MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION

PLAN AND PROFILE OF

BRUCE FREEMAN RAIL TRAIL PHASE 2B

IN THE TOWNS OF

ACTON & CONCORD

MIDDLESEX COUNTY

FEDERAL AID PROJECT NO.

25% SUBMITTAL

ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	1	44
PROJECT FILE NO.	606223		

TITLE SHEET & INDEX

THE MASSACHUSETTS HIGHWAY DEPARTMENT STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES DATED 1988, AS AMENDED, THE SUPPLEMENTAL SPECIFICATIONS DATED JULY 1, 2015, THE 2014 CONSTRUCTION STANDARD DETAILS, THE 1996 CONSTRUCTION AND TRAFFIC STANDARD DETAILS, (AS RELATED TO TRAFFIC STANDARD DETAILS ONLY), THE LATEST MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS WITH MASSACHUSETTS AMENDMENTS, THE 1990 STANDARD DRAWINGS FOR SIGNS AND SUPPORTS, THE 1968 STANDARD DRAWINGS FOR TRAFFIC SIGNALS AND HIGHWAY LIGHTING, AND THE LATEST EDITION OF THE AMERICAN STANDARD FOR NURSERY STOCK, WILL GOVERN.

INDEX

SHEET NO.	DESCRIPTION
1	TITLE SHEET & INDEX
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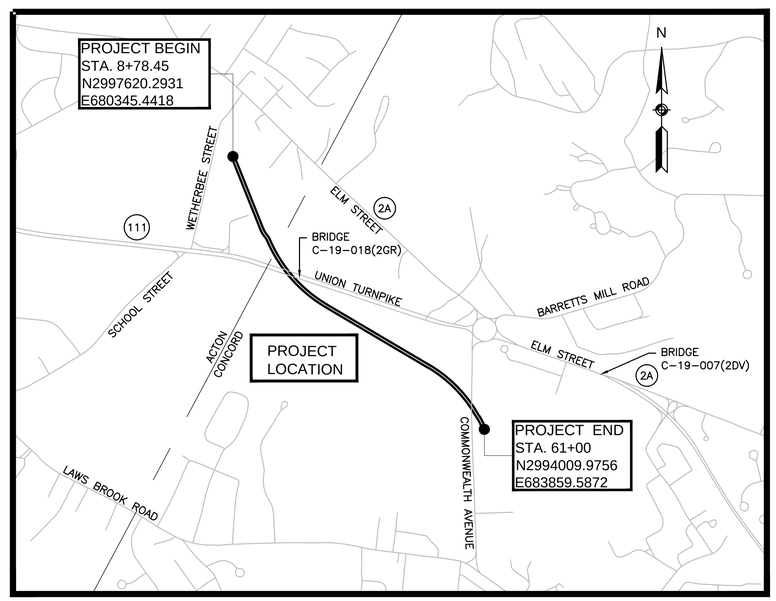
39-44	CRITICAL SECTIONS



0 1000 2000 3000 4000

SCALE: 1" = 1000'

LENGTH OF PROJECT = 5221.04 FEET = 0.989 MILES

DESIGN DESIGNATION

DESIGN SPEED	18 MPH
MINIMUM HORIZONTAL CURVE RADIUS	60'
MINIMUM LENGTH OF CREST VERTICAL CURVE	100'
MAXIMUM GRADE FOR LEVEL TERRAIN	4.5%

DATE	DESCRIPTION	REV #
2/24/16	25% DESIGN SUBMISSION	

massDOT
Massachusetts Department of Transportation
Highway Division

TRANSPORTATION AECOM

AECOM TECHNICAL SERVICES, Inc.
250 Apollo Drive
Chelmsford, Massachusetts 01824
T 978.905.2100 F 978.905.2101 www.aecom.com

RECOMMENDED FOR APPROVAL

CHIEF ENGINEER **DATE**

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED:

