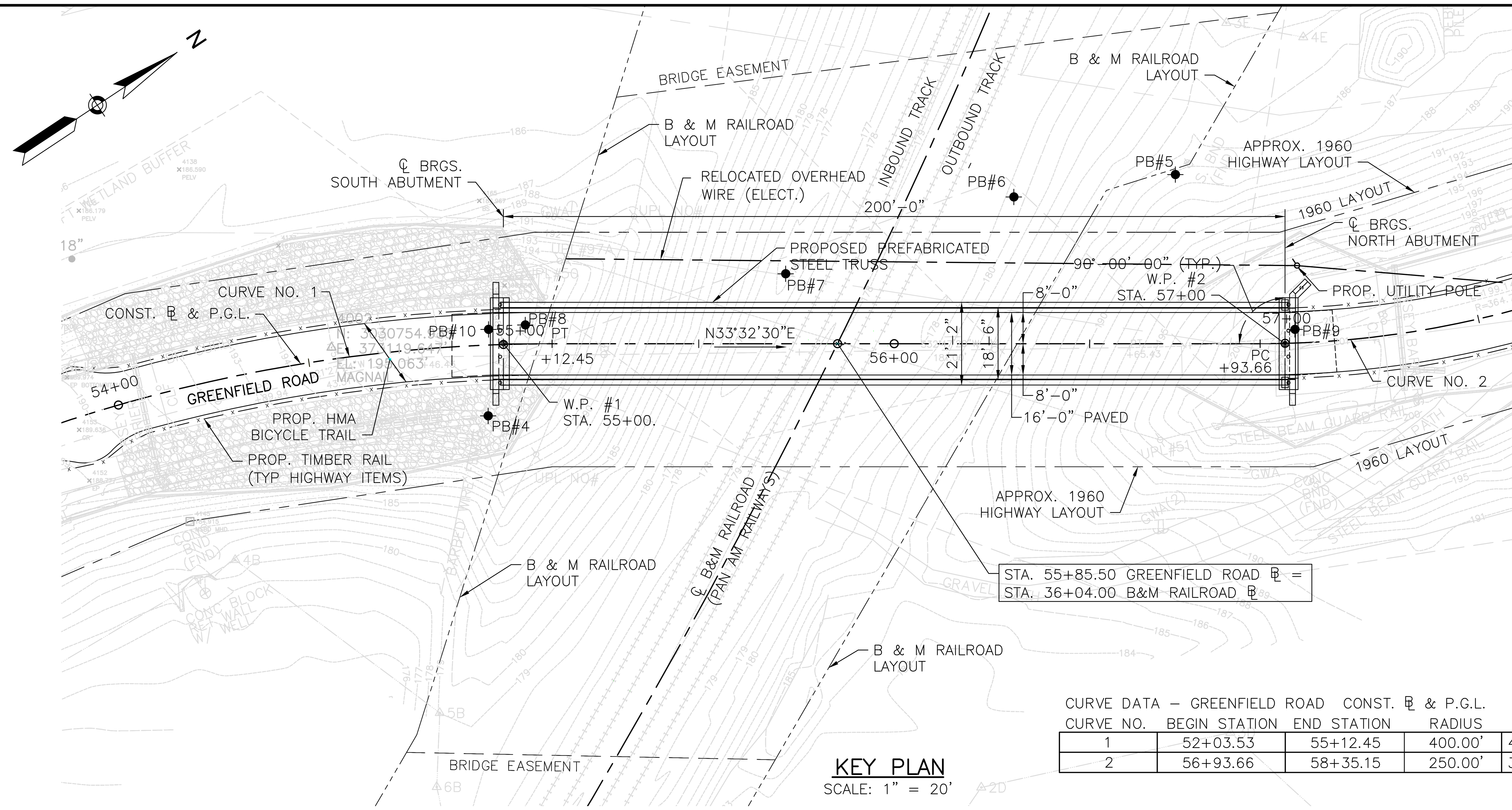
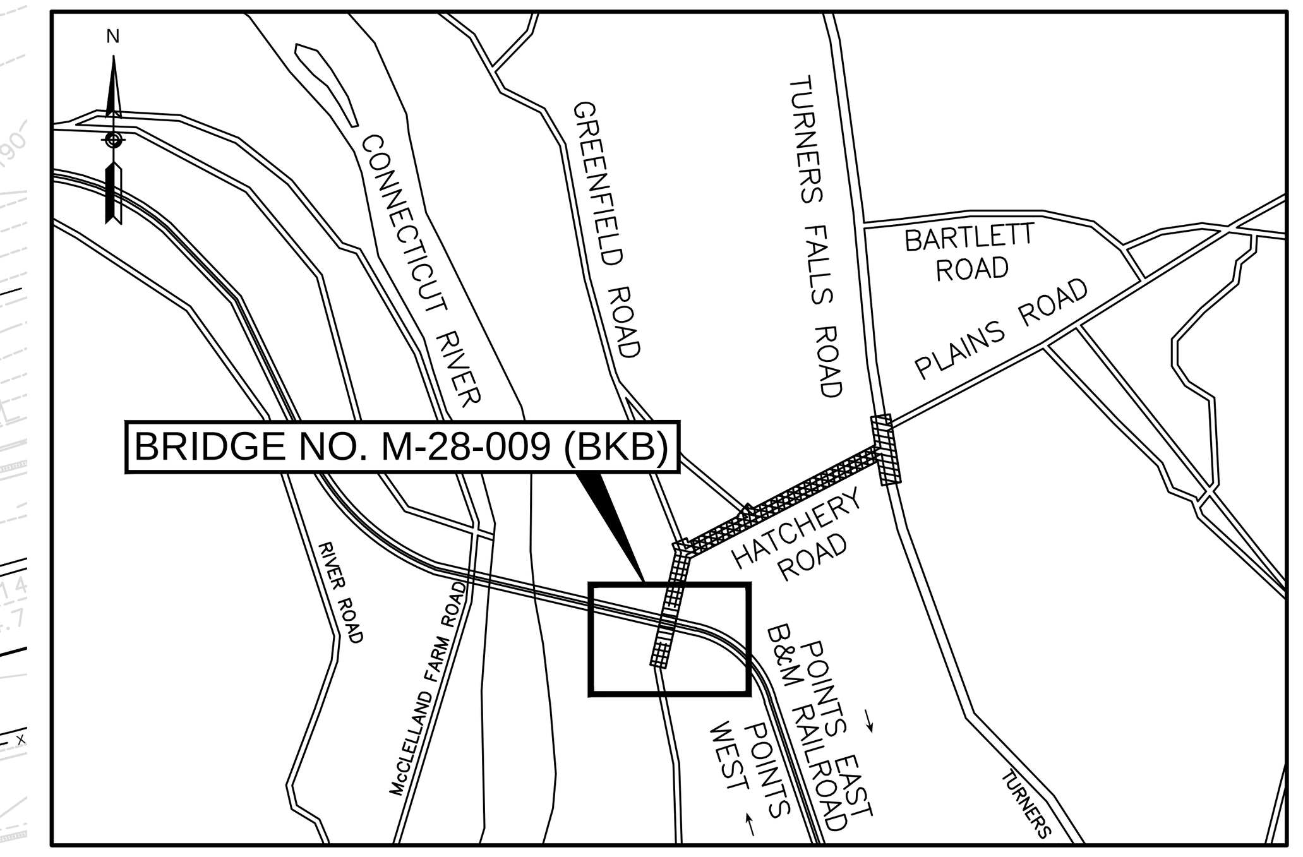


KEY PLAN
SCALE: 1" = 20'

CURVE DATA – GREENFIELD ROAD CONST. ℄ & P.G.L.

