)	Material Description
		0	T1			Sand		T1 - Silty SAND (SM), fine, trace medium, trace coarse, 25-30% fines, 5-10% subrounded gravel, brown, moist
		1	T2					T2 - Silty SAND (SM), fine, 15-20% fines, trace organic, orange / light brown, wet
		1.5	T3					T3 - Poorly Graded SAND with Silt (SP-SM), fine, trace medium, 10-15% fines, light brown, wet
							2.5	Bottom of borehole at 2.5 feet.
5	55.0							
10	50.0							
15	45.0							
20	40.0							
25	35.0							

GENERAL NOTES:

1. The ground surface elevation was interpolated to the nearest 1/2 foot from drawing titled: "Massachusetts Department of Transportation Plan of Topographic Survey of Elm Street in the Town of Bridgewater as Ordered by the Massachusetts Department of Transportation, Highway Division," prepared by Vanasse Hangen Brustlin, Inc. (VHB) on November 3, 2017 and e-mailed to LGCI on May 29, 2019.

Appendix C – Laboratory Test Results

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.6	6.1	89.3	4.0	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100.0	100.0	
1.5"	100.0	80.0 - 100.0	
.75"	100.0		
.5"	100.0	50.0 - 100.0	
#4	100.0	30.0 - 85.0	X
#8	99.6		
#20	98.0	15.0 - 60.0	X
#40	93.3		
#60	78.4	5.0 - 35.0	X
#200	4.0	0.0 - 10.0	

* LGCI Structural Fill

Material Description

Poorly Graded SAND (SP), fine, <5% fines

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS (D 2487)= SP AASHTO (M 145)=

Coefficients

D_{90}= 0.3600 D_{85}= 0.2998 D_{60}= 0.1723
D_{50}= 0.1459 D_{30}= 0.1079 D_{15}= 0.0873
D_{10}= 0.0815 C_u= 2.11 C_c= 0.83

Remarks

Natural sand sample

Date Received: 5/16/2019 **Date Tested:** 6/3/2019

Tested By: BM

Checked By: HA

Sample Number: B-5 S3 Bot 6" **Depth:** 4.3'-6.3' **Date Sampled:** 5/16/2019

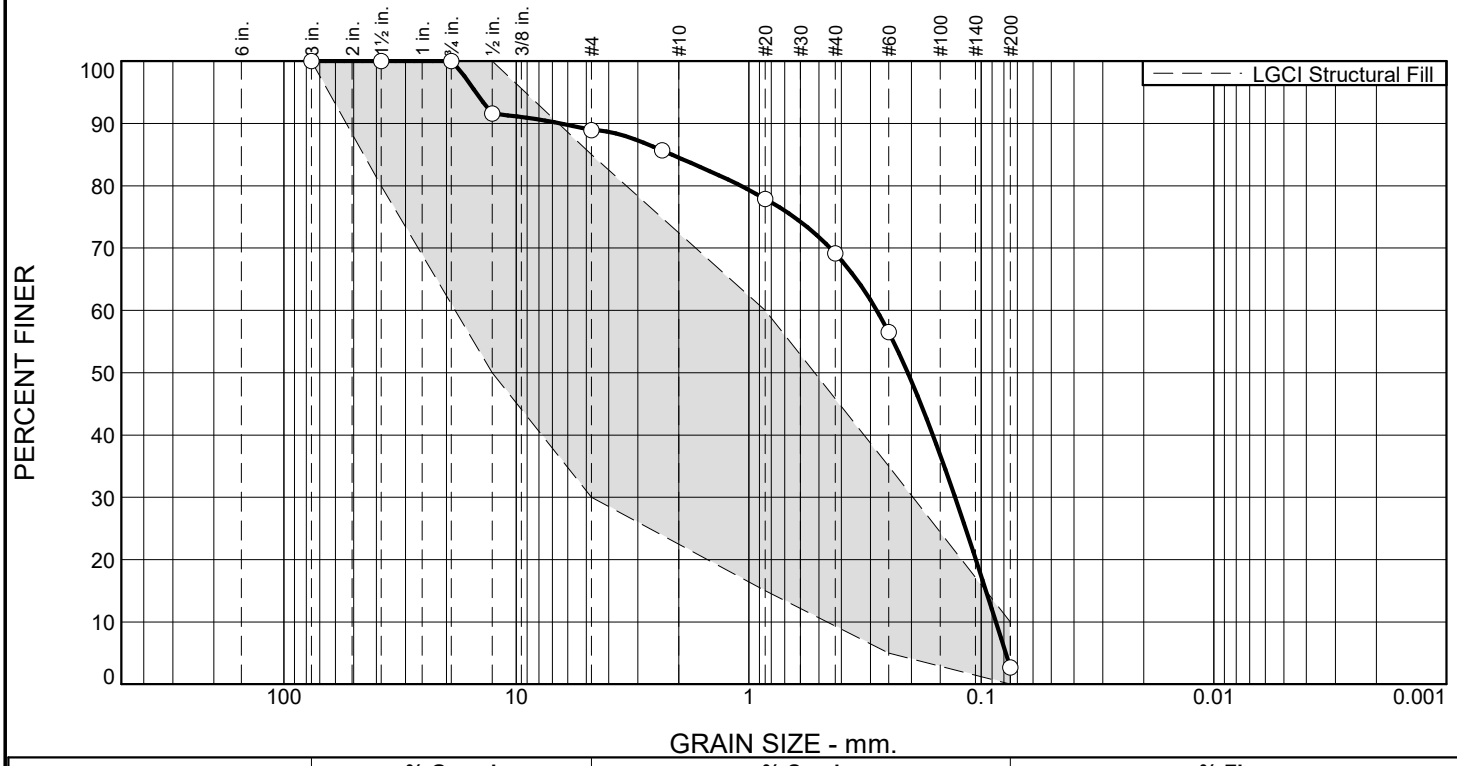
LGCI
Lahlaf Geotechnical Consulting, Inc.

Client: Vanasse Hangen Brustlin, Inc.

Project: Proposed Headwalls and Retaining Wall, Bridgewater, MA

Project No: 1906 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	11.0	4.5	15.3	66.5	2.7	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100.0	100.0	
1.5"	100.0	80.0 - 100.0	
.75"	100.0		
.5"	91.6	50.0 - 100.0	
#4	89.0	30.0 - 85.0	X
#8	85.7		
#20	77.9	15.0 - 60.0	X
#40	69.2		
#60	56.5	5.0 - 35.0	X
#200	2.7	0.0 - 10.0	

* LGCI Structural Fill

Material Description

Poorly Graded SAND (SP), fine, <5% fines, 10-15% fine gravel

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= SP **AASHTO (M 145)=**

Coefficients

D_{90}= 6.4178 D_{85}= 2.1418 D_{60}= 0.2814
D_{50}= 0.2069 D_{30}= 0.1295 D_{15}= 0.0955
D_{10}= 0.0865 C_u= 3.25 C_c= 0.69

Remarks

Fill sample

Date Received: 5/16/2019 **Date Tested:** 6/3/2019

Tested By: BM

Checked By: HA

Sample Number: B-6 S3 Top 6" **Depth:** 4.3'-6.3' **Date Sampled:** 5/16/2019

LGCI
Lahlaf Geotechnical Consulting, Inc.