DIVISION ADMINISTRATOR **DATE**

APPROVED

HIGHWAY ADMINISTRATOR **DATE**

606223_HD1_(TITLE SHEET).DWG Plotted on 10-Mar-2015 3:39 PM

GENERAL SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
JB	JB	JERSEY BARRIER
CB	CB	CATCH BASIN
		LEACHING CATCH BASIN
		CATCH BASIN CURB INLET
FP	FP	FLAG POLE
GP	GP	GAS PUMP
MB	MB	MAIL BOX
		POST SQUARE
		POST CIRCULAR
WELL	WELL	WELL
EHH	EHH	ELECTRIC HANDHOLE
		FENCE GATE POST
GG	GG	GAS GATE
#	#	BORING HOLE
MW #	MW #	MONITORING WELL
TP #	TP #	TEST PIT
		HYDRANT
		LIGHT POLE
CO.BD.		COUNTY BOUND
		GPS POINT
Ⓒ	Ⓒ	CABLE MANHOLE
Ⓓ	Ⓓ	DRAINAGE MANHOLE
Ⓔ	Ⓔ	ELECTRIC MANHOLE
Ⓖ	Ⓖ	GAS MANHOLE
Ⓜ	Ⓜ	MISC MANHOLE
Ⓢ	Ⓢ	SEWER MANHOLE
Ⓣ	Ⓣ	TELEPHONE MANHOLE
Ⓦ	Ⓦ	WATER MANHOLE
MHB	MHB	MASSACHUSETTS HIGHWAY BOUND
MON		MONUMENT
SB		STONE BOUND
TB		TOWN OR CITY BOUND
		TRAVERSE OR TRIANGULATION STATION
TPL or GUY	TPL or GUY	TROLLEY POLE OR GUY POLE
HTP		TRANSMISSION POLE
UFB	UFB	UTILITY POLE W/ FIREBOX
UPDL	UPDL	UTILITY POLE WITH DOUBLE LIGHT
ULT	ULT	UTILITY POLE W / 1 LIGHT
UPL	UPL	UTILITY POLE
		BUSH
•SIZE & TYPE		TREE
		STUMP
		SWAMP / MARSH
WG	WG	WATER GATE
PM	PM	PARKING METER
		OVERHEAD CABLE/WIRE
		CURBING
100 99		CONTOURS (ON-THE-GROUND SURVEY DATA)
100 99		CONTOURS (PHOTOGRAMMETRIC DATA)
		UNDERGROUND DRAIN PIPE (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND ELECTRIC DUCT (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND GAS MAIN (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND SEWER MAIN (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND TELEPHONE DUCT (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND WATER MAIN (DOUBLE LINE 24 INCH AND OVER)
		BALANCED STONE WALL
		GUARD RAIL - STEEL POSTS
		GUARD RAIL - WOOD POSTS
		CHAIN LINK OR METAL FENCE
		WOOD FENCE
		HAY BALES/SILT FENCE
		TREE LINE
		SAWCUT LINE
		TOP OR BOTTOM OF SLOPE
		LIMIT OF EDGE OF PAVEMENT OR COLD PLANE AND OVERLAY
		BANK OF RIVER OR STREAM
		BORDER OF WETLAND
		100 FT WETLAND BUFFER
		200 FT RIVERFRONT BUFFER
		STATE HIGHWAY LAYOUT
		TOWN OR CITY LAYOUT
		COUNTY LAYOUT
		RAILROAD SIDELINE
		TOWN OR CITY BOUNDARY LINE
		PROPERTY LINE OR APPROXIMATE PROPERTY LINE
		EASEMENT

TRAFFIC SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
1	1	CONTROLLER PHASE ACTUATED
		TRAFFIC SIGNAL HEAD (SIZE AS NOTED)
		WIRE LOOP DETECTOR (6' x 6' TYP UNLESS OTHERWISE SPECIFIED)
		VIDEO DETECTION CAMERA
		MICROWAVE DETECTOR
		PEDESTRIAN PUSH BUTTON, SIGN (DIRECTIONAL ARROW AS SHOWN) AND SADDLE
		EMERGENCY PREEMPTION CONFIRMATION STROBE LIGHT
		VEHICULAR SIGNAL HEAD
		VEHICULAR SIGNAL HEAD, OPTICALLY PROGRAMMED
		FLASHING BEACON
		PEDESTRIAN SIGNAL HEAD, (TYPE AS NOTED OR AS SPECIFIED)
RRSG	RRSG	RAILROAD SIGNAL
OR		SIGNAL POST AND BASE (ALPHA-NUMERIC DESIGNATION NOTED)
	20'	MAST ARM, SHAFT AND BASE (ARM LENGTH AS NOTED)
		HIGH MAST POLE OR TOWER
		SIGN AND POST
		SIGN AND POST (2 POSTS)
	20'	MAST ARM WITH LUMINAIRE
		OPTICAL PRE-EMPTION DETECTOR
		CONTROL CABINET, GROUND MOUNTED
		CONTROL CABINET, POLE MOUNTED
		FLASHING BEACON CONTROL AND METER PEDESTAL
		LOAD CENTER ASSEMBLY
		PULL BOX 12"x12" (OR AS NOTED)
		ELECTRIC HANDHOLE 12"x24" (OR AS NOTED)
		TRAFFIC SIGNAL CONDUIT