CURVE NO.	BEGIN STATION	END STATION	RADIUS	DELTA	LENGTH
1	52+03.53	55+12.45	400.00'	44°15'00"	308.92'
2	56+93.66	58+35.15	250.00'	32°25'37"	141.49'



LOCUS
SCALE: 1" = 2000'

GENERAL NOTES

PROJECT FILE NO.: 604696		
TYPE OF PROJECT: PEDESTRIAN BRIDGE		
BRIDGE DESIGN LOADING: 90 PSF AND H10 TRUCK		
SURVEY: ELECTRONIC SURVEY BY GREENMAN PEDERSEN INC.		
ELEVATION REFERENCE: NAVD OF 1988		

TRAFFIC DATA

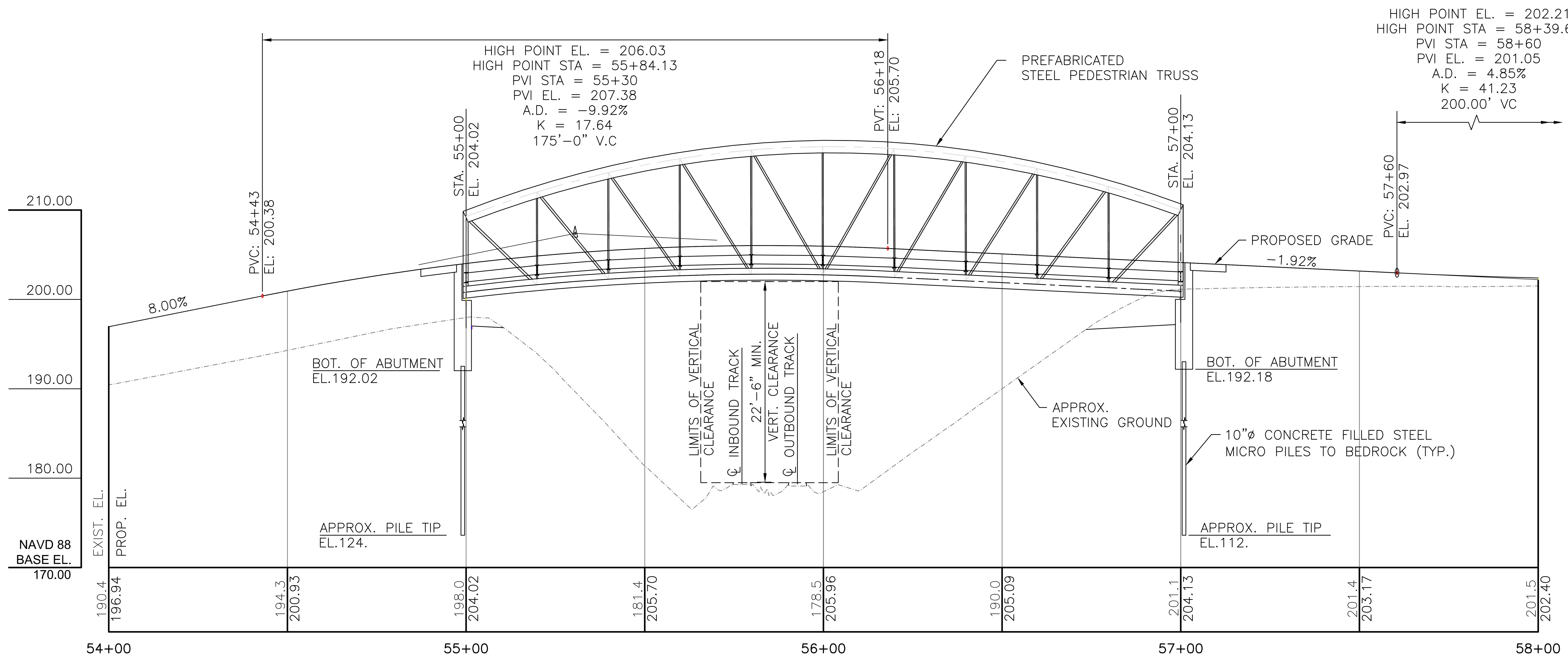
	ROADWAY OVER	ROADWAY UNDER
DESIGN YEAR		
AVERAGE DAILY TRAFFIC – PRESENT		
AVERAGE DAILY TRAFFIC – DESIGN YEAR		
DESIGN HOURLY VOLUME		
DIRECTIONAL DISTRIBUTION		
TRUCK PERCENTAGE – AVERAGE DAY		
TRUCK PERCENTAGE – PEAK HOUR		
DESIGN SPEED		
DIRECTIONAL DESIGN HOURLY VOLUME		

BENCH MARK: (DESCRIPTION, LOCATION AND ELEVATION)
TBM#3 PK. NAIL N3031631.9114, E373328.9176 EL. 215.19'
TBM#4 PK. NAIL N3030528.9528, E373069.2989 EL. 189.31'

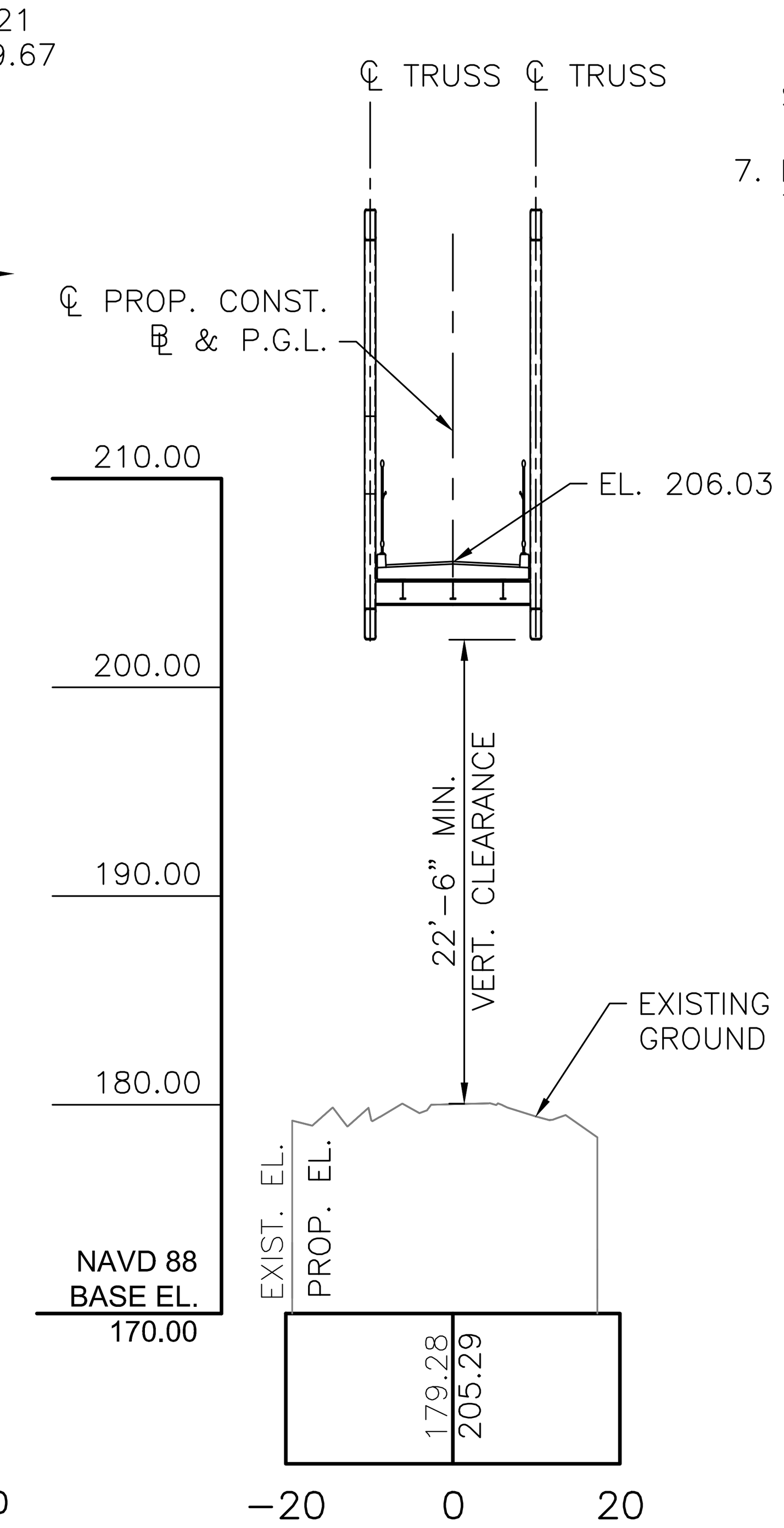
NOTES:

DESIGN:

1. IN ACCORDANCE WITH THE 2012 AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 6TH EDITION AND THE 2009 AASHTO LRFD GUIDE SPECIFICATIONS FOR THE DESIGN OF PEDESTRIAN BRIDGES FOR H10 LOADING AND 90 PSF PEDESTRIAN LOADING, WHICHEVER CONTROLS.
2. APPROVAL DOES NOT INCLUDE THE PROFILE GRADES WHICH ARE PRELIMINARY ONLY.
3. APPROVAL DOES NOT INCLUDE STRUCTURAL ANALYSIS.
4. DIMENSIONS OF STRUCTURAL MEMBERS ARE APPROXIMATE, AND WILL BE FINALIZED DURING THE FINAL DESIGN PHASE.
5. SEE GEOTECHNICAL REPORT, DATED NOVEMBER 2012.
6. SEISMIC GROUND SHAKING HAZARD:
   DESIGN SPECTRA :
   As = 0.148
   Sds = 0.333
   Sd1 = 0.140
   SITE CLASS E
   SEISMIC DESIGN CATEGORY (SDC)=A
7. NORTH AMERICAN VERTICAL DATUM (NAVD) OF 1988 IS USED THROUGHOUT.