Client: Vanasse Hangen Brustlin, Inc.

Project: Proposed Headwalls and Retaining Wall, Bridgewater, MA

Project No: 1906 **Figure**

Appendix D – Price Adjustments

DOCUMENT 00811
SPECIAL PROVISIONS
MONTHLY PRICE ADJUSTMENT FOR HOT MIX ASPHALT (HMA) MIXTURES
ENGLISH AND METRIC UNITS
Revised: 07/08/2016

This provision applies to all projects using greater than 100 tons (91 megagrams) of hot mix asphalt (HMA) mixtures containing liquid asphalt cement as stipulated in the Notice to Contractors section of the bid documents.

Price Adjustments will be based on the variance in price, for the liquid asphalt component only, between the Base Price and the Period Price. They shall not include transportation or other charges. Price Adjustments will occur on a monthly basis.

Base Price

The Base Price of liquid asphalt on a project as listed in the Notice to Contractors section of the bid documents is a fixed price determined by the Department at the time of the bid using the same method as the determination of the Period Price detailed below. The Base Price shall be used in all bids.

Period Price

The Period Price is the price of liquid asphalt for each monthly period as determined by the Department using the average selling price per standard ton of PG64-28 paving grade (primary binder classification) asphalt, FOB manufacturer's terminal, as listed under the "East Coast Market - New England, Boston, Massachusetts area" section of the Poten & Partners, Inc. "Asphalt Weekly Monitor". This average selling price is listed in the issue having a publication date of the second Friday of the month and will be posted as the Period Price for that month. The Department will post this Period Price on its website at http://www.mhd.state.ma.us/ within two (2) business days following its receipt of the relevant issue of the "Asphalt Weekly Monitor". Poten and Partners has granted the Department the right to publish this specific asphalt price information sourced from the Asphalt Weekly Monitor. This method of period price determination was formerly called the New Asphalt Period Price Method. Separate website postings using both the New Asphalt Period Price Method and the Old Asphalt Period Price Method were discontinued after June 2013.

Price Adjustment Determination, Calculation and Payment

The Contract Price of the HMA mixture will be paid under the respective item in the Contract. Price Adjustments, as herein provided, either upwards or downwards, will be made after the work has been performed using the monthly period price for the month during which the work was performed.

Price Adjustments will be paid only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases with no deduction of the 5% from either upward or downward adjustments.

The Price Adjustment applies only to the actual virgin liquid asphalt content in the mixture placed on the job in accordance with the Standard Specifications for Highways and Bridges, Division III, Section M3.11.03.

Price Adjustments will be separate payment items. The pay item numbers are 999.401 for a positive price adjustment (a payment) and 999.402 for a negative price adjustment (a deduction). Price Adjustments will be calculated using the following equation:

Price Adjustment = Tons of HMA Placed X Liquid Asphalt Content % X RAP Factor X (Period Price - Base Price)

No Price Adjustment will be allowed beyond the Completion Date of this Contract, unless there is a Department-approved extension of time.

******** END OF DOCUMENT ********

DOCUMENT 00812

SPECIAL PROVISIONS
MONTHLY PRICE ADJUSTMENT FOR DIESEL FUEL AND GASOLINE –
ENGLISH UNITS

Revised: 01/26/2009

This monthly fuel price adjustment is inserted in this contract because the national and worldwide energy situation has made the future cost of fuel unpredictable. This adjustment will provide for either additional compensation to the Contractor or repayment to the Commonwealth, depending on an increase or decrease in the average price of diesel fuel or gasoline.

This adjustment will be based on fuel usage factors for various items of work developed by the Highway Research Board in Circular 158, dated July 1974. These factors will be multiplied by the quantities of work done in each item during each monthly period and further multiplied by the variance in price from the Base Price to the Period Price.

The Base Price of Diesel Fuel and Gasoline will be the price as indicated in the Department's web site (www.mhd.state.ma.us) for the month in which the contract was bid, which includes State Tax.

The Period Price will be the average of prices charged to the State, including State Tax for the bulk purchases made during each month.

This adjustment will be effected only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases with no deduction of the 5% from either upward or downward adjustments.

No adjustment will be paid for work done beyond the extended completion date of any contract.

Any adjustment (increase or decrease) to estimated quantities made to each item at the time of final payment will have the fuel price adjustment figured at the average period price for the entire term of the project for the difference of quantity.

The fuel price adjustment will apply only to the following items of work at the fuel factors shown:

ITEMS COVERED	**FUEL FACTORS**	
	Diesel	**Gasoline**
Excavation: and Borrow Work: Items 120, 120.1, 121, 123, 124, 125, 127, 129.3, 140, 140.1, 141, 142, 143, 144., 150, 150.1, 151 and 151.1 (Both Factors used)	0.29 Gallons / CY.	0.15 Gallons / CY
Surfacing Work: All Items containing Hot Mix Asphalt	2.90 Gallons / Ton	Does Not Apply

******** END OF DOCUMENT ********

DOCUMENT 00813

SPECIAL PROVISIONS

PRICE ADJUSTMENTS FOR STRUCTURAL STEEL AND REINFORCING STEEL

October 11, 2018

This special provision applies to all projects containing the use of structural steel and/or reinforcing steel as specified elsewhere in the Contract work. It applies to all structural steel and all reinforcing steel, as defined below, on the project. Compliance with this provision is mandatory, i.e., there are no "opt-in" or "opt-out" clauses. Price adjustments will be handled as described below and shall only apply to unfabricated reinforcing steel bars and unfabricated structural steel material, consisting of rolled shapes, plate steel, sheet piling, pipe piles, steel castings and steel forgings, and.

Price adjustments will be variances between Base Prices and Period Prices. Base Prices and Period Prices are defined below.

Price adjustments will only be made if the variances between Base Prices and Period Prices are 5% or more. A variance can result in the Period Price being either higher or lower than the Base Price. Once the 5% threshold has been achieved, the adjustment will apply to the full variance between the Base Price and the Period Price.

Price adjustments will be calculated by multiplying the number of pounds of unfabricated structural steel material or unfabricated reinforcing steel bars on a project by the index factor calculated as shown below under Example of a Period Price Calculation.