PAVEMENT MARKINGS SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
		PAVEMENT ARROW - WHITE
ONLY	ONLY	LEGEND "ONLY" - WHITE
	SL	STOP LINE
	CW	CROSSWALK
	SWL	SOLID WHITE LINE
	SYL	SOLID YELLOW LINE
	BWL	BROKEN WHITE LINE
	BYL	BROKEN YELLOW LINE
	DWL	DOTTED WHITE LINE
	DYL	DOTTED YELLOW LINE
	DWLEx	DOTTED WHITE LINE EXTENSION
	DYLEx	DOTTED YELLOW LINE EXTENSION
	DBWL	DOUBLE WHITE LINE
	DBYL	DOUBLE YELLOW LINE

ABBREVIATIONS

GENERAL

AADT	ANNUAL AVERAGE DAILY TRAFFIC
ABAN	ABANDON
ADJ	ADJUST
APPROX.	APPROXIMATE
A.C.	ASPHALT CONCRETE
ACCM PIPE	ASPHALT COATED CORRUGATED METAL PIPE
BIT.	BITUMINOUS
BC	BOTTOM OF CURB
BD.	BOUND
BL	BASELINE
BLDG	BUILDING
BM	BENCHMARK
BO	BY OTHERS
BOS	BOTTOM OF SLOPE
BR.	BRIDGE
CB	CATCH BASIN
CBCI	CATCH BASIN WITH CURB INLET
CC	CEMENT CONCRETE
CCM	CEMENT CONCRETE MASONRY
CEM	CEMENT
CI	CURB INLET
CIP	CAST IRON PIPE
CLF	CHAIN LINK FENCE
CL	CENTERLINE
CMP	CORRUGATED METAL PIPE
CSP	CORRUGATED STEEL PIPE
CO.	COUNTY
CONC	CONCRETE
CONT	CONTINUOUS
CONST	CONSTRUCTION
CR GR	CROWN GRADE
DHV	DESIGN HOURLY VOLUME
DI	DROP INLET
DIA	DIAMETER
DIP	DUCTILE IRON PIPE
DW	STEADY DON'T WALK - PORTLAND ORANGE
DWY	DRIVEWAY
ELEV (or EL.)	ELEVATION
EMB	EMBANKMENT
EOP	EDGE OF PAVEMENT
EXIST (or EX)	EXISTING
EXC	EXCAVATION
F&C	FRAME AND COVER
F&G	FRAME AND GRATE
FDN.	FOUNDATION
FLDSTN	FIELDSTONE
FND	FOUND
GAR	GARAGE
GD	GROUND
GG	GAS GATE
GI	GUTTER INLET
GIP	GALVANIZED IRON PIPE
GRAN	GRANITE
GRAV	GRAVEL
GRD	GUARD
HDW	HEADWALL
HMA	HOT MIX ASPHALT
HOR	HORIZONTAL
HYD	HYDRANT
INV	INVERT
JCT	JUNCTION
L	LENGTH OF CURVE
LB	LEACH BASIN
LP	LIGHT POLE
LT	LEFT
MAG	MAGNETIC
MAX	MAXIMUM
MB	MAILBOX
MH	MANHOLE
MHB	MASSACHUSETTS HIGHWAY BOUND
MIN	MINIMUM
NIC	NOT IN CONTRACT
NO.	NUMBER
PC	POINT OF CURVATURE
PCC	POINT OF COMPOUND CURVATURE
P.G.L.	PROFILE GRADE LINE
PI	POINT OF INTERSECTION
POC	POINT ON CURVE
POT	POINT ON TANGENT
PRC	POINT OF REVERSE CURVATURE
PROJ	PROJECT
PROP	PROPOSED
PSB	PLANTABLE SOIL BORROW
PT	POINT OF TANGENCY
PVC	POINT OF VERTICAL CURVATURE
PVI	POINT OF VERTICAL INTERSECTION
PVT	POINT OF VERTICAL TANGENCY

ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	2	44
PROJECT FILE NO.	606223		

LEGEND & ABBREVIATIONS

ABBREVIATIONS (cont.)