PROFILE – ALONG CONST. ℄ & P.G.L. GREENFIELD ROAD
SCALE: 1" = 20' HORIZ.
1/8" = 1'-0" VERT.



PROFILE – ALONG B&M RAILROAD ℄
SCALE: 1" = 20' HORIZ.
1/8" = 1'-0" VERT.

Greenman-Pedersen, Inc.
GPI
181 Ballardvale Street, Suite 202, Wilmington, MA 01887

massDOT
Massachusetts Department of Transportation
Highway Division

SKETCH PLAN OF PROPOSED BRIDGE

MONTAGUE

GREENFIELD ROAD
OVER B&M RAILROAD
(PAN AM RAILWAYS)
MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION

APPROVED BY	DATE
STRUCTURAL ELEMENTS:	
TITLE:	
HIGHWAY ELEMENTS:	
TITLE:	

BORING LOGS
1 OF 6

BORING NO. PB-4

PHONE: (603) 437-1610
NEW HAMPSHIRE BORING, INC.
P.O. BOX 165 DERRY, NH 03038
E-MAIL: nhb@nhboring
FAX: (603) 437-0034

Boring #: PB-4	Project: M-28-9	Project #: 31240	Location: 45+42.9
Project Address: Greenfield Rd over B&M R.R.	City: Montague	State: MA	Offset: 1.4 LF
Date Start: 7-2-01 Start Time: 9:00 a.m.	Date End: 7-3-01	End Time: 2:30 p.m.	Elev: 59.75m
Casing:	Sampler:	Casing:	Sampler:
Type: H W	S/S	Size: .1m I.D.	34.9mm I.D.
Hammer: 136 kg	63.5 kg	Fall: .6m	760mm

GROUNDWATER OBSERVATION – METRIC, SCALE 1 : 50

Date:	Depth:	Casing:	Stablization Per:
7-3-01 7:00 p.m.	3.96m	21m	13.5 Hour

DP	S./#	DEPTH (m)	PEN(m)	REC	BLOWS/.15m	S/C	SAMPLE DESCRIPTION
	S-1	0 to 0.6			10-8-8-10		Dry, Medium Dense, Brown, COARSE SAND, Trace Fine Gravel
1m							
2m	S-2	1.5 to 2.1			10-9-8-11		Dry, Medium Dense, Brown, COARSE TO FINE SAND, Some Inorganic Silt, Trace Medium Gravel
3m	S-3	3.0 to 3.6			13-17-19-26		Wet, Dense, Brown, FINE GRAVEL
4m							
	S-4	4.5 to 5.1			2-2-3-4		Moist, Loose, TAN, INORGANIC SILT, Trace Fine Sand
5m							
6m	S-5	6.0 to 6.6			3-5-5-5		Moist, Loose, Brown, FINE SAND, Trace Inorganic Silt, Trace Clay
7m							
8m	S-6	7.5 to 8.1			2-2-2-1		Moist, Loose, Gray, COARSE SAND, Trace Inorganic silt
9m	S-7	9.0 to 9.6			3-3-3-3		Moist, Loose, Gray, FINE SAND, Trace Inorganic silt
10m							
	S-8	10.5 to 11.1			3-3-2-3		Wet, Loose, Gray, INORGANIC SILT, Trace Fine Sand
11m							
12m	S-9	12.0 to 12.6			6-9-10-11		Wet, Medium Dense Gray FINE SAND, Some Inorganic Silt
13m							
	S-10	13.5 to 14.1			9-11-12-14		Wet, Medium Dense Brown FINE SAND, Trace Inorganic Silt
14m							

EL. 200.0 FT
EL. 195.0 FT
EL. 190.0 FT
EL. 185.0 FT
EL. 180.0 FT
EL. 175.0 FT
EL. 170.0 FT
EL. 165.0 FT
EL. 160.0 FT
EL. 155.0 FT
EL. 150.0 FT
EL. 145.0 FT

SOUTH ABUTMENT
EL. 192.02 BOTTOM

MATCHLINE PB-4

BORING NO. PB-4 CONT.

BORING NO. PB-4

DP	S./#	DEPTH (m)	PEN(m)	REC	BLOWS/.15m	S/C	SAMPLE DESCRIPTION
14m							
15m	S-11	15.0 to 15.6			8-9-8-12		Wet, Medium Dense Brown FINE SAND, Trace Inorganic Silt
16m							
	S-12	16.5 to 17.1			6-11-13-13		Wet, Medium Dense Gray, FINE SAND, Trace Inorganic Silt
17m							
18m	S-13	18.0 to 18.6			8-8-13-12		Wet, Medium Dense Gray, FINE SAND, Trace Inorganic Silt
19m							
	S-14	19.5 to 20.1			4-5-5-5		Wet, Medium Dense Gray, FINE SAND, Trace Inorganic Silt
20m							
21m	S-15	21.0 to 21.6			5-8-6-8		Wet, Medium Dense Gray, FINE SAND, Trace Clay
22m							
	S-16	22.5 to 23.1			3-3-4-6		Wet, Loose Gray, INORGANIC SILT, Trace Fine Sand, Trace Clay
23m							
24m	S-17	24.0 to 24.6			5-7-8-10		Wet, Medium Dense, Gray, FINE SAND, Trace Inorganic Silt
25m							
	S-18	25.5 to 26.1			3-4-3-2		Wet, Medium Stiff Gray CLAY, Trace Fine Sand, Trace Inorganic Silt
26m							
27m	S-19	27.0 to 27.6			4-7-8-11		Wet, Medium Dense, Gray, FINE SAND, Trace Inorganic Silt
28m							
	S-20	28.5 to 29.1			9-11-11-12		Wet, Medium Dense, Gray, FINE SAND
29m							
30m	S-21	30.0 to 30.6			4-5-3-4		Wet, Loose Gray INORGANIC SILT, Trace Fine Sand
31m						30.6	Boring terminated per Consultants Field person, due to sufficient information. Grouted hole from 30.6m to surface.

Driller: Steve Garside Jr. | Helper: Denny Thersher | Inspection: Leo Charbonneau

Remarks: Hours worked: 25 Hours; Case size hw. Length: 1.52m; Casing used 30.6m; Location changed due to overhead wires, boring was moved from 45+40.7, 5.6 LT to 45+42.9, 1.4 LT, Ground Elevation 60.4m.

S./#: SAMPLE | PEN: PENETRATION | REC: RECOVERY | S/C: STRATA CHANGE

EL. 150.0 FT
EL. 145.0 FT
EL. 140.0 FT
EL. 135.0 FT
EL. 130.0 FT
EL. 125.0 FT
EL. 120.0 FT
EL. 115.0 FT
EL. 110.0 FT
EL. 105.0 FT
EL. 100.0 FT
EL. 95.0 FT
EL. 90.0 FT

APPROX. SOUTH ABUT. PILE TIP
EL. 124.

BORING NOTES

1. LOCATION OF BORINGS SHOWN ON THE PLAN THUS: ● PB-1
2. BORINGS ARE TAKEN FOR THE PURPOSE OF DESIGN AND SHOW CONDITIONS AT BORING POINTS ONLY, BUT DO NOT NECESSARILY SHOW THE NATURE OF THE MATERIALS TO BE ENCOUNTERED DURING CONSTRUCTION.
3. WATER LEVELS SHOWN ON THE BORING LOGS WERE OBSERVED AT THE TIME OF TAKING BORINGS AND DO NOT NECESSARILY SHOW THE TRUE GROUND WATER LEVEL.
4. FIGURES IN THE COLUMNS INDICATE NUMBER OF BLOWS REQUIRED TO DRIVE A 1⅜" I.D. SPLIT SPOON SAMPLER 6" USING A 140 POUND WEIGHT FALLING 30".
5. BORING SAMPLES ARE LOCATED AT 219 WINTHROP AVENUE, LAWRENCE, MA. THE CONTRACTOR MAY EXAMINE THE SOIL AND ROCK SAMPLES BY CONTACTING THE MASSDOT HIGHWAY DIVISION GEOTECHNICAL SECTION AT 10 PARK PLAZA, ROOM 6500, BOSTON, MA 02116-3973 AT (857)-368-9191.
6. PREVIOUSLY EXISTING BORINGS WERE TAKEN BETWEEN THE DATES OF JUNE 28, 2001 AND JULY 10, 2001. CURRENT BORINGS WERE TAKEN BETWEEN THE DATES OF SEPTEMBER 19, 2012 AND SEPTEMBER 21, 2012.
7. CURRENT BORINGS WERE MADE BY NEW HAMPSHIRE BORINGS, INC. OF DERRY, NH UNDER THE GUIDANCE OF GEI CONSULTANTS, INC.
8. THE NORTH AMERICAN VERTICAL DATUM (NAVD) OF 1988 IS USED THROUGHOUT.