Price adjustments will ***not*** include guardrail panels or the costs of shop drawing preparation, handling, fabrication, coatings, transportation, storage, installation, profit, overhead, fuel costs, fuel surcharges, or other such charges not related to the cost of the unfabricated structural steel and unfabricated reinforcing steel.

The weight of steel subject to a price adjustment shall not exceed the final shipping weight of the fabricated part by more than 10%.

Base Prices and Period Prices are defined as follows:

Base Prices of unfabricated structural steel and unfabricated reinforcing steel on a project are fixed prices determined by the Department and found in the table below. While it is the intention of the Department to make this table comprehensive, some of a project's unfabricated structural steel and/or unfabricated reinforcing steel may be inadvertently omitted. Should this occur, the Contractor shall bring the omission to the Department's attention so that a contract alteration may be processed that adds the missing steel to the table and its price adjustments to the Contract.

The Base Price Date is the month and year in which MassDOT opened bids for the project. This date is used to select the Base Price Index.

Period Prices of unfabricated structural steel and unfabricated reinforcing steel on a project are variable prices that have been calculated using the Period Price Date and an index of steel prices to adjust the Base Price.

The Period Price Date is the date the steel was delivered to the fabricator as evidenced by an official bill of lading submitted to the Department containing a description of the shipped materials, weights of the shipped materials and the date of shipment. This date is used to select the Period Price Index.

The index used for the calculation of Period Prices is the U.S. Department of Labor Bureau of Labor Statistics Producer Price Index (PPI) Series ID WPU101702 (Not Seasonally Adjusted, Group: Metals and Metal Products, Item: Semi-finished Steel Mill Products.) As this index is subject to revision for a period of up to four (4) months after its original publication, no price adjustments will be made until the index for the period is finalized, i.e., the index is no longer suffixed with a "(P)".

Period Prices are determined as follows:

Period Price = Base Price X Index Factor
Index Factor = Period Price Index / Base Price Index

Example of a Period Price Calculation:

Calculate the Period Price for December 2009 using a Base Price from March 2009 of $0.82/Pound for 1,000 Pounds of ASTM A709 (AASHTO M270) Grade A36 Structural Steel Plate.

The Period Price Date is December 2009. From the PPI website*, the Period Price Index = 218.0.

The Base Price Date is March 2009. From the PPI website*, the Base Price Index = 229.4.

Index Factor = Period Price Index / Base Price Index = 218.0 / 229.4 = 0.950
Period Price = Base Price X Index Factor = $0.82/Pound X 0.950 = $0.78/Pound

Since $0.82 - $0.78 = $0.04 is less than 5% of $0.82, no price adjustment is required.

If the $0.04 difference shown above was greater than 5% of the Base Price, then the price adjustment would be 1,000 Pounds X $0.04/Pound = $40.00. Since the Period Price of $0.78/Pound is less than the Base Price of $0.82/Pound, indicating a drop in the price of steel between the bid and the delivery of material, a credit of $40.00 would be owed to MassDOT. When the Period Price is higher than the Base Price, the price adjustment is owed to the Contractor.

* To access the PPI website and obtain a Base Price Index or a Period Price Index, go to http://data.bls.gov/cgi-bin/srgate

End of example.

The Contractor will be paid for unfabricated structural steel and unfabricated reinforcing steel under the respective contract pay items for all components constructed of either structural steel or reinforced Portland cement concrete under their respective Contract Pay Items.

Price adjustments, as herein provided for, will be paid separately as follows:

Structural Steel
Pay Item Number 999.449 for positive (+) pay adjustments (payments to the Contractor)

Pay Item Number 999.457 for negative (-) pay adjustments (credits to MassDOT Highway Division)

Reinforcing Steel
Pay Item Number 999.466 for positive (+) pay adjustments (payments to the Contractor)

Pay Item Number 999.467 for negative (-) pay adjustments (credits to MassDOT Highway Division)

No price adjustment will be made for price changes after the Contract Completion Date, unless the MassDOT Highway Division has approved an extension of Contract Time for the Contract.

BASE PRICES

The Department's table of Base Prices specified above is updated monthly. The current table is attached to this Document 00813 and included in each new contract.

DOCUMENT 00814

SPECIAL PROVISIONS
PRICE ADJUSTMENT FOR PORTLAND CEMENT CONCRETE MIXES

January 12, 2009

This provision applies to all projects using greater than 100 Cubic Yards (76 Cubic Meters) of Portland cement concrete containing Portland cement as stipulated in the Notice to Contractors section of the Bid Documents. This Price Adjustment will occur on a monthly basis.

The Price Adjustment will be based on the variance in price for the Portland cement component only from the Base Price to the Period Price. It shall not include transportation or other charges.

The Base Price of Portland cement on a project is a fixed price determined at the time of bid by the Department by using the same method as for the determination of the Period Price (see below) and found in the Notice to Contractors.

The Period Price of Portland cement will be determined by using the latest published price, in dollars per ton (U.S.), for Portland cement (Type I) quoted for Boston, U.S.A. in the **Construction Economics** section of *ENR Engineering News-Record* magazine or at the ENR website http://www.enr.com under **Construction Economics**. The Period Price will be posted on the MassHighway website the Wednesday immediately following the publishing of the monthly price in ENR, which is normally the first week of the month.

The Contract Price of the Portland cement concrete mix will be paid under the respective item in the Contract. The price adjustment, as herein provided, upwards or downwards, will be made after the work has been performed, using the monthly period price for the month during which the work was performed.

The price adjustment applies only to the actual Portland cement content in the mix placed on the job in accordance with the Standard Specifications for Highways and Bridges, Division III, Section M4.02.01. No adjustments will be made for any cement replacement materials such as fly ash or ground granulated blast furnace slag.

The Price Adjustment will be a separate payment item. It will be determined by multiplying the number of cubic yards of Portland cement concrete placed during each monthly period times the Portland cement content percentage times the variance in price between the Base Price and Period Price of Portland cement.

This Price Adjustment will be paid only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases with no deduction of the 5% from either upward or downward adjustments.

No Price Adjustment will be allowed beyond the Completion Date of this Contract, unless there is a Department-approved extension of time.