GENERAL

PVMT	PAVEMENT
PWW	PAVED WATER WAY
R	RADIUS OF CURVATURE
R&D	REMOVE AND DISPOSE
RCP	REINFORCED CONCRETE PIPE
RD	ROAD
RDWY	ROADWAY
REM	REMOVE
RET	RETAIN
RET WALL	RETAINING WALL
ROW	RIGHT OF WAY
RR	RAILROAD
R&R	REMOVE AND RESET
R&S	REMOVE AND STACK
RT	RIGHT
SB	STONE BOUND
SHLD	SHOULDER
SHLO	STATE HIGHWAY LAYOUT LINE
SMH	SEWER MANHOLE
SSD	STOPPING SIGHT DISTANCE
SSM	STATE SURVEY MARK
ST	STREET
STA	STATION
SW	SIDEWALK
T	TANGENT DISTANCE OF CURVE/TRUCK %
TAN	TANGENT
TEMP	TEMPORARY
TC	TOP OF CURB
TOS	TOP OF SLOPE
TYP	TYPICAL
UP	UTILITY POLE
VAR	VARIES
VERT	VERTICAL
VC	VERTICAL CURVE
WCR	WHEEL CHAIR RAMP
WG	WATER GATE
WIP	WROUGHT IRON PIPE
WM	WATER METER/WATER MAIN
X-SECT	CROSS SECTION

TRAFFIC SIGNAL

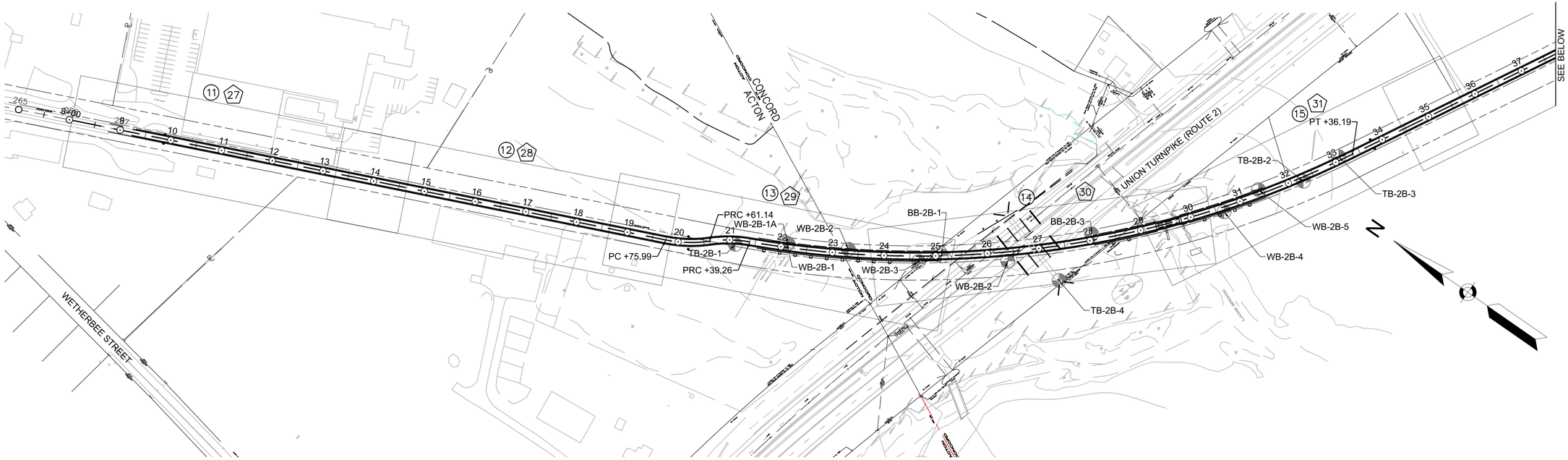
CAB.	CABINET
CCVE	CLOSED CIRCUIT VIDEO EQUIPMENT
DW	STEADY DON'T WALK
FDW	FLASHING DON'T WALK
FR	FLASHING CIRCULAR RED
FRL	FLASHING RED LEFT ARROW
FRR	FLASHING RED RIGHT ARROW
FY	FLASHING CIRCULAR AMBER
FYL	FLASHING AMBER LEFT ARROW
FYR	FLASHING AMBER RIGHT ARROW
G	STEADY CIRCULAR GREEN
GL	STEADY GREEN LEFT ARROW
GR	STEADY GREEN RIGHT ARROW
GSL	STEADY GREEN SLASH LEFT ARROW
GSR	STEADY GREEN SLASH RIGHT ARROW
GV	STEADY GREEN VERTICAL ARROW
OL	OVERLAP
PED	PEDESTRIAN
PTZ	PAN, TILE, ZOOM
R	STEADY CIRCULAR RED
RL	STEADY RED LEFT ARROW
RR	STEADY RED RIGHT ARROW
TR SIG	TRAFFIC SIGNAL
TSC	TRAFFIC SIGNAL CONDUIT
W	STEADY WALK
Y	STEADY CIRCULAR AMBER
YL	STEADY AMBER LEFT ARROW