BORING NO. PB-8

PHONE: (603) 437-1610	**NEW HAMPSHIRE BORING, INC. P.O. BOX 165 DERRY, NH 03038 E-MAIL: nhb@nhboring**	**FAX: (603) 437-0034**

Boring #: PB-8	**Project:** Bridge No. M-28-9	**Project #:** 31240	**Station:** 45+38.5
Project Address: Greenfield Rd over B&M RR	**City:** Montague	**State:** MA	**Offset:** 5.2m RT.
Date Start: 7-5-01	**Start Time:** 9:30 a.m.	**Date End:** 7-6-01	**End Time:** 2:30 p.m.	**Elev:** 60.00 m

Casing:	**Sampler:**	**Casing:**	**Sampler:**
Type: H W	S/S	**Size:** .1m I.D.	34.9mm I.D.
Hammer: 136 kg	63.5 kg	**Fall:** .6m	760mm

GROUNDWATER OBSERVATION - METRIC, SCALE 1 : 50

Date:	**Depth:**	**Casing:**	**Stabilization Per:**
7-6-01	3.66m	10.5m	11.5 Hrs.

DP	S./#	DEPTH (m)	PEN(m)	REC	BLOWS/.15m	S/C	SAMPLE DESCRIPTION
	S-1	0. to 0.6			3-7-10-12		Dry Medium Dense, Brown, FINE SAND, Trace Medium Gravel
1m							
	S-2	1.5 to 2.1			8-9-10-11		Moist, Medium Dense, Brown, FINE SAND, Some Inorganic Silt
2m							
	S-3	3.0 to 3.6			2-2-5-8		Moist, Loose, Brown, INORGANIC SILT, Trace Fine Sand, Trace Fine Gravel
4m							
	S-4	4.5 to 5.1			3-3-4-5		Moist, Loose, Gray, INORGANIC SILT, Trace Fine Sand
5m							
6m							
	S-5	6.0 to 6.6			5-5-6-1		Moist, Medium Dense, Gray, FINE SAND, Trace Inorganic Silt
7m							
	S-6	7.5 to 8.1			1-1-2-3		Wet, Very Loose, Gray, INORGANIC SILT, Some Clay, Trace Fine Sand
8m							
9m							
	S-7	9.0 to 9.6			1-1-1-2		Wet, Very Loose, Gray, FINE SAND, Trace Inorganic Silt, Trace Clay
10m							
	S-8	10.5 to 11.1			3-6-7-6		Wet, Medium Dense, Brown, FINE SAND, Some Gray, Inorganic Silt
	S-7	9.0 to 9.6			1-1-1-2		Wet, Very Loose, Gray, FINE SAND, Trace Inorganic Silt, Trace Clay
10m							
	S-8	10.5 to 11.1			3-6-7-6		Wet, Medium Dense, Brown, FINE SAND, Some Gray, Inorganic Silt
11m							
12m							
	S-9	12.0 to 12.6			3-5-8-11		Wet, Medium Dense, Brown, FINE SAND, Some Inorganic Silt
13m							
	S-10	13.5 to 14.1			5-6-10-11		Wet, Medium Dense, Brown, FINE SAND
14m							

EL. 200.0 FT, EL. 195.0 FT, EL. 190.0 FT, EL. 185.0 FT, EL. 180.0 FT, EL. 175.0 FT, EL. 170.0 FT, EL. 165.0 FT, EL. 160.0 FT, EL. 155.0 FT, EL. 150.0 FT, EL. 145.0 FT, EL. 140.0 FT, EL. 135.0 FT, EL. 130.0 FT

SOUTH ABUTMENT EL. 192.02 BOTTOM

NOTE:

FOR BORING NOTES, SEE SHEET 2 OF 8.

MATCHLINE PB-8

BORING NO. PB-8 CONT.

BORING NO. PB-8

	S./#	DEPTH (m)	PEN(m)	REC	BLOWS/.15m	S/C	SAMPLE DESCRIPTION
14m	S-10	13.5 to 14.1			5-6-10-11		Wet, Medium Dense, Brown, FINE SAND
15m	S-11	15 to 15.6			6-5-8-7		Wet, Medium Dense, Brown, FINE SAND
16m	S-12	16.5 to 17.1			7-4-10-12		Wet, Medium Dense, Gray, FINE SAND, Trace Inorganic Silt
17m							
18m	S-13	18 to 18.6			6-4-8-7		Wet, Medium Dense, Gray, FINE SAND, Trace Inorganic Silt
19m							
20m	S-14	19.5 to 20.1			5-5-4-5		Wet, Loose, Gray, FINE SAND, Trace Inorganic Silt
21m	S-15	21 to 21.6			1-1-3-5		Wet, Dense, Gray, INORGANIC SILT, Trace Fine Sand
22m	S-16	22.5 to 23.1			2-3-2-6		Wet, Loose, Gray, FINE SAND, Some Inorganic Silt
23m							
	S-16	22.5 to 23.1			2-3-2-6		Wet, Loose, Gray, FINE SAND, Some Inorganic Silt
23m							
24m	S-17	24 to 24.6			3-.2-.3-.5		Wet, Loose, Gray, FINE SAND, Trace Inorganic Silt
25m							
	S-18	25.5 to 26.1			1-1-6-7		Wet, Loose, Gray, FINE SAND, Some Inorganic Silt
26m							
27m	S-19	27.0 to 27.6			5-8-11-12		Wet, Medium Dense, Gray, FINE SAND, Trace Inorganic Silt
28m							
29m	S-20	28.5 to 29.1			5-4-2-1		Wet, Loose, Gray, FINE SAND, Trace Inorganic Silt,
30m	S-21	30.0 to 30.6			1-1-2-2		Wet, Very Loose, Gray, FINE SAND
				30.6			Bottom of Exploration 30.6m Boring terminated per Consultants Field Person, due to sufficient information Grouted Hole to Surface from 30.6m
31m							

EL. 135.0 FT, EL. 130.0 FT, EL. 125.0 FT, EL. 120.0 FT, EL. 115.0 FT, EL. 110.0 FT, EL. 105.0 FT, EL. 100.0 FT, EL. 95.0 FT, EL. 90.0 FT, EL. 85.0 FT, EL. 80.0 FT, EL. 75.0 FT, EL. 70.0 FT, EL. 65.0 FT, EL. 60.0 FT, EL. 55.0 FT

APPROX. SOUTH ABUT. PILE TIP EL. 124.

Driller: Steve Garside	**Helper:** Eric Sheinfield	**Inspection:** Leo Charbonneau

Remarks: Hours worked: 15.5 Hours; Casing size hw length: 1.52m. Casing used 30m. Location changed from station 45+30.2 offset 7.4m RT to station 45+38.5 offset 5.2m RT, due to overhead wires.

S./#: SAMPLE | PEN: PENETRATION | REC: RECOVERY | S/C: STRATA CHANGE

MONTAGUE
GREENFIELD ROAD OVER B&M RAILROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-		
PROJECT FILE NO. 604696			

BORING LOGS
2 OF 6

BORING NO. PB–7

PHONE: (603) 437–1610 | NEW HAMPSHIRE BORING, INC. P.O. BOX 165 DERRY, NH 03038 E–MAIL: nhb@nhboring | FAX: (603) 437–0034

Boring #: PB–7 | Project: M–28–9 | Project #: 31240 | Location: 45+17.8
Project Address: Greenfield Rd over B&M R.R. City: Montague | State: MA | Offset: 4.9 RT
Date Start: 7–9–01 | Start Time: 9:00 a.m. | Date End: 7–10–01 | End Time: 4:30 p.m. | Elev: 54.00m

Casing:	Sampler:	Casing:	Sampler:
Type: H W	S/S	Size: .1m I.D.	34.9mm I.D.
Hammer: 136 kg	63.5 kg	Fall: .6m	760mm

GROUNDWATER OBSERVATION – METRIC, SCALE 1 : 50

Date: 7–10–01 7:30 p.m. | Depth: Ground Surface | Casing: 27.9m | Stablization Per: 14 Hours

DP	S./#	DEPTH (m)	PEN(m)	REC	BLOWS/.15m	S/C	SAMPLE DESCRIPTION
	S–1	0 to 0.6			3–3–4–8		Dry, Loose, Brown, FINE TO COARSE SAND, Trace Coarse Gravel
2m	S–2	1.5 to 2.1			7–23–19–8		Wet, Dense, Gray FINE TO COARSE GRAVEL, Some wood, Coarse Sand
3m	S–3	3.0 to 3.6			2–2–2–3		Wet, Very Loose, Gray FINE SAND, Some Medium Gravel, Trace Organic Silt
	S–4	4.5 to 5.1			2–2–3–5		Wet, Loose, Brown, FINE SAND, Trace Inorganic Silt
6m	S–5	6.0 to 6.6			3–4–6–5		Wet, Loose, Brown, INORGANIC SILT, Trace Fine Sand
8m	S–6	7.5 to 8.1			2–3–4–5		Wet, Loose, Brown, FINE SAND, Trace Inorganic Silt
9m	S–7	9.0 to 9.6			5–5–9–10		Wet, Medium, Dense, Brown, FINE SAND, Trace Inorganic Silt
11m	S–8	10.5 to 11.1			5–5–4–4		Wet, Loose, Gray, FINE SAND, Trace Inorganic Silt
12m	S–9	12.0 to 12.6			5–4–3–3		Wet, Loose, Gray, FINE SAND, Trace Inorganic Silt

EL. 180.0 FT, EL. 175.0 FT, EL. 170.0 FT, EL. 165.0 FT, EL. 160.0 FT, EL. 155.0 FT, EL. 150.0 FT, EL. 145.0 FT, EL. 140.0 FT, EL. 135.0 FT, EL. 130.0 FT

MATCHLINE PB–7

BORING NO. PB–7 CONT.