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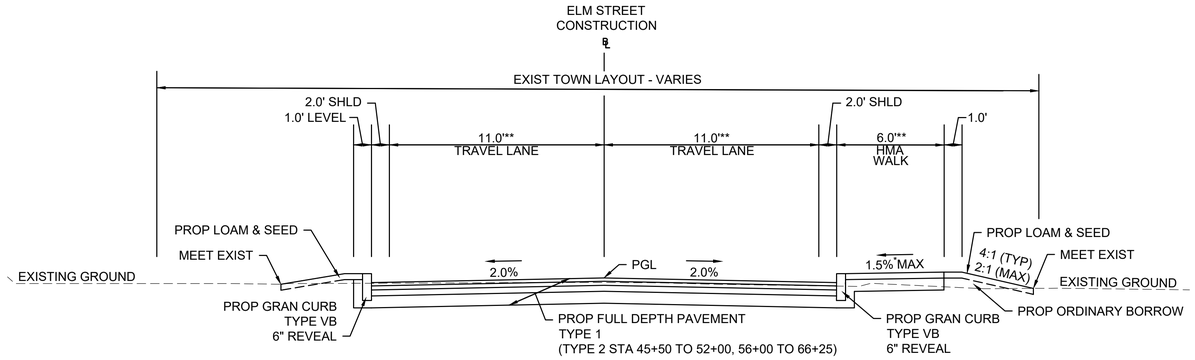
*

END OF DOCUMENT

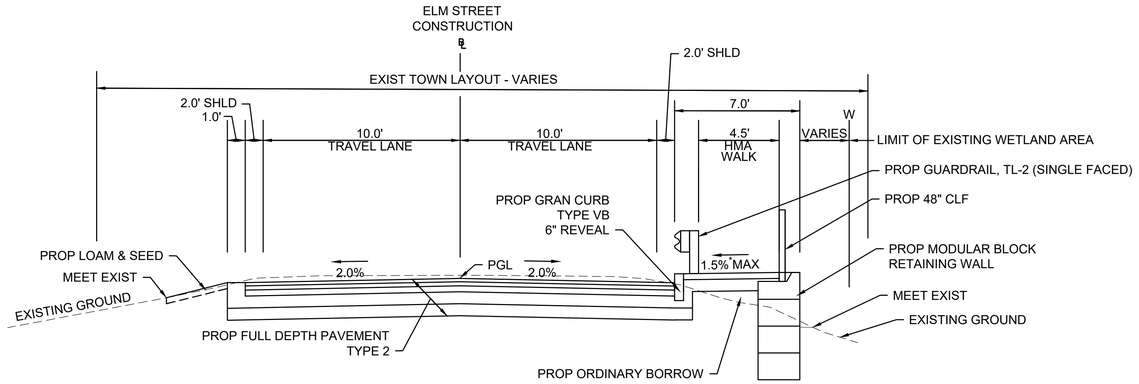
14004.00-TYP.DWG Plotted on 7-Jun-2019 10:32 AM



ELM STREET - STA 10+64± TO 52+00±
STA 56+00± TO 66+25±

NTS

* TOLERANCE FOR CONSTRUCTION ±0.5%
** DIMENSION VARIES - SEE PLAN VIEWS



ELM STREET WITH WALL - STA 52+00± TO 56+00±

NTS

* TOLERANCE FOR CONSTRUCTION ±0.5%

PAVEMENT NOTES

PROPOSED FULL DEPTH PAVEMENT - TYPE 1 (STA 10+64 TO 45+50, 75+50 TO 92+50)

SURFACE:	2 ¼"	SUPERPAVE SURFACE COURSE - 12.5 (SSC-12.5) LEVEL 2
INTERMEDIATE:	2 ¾"	SUPERPAVE INTERMEDIATE COURSE - 19.0 (SIC-19.0) LEVEL 2
SUBBASE:	4"	DENSE GRADED CRUSHED STONE FOR SUB-BASE OVER
	8"	GRAVEL BORROW, TYPE B

PROPOSED FULL DEPTH PAVEMENT - TYPE 2 (STA 45+50 TO 75+50)

SURFACE:	2 ¼"	SUPERPAVE SURFACE COURSE - 12.5 (SSC-12.5) LEVEL 2
INTERMEDIATE:	2 ¾"	SUPERPAVE INTERMEDIATE COURSE - 19.0 (SIC-19.0) LEVEL 2
SUBBASE:	4"	DENSE GRADED CRUSHED STONE FOR SUB-BASE OVER
	8"	GRAVEL BORROW, TYPE B OVER
	8"	SPECIAL BORROW*

* SPECIAL BORROW TO BE USED TO REPLACE UNSUITABLE SOIL ANTICIPATED NEAR THE WETLAND AREAS OR AS REQUIRED BY THE ENGINEER.

PROPOSED HOT MIX ASPHALT DRIVEWAY/DRIVEWAY APRON:

SURFACE:	1 ½"	SUPERPAVE SURFACE COURSE - 12.5 (SSC-12.5) LEVEL 2
INTERMEDIATE:	2 ¼"	SUPERPAVE INTERMEDIATE COURSE - 19.0 (SIC-19.0) LEVEL 2
SUBBASE:	8"	GRAVEL BORROW, TYPE B

PROPOSED CEMENT CONCRETE DRIVEWAY

SURFACE:	6"	AIR ENTRAINED CONCRETE (4000 PSI, ¾", 610 LB)
SUBBASE:	8"	GRAVEL BORROW, TYPE B

PROPOSED HOT MIX ASPHALT WALK

SURFACE:	1"	SUPERPAVE SURFACE COURSE - 9.5 (SSC-9.5) LEVEL 2
INTERMEDIATE:	1 ½"	SUPERPAVE INTERMEDIATE COURSE - 12.5 (SIC-12.5) LEVEL 2
SUBBASE:	8"	GRAVEL BORROW, TYPE B

PROPOSED CEMENT CONCRETE WHEELCHAIR RAMPS:

SURFACE:	4"	AIR ENTRAINED CONCRETE (4000 PSI, ¾", 610 LB)
SUBBASE:	8"	GRAVEL BORROW, TYPE B

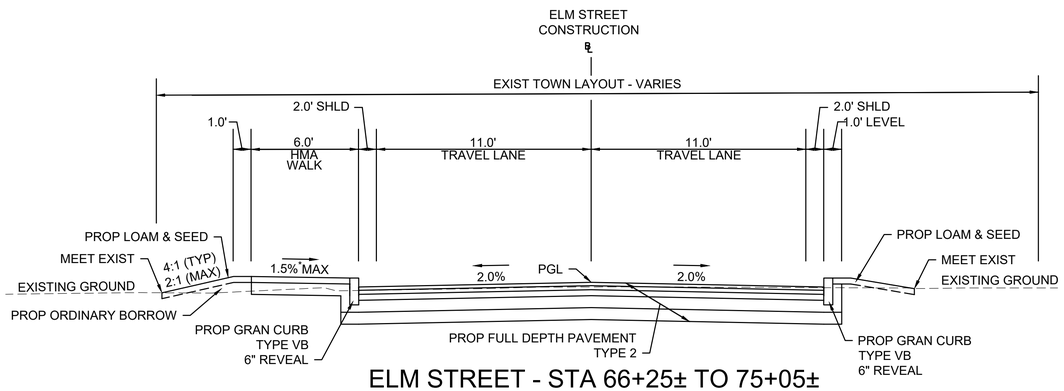
ADDITIONAL NOTES:

1. ALL HOT MIX ASPHALT PAVEMENTS SHALL BE CONSTRUCTED IN ACCORDANCE WITH SECTION 450 SUPERPAVE HMA SPECIFICATIONS.

2. ALL HOT MIX ASPHALT WALK SURFACES SHALL BE ESTIMATED AND PAID FOR UNDER ITEM 702 OF STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES.