606223_HD2_(LEGEND & ABBREVIATIONS).DWG Plotted on 10-Mar-2015 3:39 PM

ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	3	44
PROJECT FILE NO.	606223		

KEY PLAN & BORING LOCATIONS



PLAN TYPE

- (#) CONSTRUCTION PLAN
- [#] TRAFFIC PLAN
- (#) LANDSCAPING PLAN

SYMBOLS/NOTES

- # BORING

0 100 200 300 400
SCALE: 1" = 100'

606223_HD3_(KEY PLAN & BORING LOCATIONS).DWG Plotted on 10-Mar-2015 3:39 PM

ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	4	44
PROJECT FILE NO.	606223		

BORING LOGS

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. BB-2B-1
Scale 1" = 5'

City/Town: Acton Concord | Bridge: Bruce Freeman Rail Trail (Phase II-B) | Project File No: 606223 | Contract No: 76859
Project: Bruce Freeman Rail Trail Route 2 (Phase II-B) | Date & Time Started: 11-12-14 2:00 pm | Total Hours: 12.5
Groundwater Depth: 9' | Date & Time: 11-13-14 7:25 am | Date & Time Completed: 11-14-14 11:00 am
Coordinates: N 2996155 E 681053 | Driller's Name: Manlea Thompson | Helper's Name: Donald Palmer
Ground Elevation: 129.5 | Inspector's Name: Weijie Dong | Inspector's Company: Lamson Engineering, Corp., for *

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'	2 3 5 3	14"	Dry, loose, brown, FINE TO COARSE SAND, some inorganic silt.	
S-2	5' - 7'	7 9 14 16	13"	Dry, medium dense, brown, FINE SAND, some coarse sand, trace inorganic silt.	
S-3	10' - 12'	8 13 15 16	10"	Wet, medium dense, brown, FINE TO COARSE SAND, some fine to medium gravel, trace inorganic silt.	13'6"
S-4	15' - 16'	7 9 11 11	5"	Wet, medium dense, brown-red, FINE SAND and inorganic silt.	16'
S-4A	16' - 17'		4"	Wet, medium dense, gray, FINE SAND, trace inorganic silt.	
S-5	20' - 22'	3 3 5 5	17"	Wet, loose, gray, FINE SAND, some inorganic silt, trace clay.	25'
S-6	25' - 26'	2 4 4 4	8"	Wet, loose, brown, FINE SAND, some inorganic silt.	26'
S-6A	26' - 27'		8"	Wet, loose, gray, FINE SAND, some inorganic silt, trace clay.	28'6"
S-7	30' - 32'	21 22 24 15	12"	Wet, dense, gray, FINE TO COARSE SAND and fine to medium gravel, trace inorganic silt.	
				Top of possible BEDROCK at 33'	33'
C-1	34' - 39'	4 2 2 3 2	48"	Advanced rollerbit to 34' and began coring. Hard very weathered, moderately fractured GRANITE. Percent Recovery = 80%	
C-2	39' - 44'	2 1 1 1 1	0"	No recovery, very weathered GRANITE. Rollerbit to 45', telescoped 3" casing to sample.	
S-8	45' - 45'11"	34 86/5"	9"	Moist, very dense, gray, possible weathered BEDROCK.	
S-9	50' - 50'2"	120/2"	2"	Moist, very dense, brown, FINE TO MEDIUM GRAVEL, trace inorganic silt (weathered possible bedrock) Advanced rollerbit to 55'	
				Terminated boring at 55'	55'
				Bottom of Exploration = 55'	

Remarks: * AECOM (Consultants)
Boring terminated due to not being able to advanced corebarrell down the hole.
Boring terminated without coring another 5 foot run to compensate for the no recovery obtained from C-2; enough information was obtained for the design engineer. Installed monitoring well at 20'

Protective Device - Stand: Box:
Well Depth: 20' Solid Pipe: 13'
Stick Up Pipe: 3' Screen Pipe: 10'

Penetration Resistance (N) Guide:

Cohesionless Soils (Sands, Gravels) Relative Density	Penetration Resistance	Cohesive Soils (Silts, Clays) 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

Type of Drill Rig: CME 550X
Arrow-Board: Signs: Cones:
Casing: HW Size: 4" Amt: 39'
Casing: NW Size: 3" Amt: 45'
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: NX Size: 2.15"

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. BB-2B-2
Scale 1" = 5'