BORING NO. PB–7

13m	S–10	13.5 to 14.1			2–4–3–5		Wet, Loose, Gray, FINE SAND, Trace Inorganic Silt
15m	S–11	15.0 to 15.6			5–5–5–4		Wet, Loose, Gray, FINE SAND, Some Inorganic silt, Trace Clay
17m	S–12	16.5 to 17.1			3–6–6–6		Wet, Medium Dense, Gray, FINE SAND, Trace Inorganic Silt, Trace Clay
18m	S–13	18.0 to 18.6			4–6–6–5		Wet, Medium Dense, Gray, FINE SAND, Trace Inorganic Silt, Trace Clay
19m	S–14	19.5 to 20.1			2–2–3–5		Wet, Loose Gray, FINE SAND, Some Inorganic Silt, Trace Clay
21m	S–15	21.0 to 21.6			6–6–10–9		Wet, Medium Dense, Gray, FINE SAND, Trace Inorganic Silt
22m	S–16	22.5 to 23.1			5–2–2–4		Wet, Loose, Gray, INORGANIC SILT, Some Fine Sand, Trace Clay
24m	S–17	24.0 to 24.6			2–2–4–5		Wet, Loose, Gray, INORGANIC SILT, Trace Fine Sand, Trace Clay
25m	S–18	25.5 to 26.1			2–2–3–5		Wet, Loose, Gray, INORGANIC SILT, Trace Fine Sand
27m	S–19	27.0 to 27.6			3–4–5–8		Wet, Loose, Gray, COARSE SAND, Some Fine Gravel
28m	S–20	27.9 to 28.05			120/.15m		Possible Bedrock Sample at 27.9m, Black Shale Dense, Black, SHALE
						28.05	Boring terminated per Consultants Field Person, due to sufficient information Grouted hole to surface from 28.05m

EL. 135.0 FT, EL. 130.0 FT, EL. 125.0 FT, EL. 120.0 FT, EL. 115.0 FT, EL. 110.0 FT, EL. 105.0 FT, EL. 100.0 FT, EL. 95.0 FT, EL. 90.0 FT, EL. 85.0 FT, EL. 80.0 FT

Driller: Steve Garside Jr. | Helper: Denny Thresher | Inspection: Leo Charbonneau

Remarks: Hours worked: 26 Hours; Case size hw. Length: 1.52m; Casing used 27.9m; Location changed due to slope conditions boring was moved from 45+20.1, 7.4 RT to 45+17.8, 4.9 RT

S./#: SAMPLE | PEN: PENETRATION | REC: RECOVERY | S/C: STRATA CHANGE

NOTE:
FOR BORING NOTES, SEE SHEET 2 OF 8.

MONTAGUE
GREENFIELD ROAD OVER B&M RAILROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	–		
PROJECT FILE NO. 604696			

BORING LOGS
4 OF 6

21-Jan-2014

2,3,4,5,6,7-BORING LOGS.DWG

BORING NO. PB–6

PHONE: (603) 437–1610 — NEW HAMPSHIRE BORING, INC. P.O. BOX 165 DERRY, NH 03038 E–MAIL: nhb@nhboring — FAX: (603) 437–0034

Boring #: PB–6 | Project: M–28–9 | Project #: 31240 | Location: 44+97.7
Project Address: Greenfield Rd over B&M R.R. City: Montague | State: MA | Offset: 7.4 RT
Date Start: 6–20–01 Start Time: 9:30 a.m. | Date End: 6–25–01 End Time: 6:30 p.m. | Elev: 55.25m

Casing:	Sampler:	Casing:	Sampler:
Type: H W	S/S	Size: .1m I.D.	34.9mm I.D.
Hammer: 136 kg	63.5 kg	Fall: .6m	760mm

GROUNDWATER OBSERVATION – METRIC, SCALE 1 : 50

Date: 6–25–01 | Depth: 0.61m | Casing: 30.0m | Stablization Per: 60 Hours

DP	S./#	DEPTH (m)	PEN(m)	REC	BLOWS/.15m	S/C	SAMPLE DESCRIPTION
1m	S–1	0 to 0.6			2–3–3–3		Moist, Loose, Brown, INORGANIC SILT, Some Coarse Sand
2m	S–2	1.5 to 2.1			1–1–1–1		Moist, Very Loose, Gray, INORGANIC SILT, Some Clay, Trace Fine Sand
3m	S–3	3.0 to 3.6			1–1–1–1		Wet, Very Soft, Gray, CLAY, Trace Fine Sand
4m							
5m	S–4	4.5 to 5.1			1–1–1–1		Wet, Very Soft, Gray CLAY, Trace Fine Sand
6m	S–5	6.0 to 6.6			1–2–3–4		Wet, Loose, Gray, INORGANIC SILT and Fine Sand
7m							
8m	S–6	7.5 to 8.1			2–2–3–4		Wet, Loose, Gray, INORGANIC SILT, Trace Fine Sand, Trace Clay
9m	S–7	9.0 to 9.6			1–3–6–7		Moist, Loose, Gray, FINE SAND, Trace Inorganic Silt
10m							
11m	S–8	10.5 to 11.1			1–2–5–4		Wet, Loose, Gray, FINE SAND, Trace Inorganic Silt
12m	S–9	12.0 to 12.6			3–3–4–4		Wet, Loose, Gray, FINE SAND, Trace Inorganic Silt
13m							
14m	S–10	13.5 to 14.1			2–2–3–3		Wet, Loose, Gray, FINE SAND, Trace Inorganic Silt
15m	S–11	15.0 to 15.6			1–2–2–3		Wet, Loose, Gray, FINE SAND, Trace Inorganic silt
16m							
17m	S–12	16.5 to 17.1			1–2–2–2		Wet, Loose Gray, FINE SAND, Trace Clay, Trace Inorganic Silt
18m	S–13	18.0 to 18.6			1–2–2–4		Wet, Soft, Gray, CLAY

EL. 185.0 FT, EL. 180.0 FT, EL. 175.0 FT, EL. 170.0 FT, EL. 165.0 FT, EL. 160.0 FT, EL. 155.0 FT, EL. 150.0 FT, EL. 145.0 FT, EL. 140.0 FT, EL. 135.0 FT, EL. 130.0 FT, EL. 125.0 FT, EL. 120.0 FT

MATCHLINE PB–6

BORING NO. PB–6 CONT.