3. ALL HOT MIX ASPHALT DRIVEWAY SURFACES SHALL BE ESTIMATED AND PAID FOR UNDER ITEM 703 OF STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES.

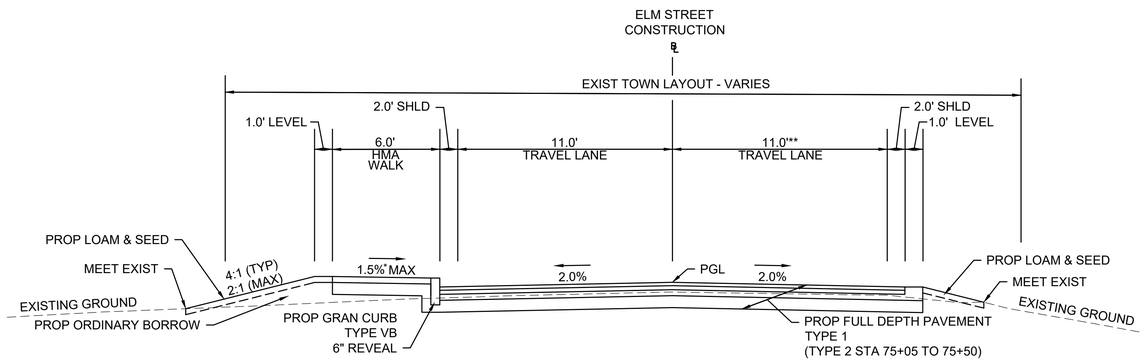
4. TEMPORARY CONSTRUCTION SHALL USE SUPERPAVE HOT MIX ASPHALT MIXTURES AND MAY NOT BE SUBJECT TO THE SAME SAMPLING AND TESTING REQUIRED FOR PERMANENT CONSTRUCTION.



ELM STREET - STA 66+25± TO 75+05±

NTS

* TOLERANCE FOR CONSTRUCTION ±0.5%



ELM STREET - STA 75+05± TO 92+50±

NTS

* TOLERANCE FOR CONSTRUCTION ±0.5%
** DIMENSION VARIES - SEE PLAN VIEWS

BRIDGEWATER
ELM STREET
CONSTRUCTION PLAN & PROFILE
SHEET 07 OF 65

14004.00-GEN.DWG Plotted on 6-Jun-2019 2:08 PM

ELM STREET BASELINE DRAINAGE STRUCTURE DATA

NO.	TYPE	STATION	RIM ELEV.	INV. IN	INV. OUT	REMARKS
D22	CBCI	28+91.0 12.0 LT	68.0		64.50	
D23	CBCI	28+81.4 12.0 RT	67.9		64.20	
D24	DMH	28+74.3 7.4 RT	67.9	(D22) 64.10 (D23) 64.10	64.00	DEEP SUMP

N

N/F
BARN ALLEY LLC
200 ELM ST
71_60_0
BOOK 45135 PAGE 323

N/F
BRADLEY RICHARD W
206 ELM ST
58_31_0
BOOK 47976 PAGE 181

N/F
BURDEN MICHAEL
10 SOPHIA LANE
58_5_0
BOOK 44582 PAGE 260

N/F
HAMM TRICIA
5 SOPHIA LANE
58_66_0
BOOK 43810 PAGE 35

N/F
58_57_0
BOOK 43909 PAGE 171-87

ELM STREET

SOPHIA LANE

BENCHMARK: #D
EL=69.24'

APPROX LIMIT OF GRADING (TYP)

CUT AND CAP OR PLUG ABAN WATER

PROP HMA DWY (TYP)

PROP LOAM & SEED (TYP)

PROP GRAN CURB (TYP)

R&R HYD
PROP 11 FT - 6" DIP

5
N: 2816090.330'
E: 786230.896'
EL: 69.775'
MAG NAIL

PROP CLEAR & GRUB
STA 30+80 TO STA 31+50

END PROP GRAN CURB

R&R FENCE

PROP CEM CONC WCR

PROP W11-2/W16-9p

BEGIN PROP GRAN CURB

TEMP CONST EASEMENT (TYP)

RET PLASTIC FENCE

REM CB & PIPE

ELM STREET CONST B

PROP FDP - TYPE 1

PROP CW

ADJ(BO)

ADJ (BO)

R&R UP (BO)

R&R UP & GUY (BO)

R&R MB (TYP)

PROP HMA DWY

PROP PEASTONE DWY

PROP HMA DWY (TYP)

161' - 12"RCP

41' - 12"RCP

REM TREE

PROP GRAN CURB (TYP)

PROP TEST PIT
SEE NOTE 1
PROP GAS MAIN
RELOCATION (BO)

PROP 6' HMA WALK (TYP)

PROP W11-2/W16-7p(L)

TEMP CONST EASEMENT (TYP)

PROP TREE PROTECTION (TYP)