City/Town: Acton Concord | Bridge: Bruce Freeman Rail Trail (Phase II-B) | Project File No: 606223 | Contract No: 76859
Project: Bruce Freeman Rail Trail Route 2 (Phase II-B) | Date & Time Started: 11-25-14 7:30 am | Total Hours: 7
Groundwater Depth: 8' | Date & Time: 11-25-14 2:15 am | Date & Time Completed: 11-25-14 2:30 pm
Coordinates: N 2996044 E 681118 | Driller's Name: Manlea Thompson | Helper's Name: Donald Palmer
Ground Elevation: 129.7 | Inspector's Name: Weijie Dong | Inspector's Company: Lamson Engineering, Corp. for *

Sample Number	Depth Range (Feet)	Blow Counts per 6 Inches Coring Times Minute Per Foot	Recovery Inches	Field Description	Strata Changes
				TOPSOIL 3"	
S-1	0' - 2'	2 5 6 6	10"	Dry, medium dense, brown, FINE TO COARSE SAND, trace fine to medium gravel, trace inorganic silt.	
S-2	5' - 7'	3 3 5 7	8"	Moist, loose, dense, brown FINE TO COARSE SAND, trace fine gravel, trace inorganic silt.	
S-3	10' - 12'	5 7 6 7	14"	Wet, medium dense, brown, FINE TO COARSE SAND, trace fine gravel, trace inorganic silt.	
S-4	15' - 17'	7 10 9 10	11"	Wet, medium dense, gray, FINE TO COARSE SAND, trace fine to medium gravel, trace inorganic silt.	19'
S-5	20' - 22'	9 11 13 16	15"	Wet, medium dense, brown, FINE TO COARSE SAND and fine to medium gravel, some inorganic silt.	23'
S-6	25' - 26'	5 6 5 5	7"	Wet, medium dense, brown, FINE SAND and inorganic silt.	26'
S-6A	26' - 27'		7"	Wet, loose, gray, FINE SAND and inorganic silt.	30'
S-7	30' - 32'	10 10 16 19	6"	Wet, medium dense, gray, COARSE TO FINE SAND and fine to medium gravel, trace inorganic silt.	32'6"
S-8	35' - 36'4"	42 55 65/4"	16"	Wet, very dense, gray, FINE TO COARSE SAND, some fine to medium gravel, some inorganic silt (Till.)	
S-9	40' - 41'3"	37 67 53/3"	12"	Wet, very dense, gray, FINE TO COARSE SAND, some fine to medium gravel, some inorganic silt (Till.)	
S-10	45' - 46'4"	28 40 80/4"	15"	Wet, very dense, gray, FINE TO COARSE SAND, some fine to medium gravel, some inorganic silt (Till.)	46'4"
S-11	50' - 50'2"	120/2"	0"	No Recovery	
S-12	55' - 55'8"	86 34/2"	4"	Wet, very dense, brown-white INORGANIC SILT and fine sand, some fine gravel, trace weathered bedrock.	
S-13	60' - 60'3"	120/3"	2"	Wet, very dense, brown-gray, weathered BEDROCK.	
S-14	65' - 65'4"	120/4"	3"	Wet, very dense, brown-gray weathered BEDROCK.	65'4"
				Bottom of Exploration = 65'4"	

Remarks: * AECOM (Consultants)

Protective Device - Stand: Box:
Well Depth: Solid Pipe:
Stick Up Pipe: Screen Pipe:

Penetration Resistance (N) Guide:

Cohesionless Soils (Sands, Gravels) Relative Density	Penetration Resistance	Cohesive Soils (Silts, Clays) 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

Type of Drill Rig: CME 550X
Arrow-Board: Signs: 2 Cones: 20
Casing: HW Size: 4" Amt: 65'
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:

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. BB-2B-3
Scale 1" = 5'

City/Town: Acton Concord | Bridge: Bruce Freeman Rail Trail (Phase II-B) | Project File No: 606223 | Contract No: 76859
Project: Bruce Freeman Rail Trail Route 2 (Phase II-B) | Date & Time Started: 11-17-14 8:00 am | Total Hours: 10.5
Groundwater Depth: 7' | Date & Time: 11-18-14 11:00 am | Date & Time Completed: 11-18-14 12:00 pm
Coordinates: N 2995941 E 681254 | Driller's Name: Manlea Thompson | Helper's Name: Donald Palmer
Ground Elevation: 128.5 | Inspector's Name: Weijie Dong | Inspector's Company: Lamson Engineering, Corp., for *