BORING NO. PB–6

18m	S–13	18.0 to 18.6			1–2–2–4		Wet, Soft, Gray, CLAY
19m	S–14	19.5 to 20.1			4–8–2–3		Wet, Loose Gray, INORGANIC SILT, Trace Fine Sand
20m							
21m	S–15	21.0 to 21.6			3–3–8–12		Wet, Medium Dense, Gray, FINE SAND, Trace Inorganic Silt
22m	S–16	22.5 to 23.1			2–3–4–6		Wet, Loose, Gray, FINE SAND
23m							
24m	S–17	24.0 to 24.6			1–1–1–1		Wet, Very Loose, Gray, INORGANIC SILT, Trace clay
25m	S–18	25.5 to 26.1			1–2–3–3		Moist, Medium Stiff, Gray, CLAY, Trace Inorganic Silt
26m							
27m	S–19	27.0 to 27.6			1–2–2–3		Moist, Loose, Gray, INORGANIC SILT, Trace Clay
28m	S–20	28.5 to 29.1			1–3–3–5		Moist, Loose, Gray, COARSE SAND, Some Inorganic Silt
29m							
30m	S–21	30.0 to 30.49			9–19–34–86/.04m		Moist, Very Dense, Gray, COARSE SAND, Some Medium Gravel
31m						30.49	Drove casing from 30.49m to 31.09m and washed out. Possible bedrock at 31.09m
32m						31.09	Type of core barrel used: 54.7mm (nx) Drove down to bedrock seated on rock, roller bitted hole to clean then started to core. At 508 mm core barrel jammed up with silt (inorganic). Cleaned core out and tried to re–core. Barrel silted up again at 3:00 p.m.. Inspector called hold and we started pulling casing back we found out that the bottom at 1.5m of casing had unspun. Inspector: 6/20, 6/21 – Mary Billings 6/22, 6/25 – Leo Charbonneau Helper: 6/20, 6/21, 6/23 – Eric Allard 6/25 – Denny Thresher
33m							
34m							

Driller: Steve Garside Jr. | Helper: Denny Thresher | Inspection: Leo Charbonneau
Remarks: Hours worked: 34.5 Hours; Case size hw. Length: 1.52m; Casing used 31.09m
S./#: SAMPLE | PEN: PENETRATION | REC: RECOVERY | S/C: STRATA CHANGE

EL. 120.0 FT, EL. 120.0 FT, EL. 115.0 FT, EL. 110.0 FT, EL. 105.0 FT, EL. 100.0 FT, EL. 95.0 FT, EL. 90.0 FT, EL. 85.0 FT, EL. 80.0 FT, EL. 75.0 FT, EL. 70.0 FT, EL. 65.0 FT

NOTE:
FOR BORING NOTES, SEE SHEET 2 OF 8.

BORING NO. PB-5

EL. 190.0 FT
EL. 185.0 FT
EL. 180.0 FT
EL. 175.0 FT
EL. 170.0 FT
EL. 165.0 FT
EL. 160.0 FT
EL. 155.0 FT
EL. 150.0 FT
EL. 145.0 FT
EL. 140.0 FT
EL. 135.0 FT
EL. 130.0 FT
EL. 125.0 FT
EL. 120.0 FT

PHONE: (603) 437-1610
NEW HAMPSHIRE BORING, INC.
P.O. BOX 165 DERRY, NH 03038
E-MAIL: nhb@nhboring
FAX: (603) 437-0034

Boring #: PB-5 Project: M-28-9 Project #: 31240 Location: 44+87.6
Project Address: Greenfield Rd over B&M R.R. City: Montague State: MA Offset: 7.4 RT
Date Start: 6-26-01 Start Time: 7:00 a.m. Date End: 6-28-01 End Time: 6:30 p.m. Elev: 56.50m

Casing:	Sampler:	Casing:	Sampler:
Type: H W	S/S	Size: .1m I.D.	34.9mm I.D.
Hammer: 136 kg	63.5 kg	Fall: .6m	760mm

GROUNDWATER OBSERVATION - METRIC, SCALE 1 : 50

Date:	Depth:	Casing:	Stablization Per:
6/28/01 7:00 a.m.	.61m	30m	12.5 Hours

DP	S./#	DEPTH (m)	PEN(m)	REC	BLOWS/.15m	S/C	SAMPLE DESCRIPTION
	S-1	0 to 0.6			1-2-2-1		Dry, Very, Loose, Brown, COARSE SAND, Some Organic Silt
1m							
2m	S-2	1.5 to 2.1			3-3-7-20		Wet, Loose, Gray, COARSE SAND, Trace Fine to Coarse Gravel, Trace Organic Silt
3m	S-3	3.0 to 3.6			2-2-2-3		Wet, Very Loose, Gray, COARSE SAND, Trace Inorganic Silt, Trace Fine Gravel
4m							
5m	S-4	4.5 to 5.1			1-1-1-1		Wet, Very Loose, Gray, INORGANIC SILT, Trace Fine Sand, Trace Clay
6m	S-5	6.0 to 6.6			1-1-1-1		Wet, Loose, Tan, COARSE SAND, Trace Inorganic Silt
7m							
8m	S-6	7.5 to 8.1			3-3-3-4		Wet, Very Loose, Tan, FINE SAND, Trace Inorganic Silt
9m	S-7	9.0 to 9.6			4-5-7-7		Wet, Medium, Dense, Gray, INORGANIC SILT, Trace Fine Sand, Trace Clay
10m							
11m	S-8	10.5 to 11.1			3-4-5-7		Wet, Loose, Tan, FINE SAND
12m	S-9	12.0 to 12.6			9-11-14-17		Wet, Medium Dense, Tan, FINE SAND, Trace Inorganic Silt
13m							
14m	S-10	13.5 to 14.1			7-8-8-9		Wet, Medium Dense Gray, FINE SAND
15m	S-11	15.0 to 15.6			4-5-5-8		Wet, Medium Dense Gray, FINE SAND
16m							
17m	S-12	16.5 to 17.1			4-4-5-7		Wet, Loose Gray, FINE SAND, Trace Inorganic Silt
18m	S-13	18.0 to 18.6			4-3-4-6		Wet, Loose, Gray, INORGANIC SILT, Trace clay.
19m							

MATCHLINE PB-5

BORING NO. PB-5 CONT.

BORING NO. PB-5

EL. 125.0 FT
EL. 120.0 FT
EL. 115.0 FT
EL. 110.0 FT
EL. 105.0 FT
EL. 100.0 FT
EL. 95.0 FT
EL. 90.0 FT
EL. 85.0 FT
EL. 80.0 FT
EL. 75.0 FT
EL. 70.0 FT
EL. 65.0 FT
EL. 60.0 FT
EL. 55.0 FT
EL. 50.0 FT

DP	S./#	DEPTH (m)	PEN(m)	REC	BLOWS/.15m	S/C	SAMPLE DESCRIPTION
19m	S-14	19.5 to 20.1			3-4-4-6		Wet, Loose, INORGANIC SILT, Trace Fine Sand
20m							
21m	S-15	21.0 to 21.6			4-6-6-8		Wet, Medium Dense, Gray, INORGANIC SILT, Trace Fine Sand
22m	S-16	22.5 to 23.1			5-10-11-11		Wet, Medium Dense, Gray, INORGANIC SILT, Trace Fine Sand
23m							
24m	S-17	24.0 to 24.6			4-11-9-11		Wet, Medium Dense, Gray, INORGANIC SILT, Trace Fine Sand
25m							
26m	S-18	25.5 to 26.1			4-3-4-4		Wet, Loose Gray, INORGANIC SILT, Trace Clay
27m	S-19	27.0 to 27.6			2-2-3-4		Wet, Loose, Gray, INORGANIC SILT
28m							
29m	S-20	28.5 to 29.1			4-7-9-16		Wet, Medium Dense, Gray, INORGANIC SILT, Trace Clay
30m	S-21	30.0 to 30.6			7-4-2-2		Wet, Medium Stiff, Gray, CLAY, Trace Inorganic Silt, Trace Fine Gravel
31m							
32m						31.7	Casing Refusal at 31.7m Cleaned out casing with rollerbit Bedrock at 31.7 Cleaned wash tub and add clean water for morning
33m	C-1	32.3 to 33.8	1.5m	1.5	Core Time Minutes Per .5m 10: 4: 7.5:		Dense, Black, Slightly, Fracture, SHALE Percent Recovery = 100%
34m	C-2	33.8 to 35.4	1.6m	1.5	Core Time Minutes Per .5m 8: 9: 7.5:		Dense, Black, Slightly, Fracture, SHALE Percent Recovery = 93.8%
35m							
36m							Bottom of Exploration 35.4 Type of core barrel used: 54.7mm (nx)
37m							- Tried to core, barrel plugged - Pulled from hole to clean - Had running sand conditions - Barrel plugged 3 more times - Ran roller bit down to 32.2m - Took wash sample from 31 to 32m to confirm that we were on rock and seated casing. - Attempted to core again at 32.3m - Core 32.3 to 33.8 Rec 1.50m - Black Shale core 33.8 to 35.4 - Black Shale, end hole at 35.4 - Pulled back 6.1m casing
38m							
37m							- Set a 50mm TYPE IV well at 3.66m - 1.22m Solid PVC pipe - 3.048m of screen PVC pipe - Sand up to 0.914 - Bentonite to surface (ground) - 1 protective stand pipe (1.219m I.D.) - Per Consultants Field Inspector
37m							

Driller: Steve Garside Jr. Helper: Denny Thresher Inspection: Leo Charbonneau
Remarks: Hours worked: 43.0 Hours; Case size hw. Length: 1.52m; Casing used 31.7m
S./#: SAMPLE PEN: PENETRATION REC: RECOVERY S/C: STRATA CHANGE

NOTE:
FOR BORING NOTES, SEE SHEET 2 OF 8.