REM BLOCK WALL TO BACK OF SW

PROP CEM CONC WCR
PROP W11-2/W16-9p

SEWER EASEMENT

PLASTIC FENCE

ABANDONED WATER

EDGE PAVEMENT

GRAVEL

N/F
WELLS HOLDINGS LLC
197 ELM ST
58_28_0
BOOK 34764 PAGE 311

N/F
RONDEAU ROLAND E & PATRICIA J LE &
207 ELM ST
58_27_0
BOOK 45521 PAGE 40-42

N/F
FERNANDES DOMINGOS & MELISSA
221 ELM ST
58_26_0
BOOK 31377 PAGE 046-47

N/F
STARKE DOUGLAS J
237 ELM ST
58_25_0
BOOK 48254 PAGE 190-91

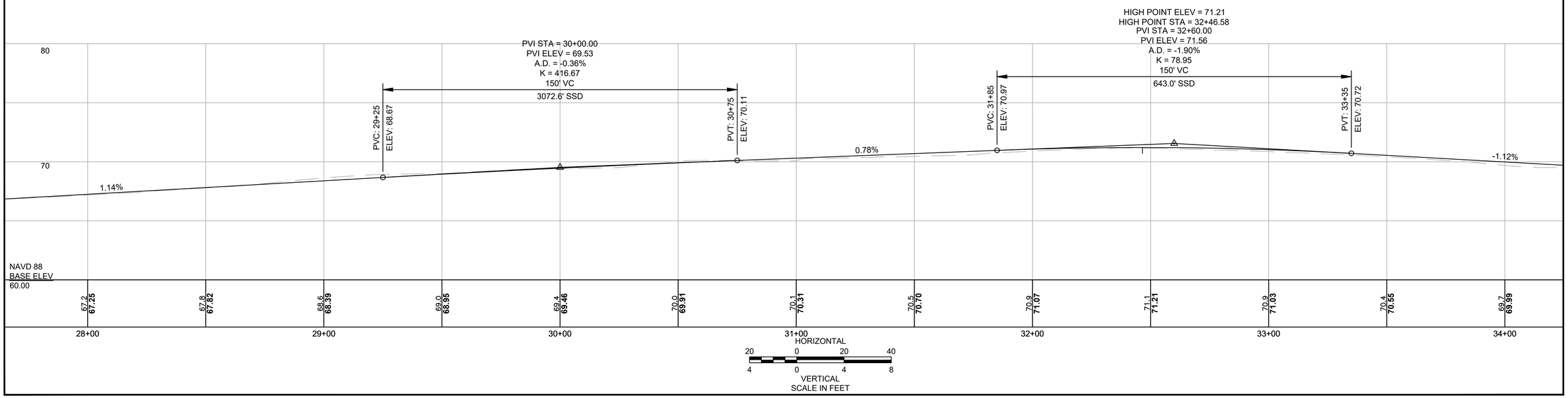
6
N: 2816473.543'
E: 786226.397'
EL: 69.245'
MAG NAIL

CONTINUED ON SHEET NO. 06

CONTINUED ON SHEET NO. 08

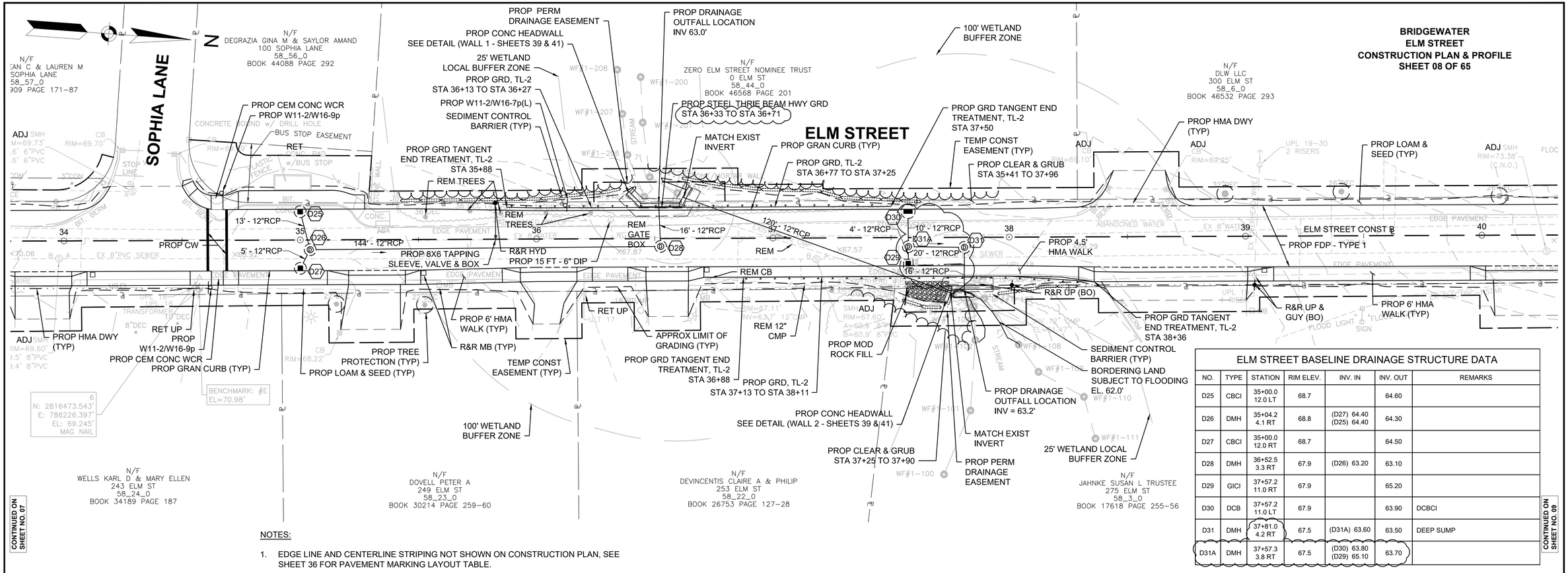
NOTES:

1. CONTRACTOR SHALL CONFIRM THE LOCATION OF THE EXIST GAS LINE PRIOR TO CONSTRUCTION. IF A UTILITY CONFLICT EXISTS, THE CONTRACTOR SHALL COORDINATE WITH THE GAS UTILITY COMPANY TO RELOCATE THE EXIST GAS LINE.
2. EDGE LINE AND CENTERLINE STRIPING NOT SHOWN ON CONSTRUCTION PLAN, SEE SHEET 36 FOR PAVEMENT MARKING LAYOUT TABLE.