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'	3 3 3 2	12"	Moist, loose, black, FINE TO COARSE SAND, some inorganic silt, trace fine to medium gravel.	3'6"
S-2	5' - 7'	4 6 6 8	17"	Moist, medium dense, brown COARSE TO FINE SAND, trace inorganic silt.	
S-3	10' - 12'	5 6 8 8	19"	Wet, medium dense, brown, COARSE TO FINE SAND, trace fine gravel, trace inorganic silt.	
S-4	15' - 17'	8 9 12 13	17"	Wet, medium dense, brown FINE TO COARSE SAND, trace fine gravel, trace inorganic silt.	
S-5	20' - 22'	12 10 9 10	10"	Wet, medium dense, gray FINE TO COARSE SAND, some fine to medium gravel, trace inorganic silt.	
S-6	25' - 27'	6 8 10 12	4"	Wet, medium dense, gray-brown, FINE TO COARSE SAND and fine to medium gravel, trace inorganic silt.	
S-7	30' - 32'	10 9 10 10	13"	Wet, medium dense, gray, FINE TO COARSE SAND, some inorganic silt, trace fine gravel.	
				Top of weathered BEDROCK at 33'	33'
S-8	35' - 35'3"	120/3"	2"	Advanced casing and roller bit through weathered bedrock to 35'. Moist, very dense, gray FINE TO COARSE SAND and fine to coarse gravel, trace inorganic silt (weathered bedrock). Roller bit through weathered bedrock and began coring.	
C-1	38' - 43'	5 5 4 4 5	60"	Hard, fresh, sound, gray GRANITE. Percent Recovery = 100%	
C-2	43' - 48'	4 5 5 4 5	60"	Hard, fresh, sound, gray GRANITE. Percent Recovery = 100%	
					48'
				Bottom of Exploration = 48'	

Remarks: * AECOM (Consultants)
Set monitoring well at 17"

Protective Device - Stand: Box:
Well Depth: 17' Solid Pipe: 10'
Stick Up Pipe: 3' Screen Pipe: 10'

Penetration Resistance (N) Guide:

Cohesionless Soils (Sands, Gravels) Relative Density	Penetration Resistance	Cohesive Soils (Silts, Clays) 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

Type of Drill Rig: CME 550X
Arrow-Board: Signs: Cones:
Casing: PW Size: 5" Amt: 34'
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: NX Size: 2.15"

5 0 5 10
HORIZONTAL
SCALE IN FEET

MASSDOT_V2014_R4.1.DWT Plotted on 10-Mar-2015 3:39 PM

ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	5	44
PROJECT FILE NO.	606223		

BORING LOGS

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. TB-2B-1
Scale 1" = 5'

City/Town: Acton - Concord | Bridge: Bruce Freeman Rail Trail (Phase II-B) | Project File No: 606223 | Contract No: 76859
Project: Bruce Freeman Rail Trail Route 2 (Phase II-B) | Date & Time Started: 11-10-14 2:30 pm | Total Hours: 7.5
Groundwater Depth: 8'4" | Date & Time: 11-11-14 2:00 pm | Date & Time Completed: 11-11-14 2:00 pm
Coordinates: N 2996495 E 680844 | Driller's Name: Manlea Thompson | Helper's Name: Donald Palmer
Ground Elevation: 131.0 | Inspector's Name: Weijie Dong | Inspector's Company: Lamson Engineering, Corp., for *

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'	2 6 8 13	12"	Dry, medium dense, brown, FINE TO COARSE SAND and fine to medium gravel, trace inorganic silt.	5'
S-2	5' - 7'	11 11 7 8	9"	Moist, medium dense, brown, FINE SAND, some inorganic silt.	10'
S-3	10' - 12'	3 3 4 4	15"	Wet, loose, brown, FINE SAND and inorganic silt, trace clay.	
S-4	15' - 16'	5 6 7 6	8"	Moist, medium dense, red/brown, FINE SAN D, trace inorganic silt.	16'
S-4A	16' - 17		8"	Moist, medium dense, gray, FINE SAND, trace inorganic silt.	
S-5	20' - 22'	3 4 4 3	14"	Wet, loose, gray FINE SAND, some inorganic silt, trace clay.	23'
S-6	25' - 27'	11 10 13 15	9"	Wet, medium dense, gray, FINE TO COARSE SAND, trace inorganic silt, trace fine gravel. Top of BEDROCK at 27'6"	27'6"
C-1	29' - 34'	5 5 3 4 4	60"	Advanced rollerbit to 29' through granite and began coring. Hard, fresh, sound, gray GRANITE. Percent Recovery = 100%	
C-2	34' - 36'	5 6 *	12"	Hard, severely fractured, gray GRANITE. Percent Recovery = 50%	36'
				Bottom of Exploration = 36'	

Remarks: * AECOM (Consultants)
* Had to terminate boring at 36' due to the carbide buttons from rollerbit burning out down in the hole at the diamond bit, corebarrell would not advance past 36', steel pieces in core barrell. Boring terminated with a 7' bedrock core and enough information obtained for the design engineer.