BORING NO. PB-9

EL. 210.0 FT, EL. 200.0 FT, EL. 190.0 FT, EL. 180.0 FT, EL. 170.0 FT, EL. 160.0 FT, EL. 150.0 FT, EL. 140.0 FT, EL. 120.0 FT, EL. 110.0 FT

NORTH ABUTMENT
EL. 192.18 BOTTOM

APPROX. NORTH ABUT. PILE TIP
EL. 112.

massDOT Highway — NEW HAMPSHIRE BORING, INC., P.O. Box 165, Derry, NH 03038 — Phone: (603)437-1610, Fax: (603) 437-0034, E Mail: nhb@nhboring.com — **Boring No.** PB-9 — Scale 1" = 5'

City/Town: Montague | Bridge: M-28-009 | Project File No: 604696 | Contract No: 56297
Project: Greenfield Road over B&M Railroad | Date & Time Started: 09-19-12 12:00 pm | Total Hours: 9.5
Groundwater Depth: 6' | Date & Time: 09-20-12 1:30 pm | Date & Time Completed: 09-20-12 1:30 pm
Coordinates: N 3030963 E 373252 | Driller's Name: Manlea Thompson | Helper's Name: Matthew Stone
Ground Elevation: 201' | Inspector's Name: Jay Scully | Inspector's Company: GEI Consultants Inc. for Greenman Pedersen, Inc.

Sample Number	Depth Range (Feet)	Blow Counts per 6 Inches Coring Times Minute Per Foot				Recovery Inches	Field Description	Strata Changes
S-1	0' - 2'	10	9	8	10	15"	Moist, medium dense, brown, FINE TO COARSE SAND, trace fine to medium gravel, trace inorganic silt.	
S-2	5' - 7'	18	15	10	9	17"	Wet, medium dense, brown, FINE TO COARSE SAND, trace inorganic silt, trace clay, trace fine gravel.	
S-3	10' - 12'	8	6	3	4	15"	Wet, loose, brown, FINE SAND, trace inorganic silt, trace clay, trace fine gravel.	15'
S-4	15' - 17'	5	7	9	11	17"	Moist, very stiff, gray/brown, INORGANIC SILT, some fine sand, some clay.	
S-5	17' - 19'	6	9	13	14	17"	Moist, very stiff, gray/brown, INORGANIC SILT and clay, some fine sand.	
S-6	19' - 21'	3	4	5	7	22"	Wet, stiff, gray/brown, INORGANIC SILT and clay, some fine sand.	
S-7	21' - 23'	6	6	7	6	24"	Wet, stiff, gray/brown, INORGANIC SILT and clay, some fine sand.	23'
S-8	23' - 25'	3	4	5	4	24"	Wet, stiff, gray/brown, CLAY and inorganic silt, some fine sand.	
S-9	25' - 27'	2	3	4	4	24"	Wet, medium stiff, gray, CLAY and fine sand, some inorganic silt.	30'
S-10	30' - 32'	WOH/18"	1			24"	Wet, very soft, gray, CLAY, trace fine sand, trace inorganic silt.	
S-11	35' - 37'	1/12"	1	5		24"	Wet, very soft, gray, CLAY, some fine sand, trace inorganic silt.	40'
S-12	40' - 42'	5	6	8	10	18"	Wet, medium dense, brown/gray, FINE SAND, some clay, some inorganic silt.	
S-13	45' - 47'	5	6	6	6	18"	Wet, medium dense, brown/gray, FINE SAND, some clay, trace inorganic silt.	
S-14	50' - 52'	3	6	11	15	15"	Wet, medium dense, brown, FINE SAND, trace inorganic silt.	52'
							Bottom of Exploration = 52'	

Remarks: Set piezometer well at 51'. 2/Sand, 1/Bentonite chips, 1/J-plug, 40'/Grout, 1/Concrete.
WOR = Weight of Rods WOH = Weight of Hammer

Arrow-Board: Signs: 2 Cones: 20

Protective Device - Stand: Box: 1
Well Depth: 51' Solid Pipe: 46'
Stick Up Pipe: Screen Pipe: 5
Type of Drill Rig: CME-550X
Casing HW Size: 4"
Depth: 50'
Hammer Weight: 300 lbs. Fall: 30"
Sampler Type: S/S Size: 1 3/8"
Automatic Hammer Weight:
Safety Hammer Weight: 140 lbs.
Donut Hammer Weight:
Fall: 30"
Core Barrel Type: Size:

Penetration Resistance (N) Guide:

Cohesionless Soils (Sands, Gravels)		Cohesive Soils (Silts, Clays)	
Relative Density	Penetration Resistance	Consistency	Penetration Resistance
Very Loose	0 - 4	Very Soft	0 - 2
Loose	4 - 10	Soft	2 - 4
Medium Dense	10 - 30	Medium Stiff	4 - 8
Dense	30 - 50	Stiff	8 - 15
Very Dense	Over 50	Very Stiff	15 - 30
N=Sum of Second and Third 6" Blow Counts		Hard	Over 30

Terms Used for Second Entry of Descriptions: and = 40-50%, some = 10-40%, trace = 10% or less

BORING NO. PB-10

EL. 210.0 FT, EL. 200.0 FT, EL. 190.0 FT, EL. 180.0 FT, EL. 170.0 FT, EL. 160.0 FT, EL. 150.0 FT, EL. 140.0 FT, EL. 130.0 FT, EL. 120.0 FT

SOUTH ABUTMENT
EL. 192.02 BOTTOM

APPROX. SOUTH ABUT. PILE TIP
EL. 124.

massDOT Highway — NEW HAMPSHIRE BORING, INC., P.O. Box 165, Derry, NH 03038 — Phone: (603)437-1610, Fax: (603) 437-0034, E Mail: nhb@nhboring.com — **Boring No.** PB-10 — Scale 1" = 5'

City/Town: Montague | Bridge: M-28-009 | Project File No: 604696 | Contract No: 56297
Project: Greenfield Road over B&M Railroad | Date & Time Started: 09-20-12 1:00 pm | Total Hours: 9
Groundwater Depth: 13' | Date & Time: 09-21-12 11:30 am | Date & Time Completed: 09-21-12 12:00 pm
Coordinates: N 3030791 E 373138 | Driller's Name: Manlea Thompson | Helper's Name: Matthew Stone
Ground Elevation: 198' | Inspector's Name: Jay Scully | Inspector's Company: GEI Consultants Inc. for Greenman Pedersen, Inc.

Sample Number	Depth Range (Feet)	Blow Counts per 6 Inches Coring Times Minute Per Foot				Recovery Inches	Field Description	Strata Changes
S-1	6" - 2'6"	9	10	11	15	10"	PAVEMENT	3"
							Moist, medium dense, brown, FINE TO COARSE SAND, some inorganic silt, trace fine to medium gravel.	
S-2	5' - 7'	14	12	10	9	12"	Wet, medium dense, brown, FINE TO COARSE SAND, some clay, some inorganic silt.	
S-3	10' - 12'	5	12	9	7	15"	Wet, medium dense, brown, FINE SAND, some inorganic silt, trace clay.	15'
S-4	15' - 17'	3	2	4	3	20"	Wet, medium stiff, gray, CLAY, some inorganic silt some fine sand.	
S-5	17' - 19'	5	4	5	5	24"	Wet, stiff, gray, CLAY, some fine sand.	
S-6	19' - 21'	2	3	4	5	22"	Wet, medium stiff, gray, CLAY, some fine sand.	
S-7	21' - 23'	4	4	6	4	24"	Wet, stiff, gray, CLAY, some fine sand.	
S-8	23' - 25'	WOR/12"		WOH/12"		14"	Wet, very soft, gray, CLAY and fine sand.	
S-9	25' - 27'	WOH	2	3	3	24"	Wet, medium stiff, gray, CLAY, trace fine sand.	
S-10	30' - 32'	WOH	1	1	4	24"	Wet, very loose, gray, FINE SAND and clay, some inorganic silt.	
S-11	35' - 37'	5	4	5	7	12"	Wet, loose, gray/brown, FINE SAND and inorganic silt, some clay.	
S-12	40' - 42'	5	4	6	9	15"	Wet, medium dense, gray/brown, FINE SAND and inorganic silt, some clay.	
S-13	45' - 47'	3	9	9	10	15"	Wet, medium dense, gray/brown, FINE SAND, some inorganic silt.	
S-14	50' - 52'	4	5	3	6	15"	Wet, loose, gray/brown, FINE SAND, some inorganic silt, trace clay.	52'
							Bottom of Exploration = 52'	

Remarks: Set piezometer well at 51'. 2/Sand, 1/Bentonite chips, 1/J-plug, 40'/Grout, 1/Concrete.
WOR= Weight of Rods WOH= Weight of Hammer