BRIDGEWATER
ELM STREET
CONSTRUCTION PLAN & PROFILE
SHEET 08 OF 65

14004.00-GEN.DWG Plotted on 7-Jun-2019 3:13 PM

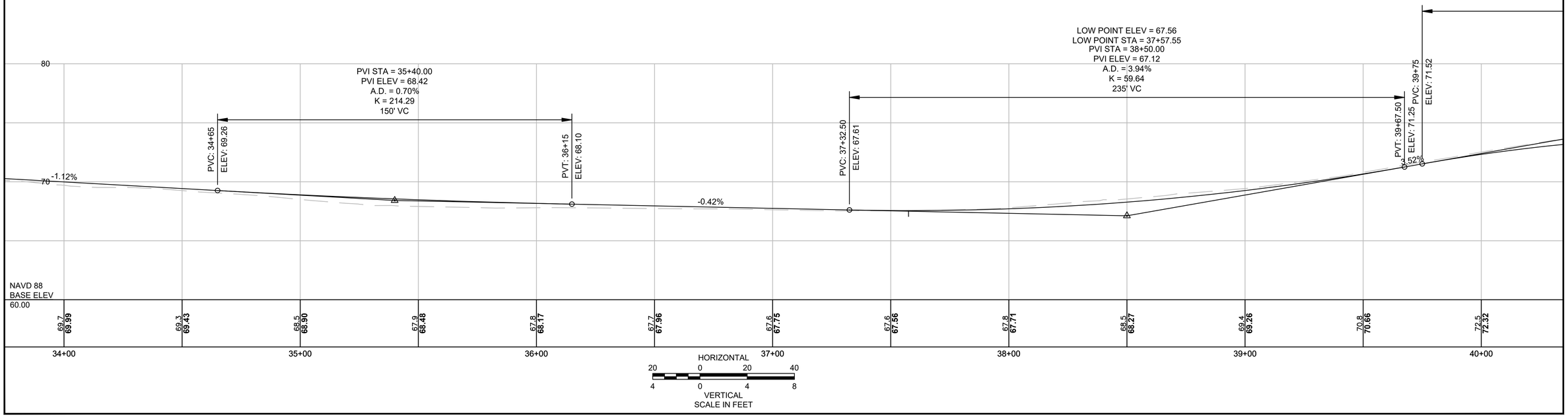


ELM STREET BASELINE DRAINAGE STRUCTURE DATA

NO.	TYPE	STATION	RIM ELEV.	INV. IN	INV. OUT	REMARKS
D25	CBCI	35+00.0 12.0 LT	68.7		64.60	
D26	DMH	35+04.2 4.1 RT	68.8	(D27) 64.40 (D25) 64.40	64.30	
D27	CBCI	35+00.0 12.0 RT	68.7		64.50	
D28	DMH	36+52.5 3.3 RT	67.9	(D26) 63.20	63.10	
D29	GICI	37+57.2 11.0 RT	67.9		65.20	
D30	DCB	37+57.2 11.0 LT	67.9		63.90	DCBCI
D31	DMH	37+81.0 4.2 RT	67.5	(D31A) 63.60	63.50	DEEP SUMP
D31A	DMH	37+57.3 3.8 RT	67.5	(D30) 63.80 (D29) 65.10	63.70	

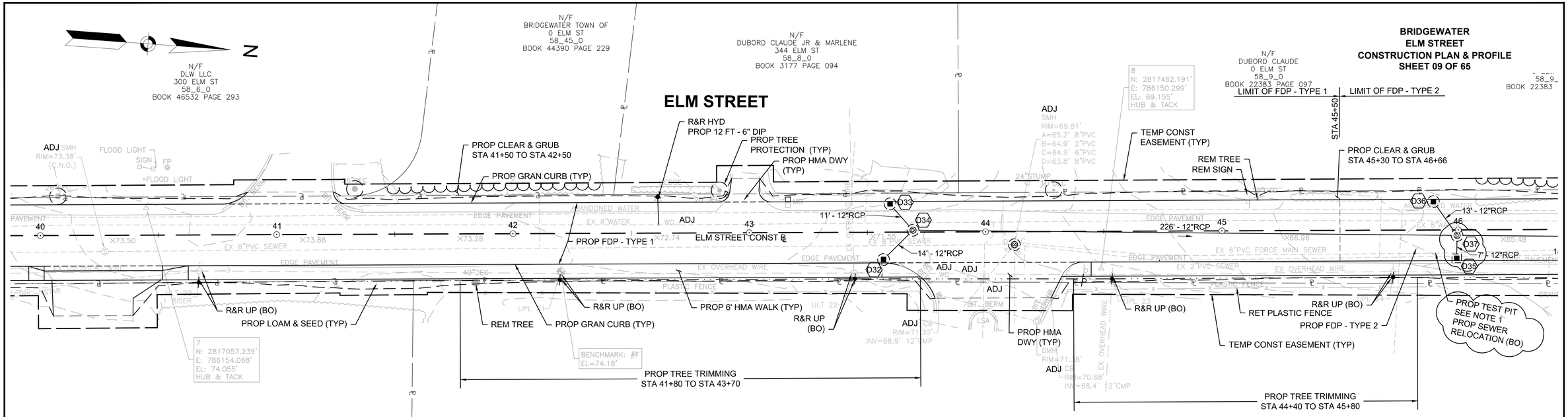
NOTES:

1. EDGE LINE AND CENTERLINE STRIPING NOT SHOWN ON CONSTRUCTION PLAN, SEE SHEET 36 FOR PAVEMENT MARKING LAYOUT TABLE.



BRIDGEWATER
ELM STREET
CONSTRUCTION PLAN & PROFILE
SHEET 09 OF 65

14004.00-GEN.DWG Plotted on 7-Jun-2019 2:31 PM



CONTINUED ON SHEET NO. 08

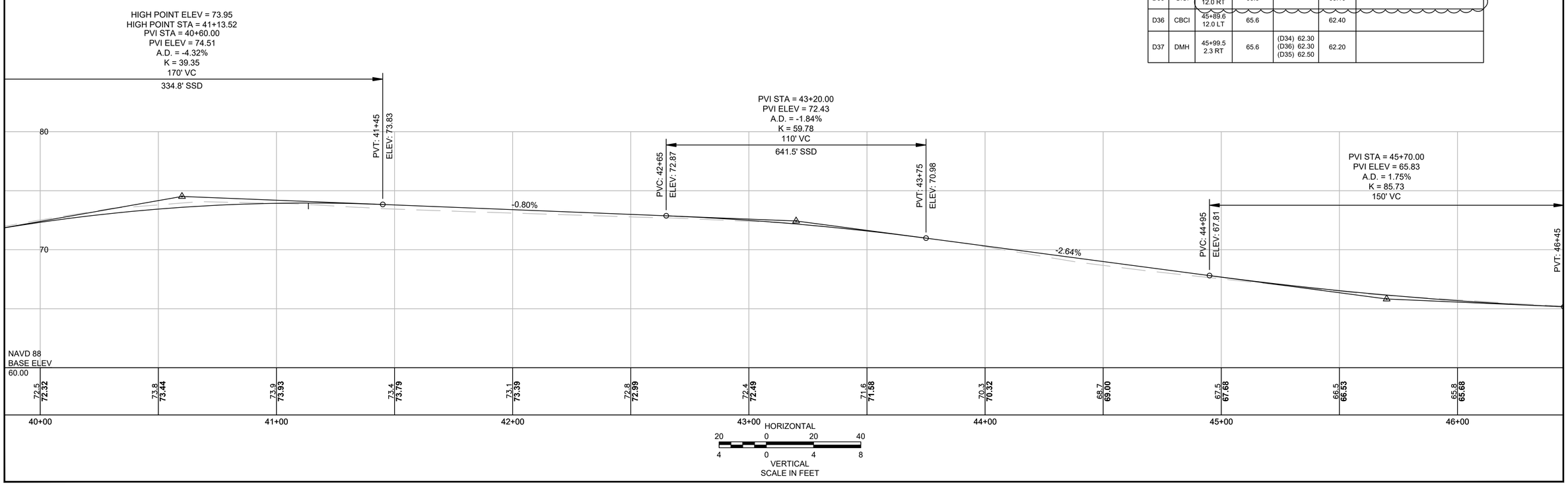
CONTINUED ON SHEET NO. 10

NOTES:

1. CONTRACTOR SHALL CONFIRM THE LOCATION OF THE EXIST SEWER PRIOR TO CONSTRUCTION. IF A UTILITY CONFLICT EXISTS, THE CONTRACTOR SHALL COORDINATE WITH THE BRIDGEWATER SEWER DEPARTMENT TO RELOCATE THE EXIST SEWER LINE.
2. EDGE LINE AND CENTERLINE STRIPING NOT SHOWN ON CONSTRUCTION PLAN, SEE SHEET 36 FOR PAVEMENT MARKING LAYOUT TABLE.