Arrow-Board: Signs: 2 Cones: 20

Protective Device - Stand: Box: 1
Well Depth: 51' Solid Pipe: 46'
Stick Up Pipe: Screen Pipe: 5
Type of Drill Rig: CME-500X
Casing HW Size: 4"
Depth: 50'
Hammer Weight: 300 lbs. Fall: 30"
Sampler Type: S/S Size: 1 3/8"
Automatic Hammer Weight:
Safety Hammer Weight: 140 lbs.
Donut Hammer Weight:
Fall: 30"
Core Barrel Type: Size:

Penetration Resistance (N) Guide:

Cohesionless Soils (Sands, Gravels)		Cohesive Soils (Silts, Clays)	
Relative Density	Penetration Resistance	Consistency	Penetration Resistance
Very Loose	0 - 4	Very Soft	0 - 2
Loose	4 - 10	Soft	2 - 4
Medium Dense	10 - 30	Medium Stiff	4 - 8
Dense	30 - 50	Stiff	8 - 15
Very Dense	Over 50	Very Stiff	15 - 30
N=Sum of Second and Third 6" Blow Counts		Hard	Over 30

Terms Used for Second Entry of Descriptions: and = 40-50%, some = 10-40%, trace = 10% or less

NOTE:

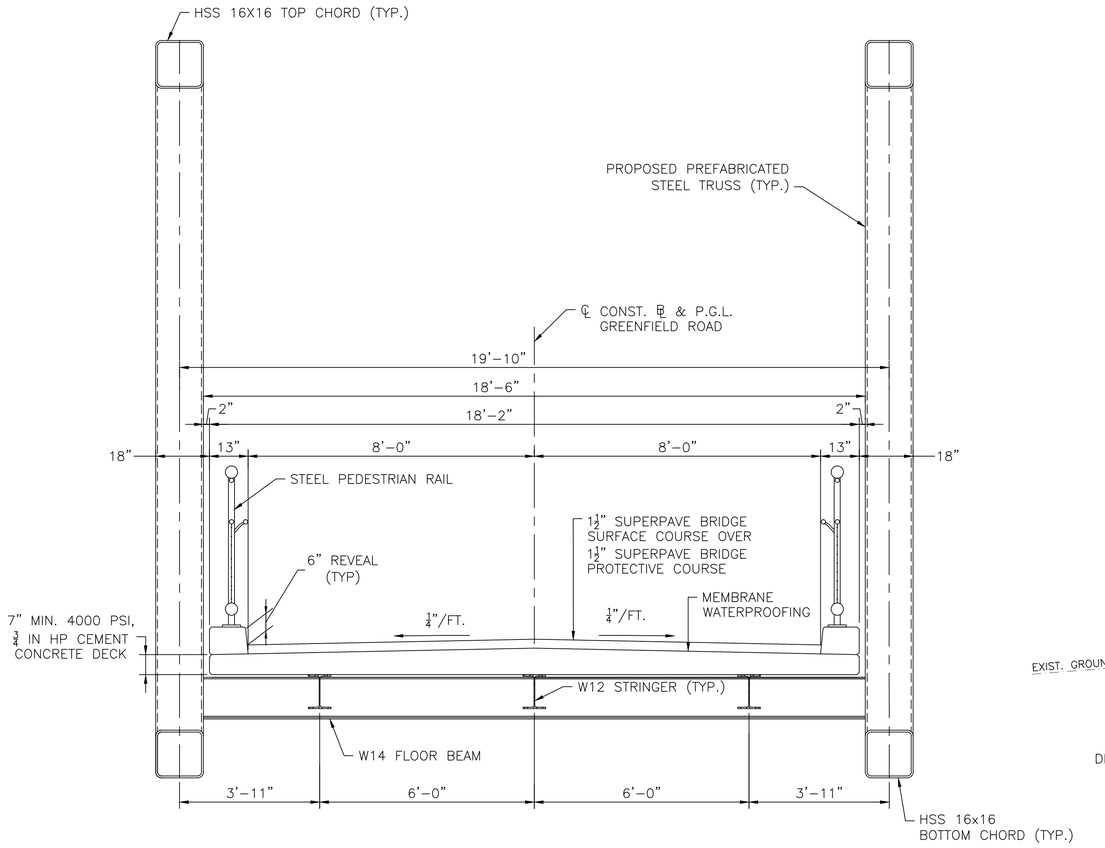
FOR BORING NOTES, SEE SHEET 2 of 8.

MONTAGUE
GREENFIELD ROAD OVER B&M RAILROAD

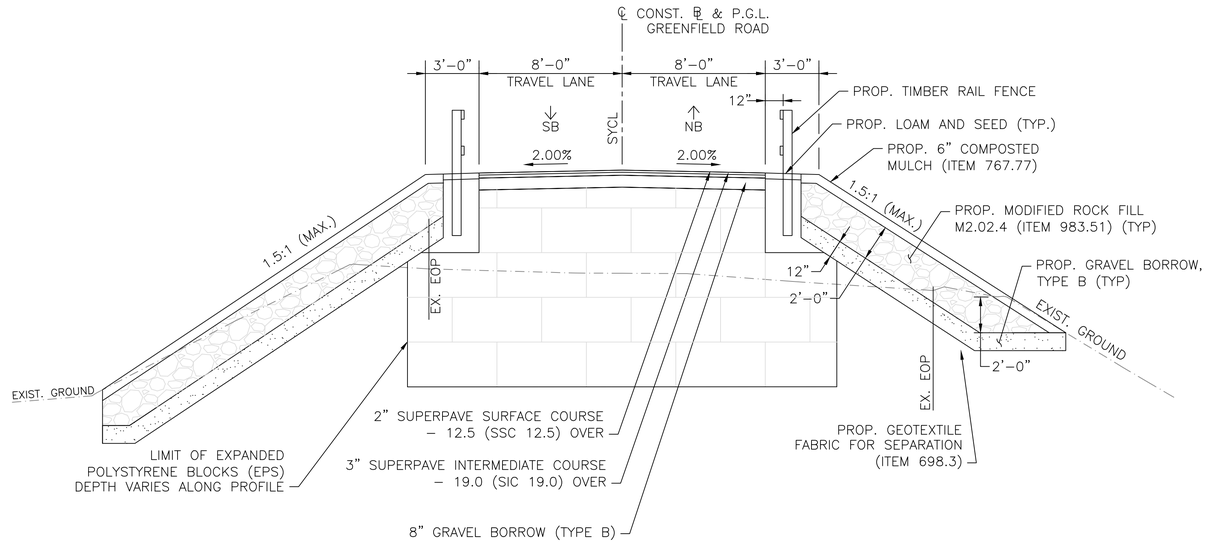
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	–	-	-
PROJECT FILE NO. 604696			

STRUCTURAL DETAILS

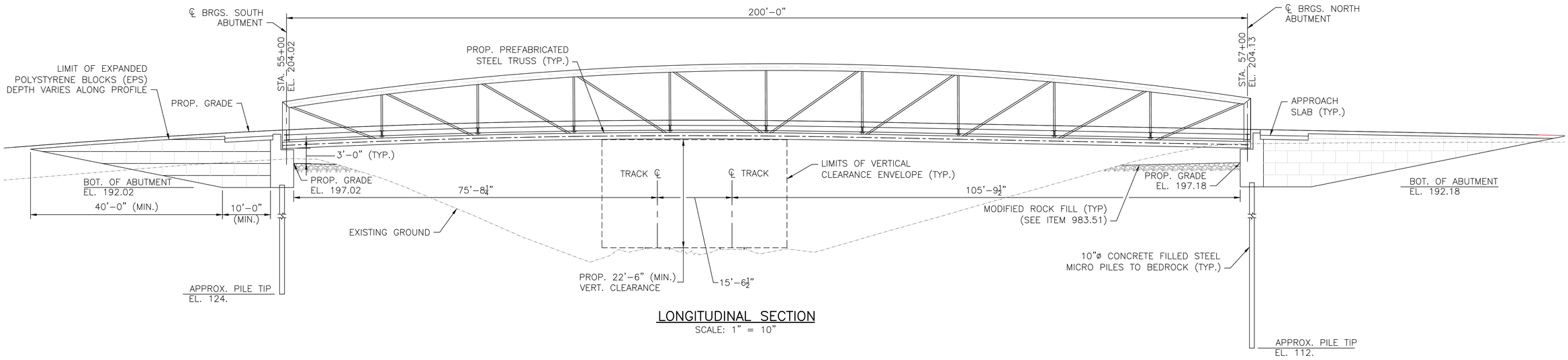
1.8. PLAN AND SECTS.DWG 21-Jan-2014



PROPOSED CROSS SECTION
SCALE: 1/2" = 1'–0"



TYPICAL APPROACH SECTION
SCALE: 1/4" = 1'–0"



LONGITUDINAL SECTION
SCALE: 1" = 10"