ELM STREET BASELINE DRAINAGE STRUCTURE DATA

NO.	TYPE	STATION	RIM ELEV.	INV. IN	INV. OUT	REMARKS
D32	CBCI	43+56.8 11.5 RT	71.2		67.70	
D33	CBCI	43+59.6 12.0 LT	71.1		67.70	
D34	DMH	43+69.3 0.8 LT	71.1	(D33) 67.60 (D32) 67.60	67.50	
D35	GICI	45+99.3 12.0 RT	65.8		63.10	
D36	CBCI	45+89.6 12.0 LT	65.6		62.40	
D37	DMH	45+99.5 2.3 RT	65.6	(D34) 62.30 (D36) 62.30 (D35) 62.50	62.20	



BRIDGEWATER
ELM STREET
CONSTRUCTION PLAN & PROFILE

14004.00-GEN.DWG   Plotted on 7-Jun-2019 2:33 PM

CONTINUED ON SHEET NO. 11

ELM STREET
V S HASEOTES & SONS LP
0 ELM ST
44_8_0
BOOK 4273 PAGE 374
N/F
JWD ELM STREET LLC
630 ELM ST
44_10_0
BOOK 46932 PAGE 248
25' WETLAND LOCAL BUFFER ZONE
100' WETLAND BUFFER ZONE
PROP PERM DRAINAGE EASEMENT
STONE FOR PIPE ENDS 4'L X 6'W
FES WITH STONE PROTECTION
BORDERING LAND SUBJECT TO FLOODING EL. 62.3'
PROP CLEAR & GRUB STA 53+50 TO STA 60+50
R&R HYD PROP 11 FT - 6" DIP
SEDIMENT CONTROL BARRIER (TYP)
APPROX LIMIT OF GRADING (TYP)
TEMP CONST EASEMENT (TYP)
PROP LOAM & SEED (TYP)
PROP GRAN CURB (TYP)
PROP CLEAR & GRUB STA 63+30 TO STA 64+50
R&R HYD PROP 13 FT - 6" DIP
BEGIN PROP GRAN CURB
21' - 12"RCP
15' - 15"RCP
67' - 15"RCP
16' - 12"RCP
149' - 15"RCP
6' - 12"RCP
13' - 12"RCP
233' - 12"RCP
8' - 12"RCP
19' - 12"RCP
PT +23.67
ELM STREET CONST ℄
ADJ 193' -
REM SIGN PROP R2-1(30)
R&R UP (BO)
R&R MB (TYP)
PROP FDP - TYPE 2
BORDERING LAND SUBJECT TO FLOODING EL. 62.0'
PROP HMA DWY (TYP)
ADJ SMH
ADJ CLEANOUT
RET FENCE
RET SHRUBS
RET
100' WETLAND BUFFER ZONE
TEMP CONST EASEMENT (TYP)
PROP TREE PROTECTION (TYP)
PROP GRAN CURB (TYP)
PROP 6' HMA WALK (TYP)
RET UP
PROP TEST PIT SEE NOTE 1 PROP SEWER RELOCATION (BO)
BENCHMARK: #I EL=66.49'
N/F
KISH ARTHUR S & LISA
509 ELM ST
44_6_0
BOOK 22383 PAGE 100-02
N/F
SNOW NORMAND G & DIANA L
515 ELM ST
44_4_0
BOOK 5612 PAGE 363
N/F
MEURLING MICHAEL J
539 ELM ST
44_3_0
BOOK 45224 PAGE 280

ELM STREET BASELINE DRAINAGE STRUCTURE DATA						
NO.	TYPE	STATION	RIM ELEV.	INV. IN	INV. OUT	REMARKS
D45	GICI	59+57.4 12.0 LT	64.3		61.60	
D46	GICI	59+81.0 11.9 RT	64.3		61.60	
D47	DMH	59+81.4 7.1 LT	64.4	(D46) 61.50 (D45) 61.50 (D50) 60.53	61.40	DEEP SUMP
D48	FES	59+78.9 24.0 LT	62.8	(D47) 61.30		
D50	DMH	60+53.0 4.0 LT	65.0	(D51) 61.10	61.00	
D51	DMH	62+06.4 2.9 LT	66.8	(D54) 62.70 (D52) 62.70 (D53) 63.30	62.60	DEEP SUMP
D52	CBCI	62+11.0 12.0 LT	66.7		63.00	
D53	GICI	62+11.6 12.0 RT	66.9		64.20	

NOTES:

1. CONTRACTOR SHALL CONFIRM THE LOCATION OF THE EXIST SEWER PRIOR TO CONSTRUCTION. IF A UTILITY CONFLICT EXISTS, THE CONTRACTOR SHALL COORDINATE WITH THE BRIDGEWATER SEWER DEPARTMENT TO RELOCATE THE EXIST SEWER LINE.
2. EDGE LINE AND CENTERLINE STRIPING NOT SHOWN ON CONSTRUCTION PLAN, SEE SHEET 36 FOR PAVEMENT MARKING LAYOUT TABLE.

CONTINUED ON SHEET NO. 13

80
70
PVI STA = 60+20.00
PVI ELEV = 64.59
A.D. = 0.82%
K = 243.90
200' VC
PVC: 59+20 ELEV: 64.17
PVT: 61+20 ELEV: 65.83
1.24%
PVC: 63+75 ELEV: 69.00
PVI STA = 64+50.00
PVI ELEV = 69.92
A.D. = -0.55%
K = 273.41
150' VC
2042.0' SSD
NAVD 88
BASE ELEV
60.00
63.7 63.88
63.9 64.09
64.1 64.32
64.7 64.64
65.1 65.07
65.6 65.59
66.3 66.20
67.1 66.82
67.6 67.44
68.1 68.06
68.5 68.68
69.1 69.29
69.6 69.82
59+00
60+00
61+00
62+00
63+00
64+00

HORIZONTAL
20 0 20 40
4 0 4 8
VERTICAL
SCALE IN FEET