Protective Device - Stand: Box:
Well Depth: Solid Pipe:
Stick Up Pipe: Screen Pipe:

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

Type of Drill Rig: CME 550X
Arrow-Board: Signs: Cones:
Casing: HW Size: 4" Amt: 29'
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: NX Size: 2.15"

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Boring No. TB-2B-2
Scale 1" = 5'

City/Town: Acton - Concord | Bridge: Bruce Freeman Rail Trail (Phase II-B) | Project File No: 606223 | Contract No: 76859
Project: Bruce Freeman Rail Trail Route 2 (Phase II-B) | Date & Time Started: 11-21-14 10:30 am | Total Hours: 5
Groundwater Depth: 7' | Date & Time: 11-21-14 3:00 pm | Date & Time Completed: 11-21-14 3:30 pm
Coordinates: N 2995663 E 681571 | Driller's Name: Manlea Thompson | Helper's Name: Donald Palmer
Ground Elevation: 129.0 | Inspector's Name: Jun Jie Li | Inspector's Company: Lamson Engineering, Corp., for *

Sample Number	Depth Range (Feet)	Blow Counts per 6 Inches Coring Times Minute Per Foot	Recovery Inches	Field Description	Strata Changes
S-1	0' - 1'6"	2 2 20 100/0"	14"	TOPSOIL 4" Dry, medium dense, brown, FINE TO COARSE SAND, trace inorganic silt, trace weathered cobble. Top of BEDROCK at 1'6" Rollerbit to 9', thinking advancement was through a boulder but confirmed it was bedrock at 1'6. Began coring at 9'.	1'6"
C-1	9' - 14'	5 5 5 8 8	60"	Hard, fresh, slightly fractured, white-gray GNEISS. Percent Recovery = 100%	
C-1	14' - 19'	10 4 5 6 6	52"	Hard, slightly weathered, slightly fractured, white-gray GNEISS. Percent Recovery = 86%	19'
				Bottom of Exploration = 19'	

Remarks: * AECOM (Consultants)

Protective Device - Stand: Box:
Well Depth: Solid Pipe:
Stick Up Pipe: Screen Pipe:

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

Type of Drill Rig: CME 550X
Arrow-Board: Signs: Cones:
Casing: HW Size: 4" Amt: 9'
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: NX Size: 2.15"

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Boring No. TB-2B-3
Scale 1" = 5'

City/Town: Acton - Concord | Bridge: Bruce Freeman Rail Trail (Phase II-B) | Project File No: 606223 | Contract No: 76859
Project: Bruce Freeman Rail Trail Route 2 (Phase II-B) | Date & Time Started: 11-24-14 8:00 am | Total Hours: 5
Groundwater Depth: 6.5' | Date & Time: 11-24-14 12:00 pm | Date & Time Completed: 11-24-14 1:00 pm
Coordinates: N 2995634 E 681649 | Driller's Name: Manlea Thompson | Helper's Name: Donald Palmer
Ground Elevation: 129.0 | Inspector's Name: Weijie Dong | Inspector's Company: Lamson Engineering, Corp., for *

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'	2 3 35 25	9"	TOPSOIL 4" Dry, dense, brown, FINE TO COARSE SAND, and fine to medium gravel trace inorganic silt.	
S-2	5' - 6'4"	28 40 80/4"	12"	Dry, very dense, brown, FINE TO COARSE SAND and fine to coarse gravel, trace inorganic silt, possible weathered bedrock in tip of spoon. Top of BEDROCK at 6'10" Advanced rollerbit to 9' through possible granite and began coring.	6'10"
C-1	9' - 14'	3 4 4 6 5	60"	Hard, gray-white GRANITE Percent Recovery = 100%	
C-2	14' - 19'	4 5 5 6 5	60"	Hard, gray, white GRANITE. Percent Recovery = 100%	19'
				Bottom of Exploration = 19'	

Remarks: * AECOM (Consultants)

Protective Device - Stand: Box:
Well Depth: Solid Pipe:
Stick Up Pipe: Screen Pipe:

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

Type of Drill Rig: CME 550X
Arrow-Board: Signs: Cones:
Casing: HW Size: 4" Amt: 9'
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: NX Size: 2.15"

5 0 5 10
HORIZONTAL
SCALE IN FEET

MASSDOT_V2014_R4.1.DWT Plotted on 10-Mar-2015 3:39 PM

ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	6	44
PROJECT FILE NO.	606223		

BORING LOGS

massDOT Highway

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Phone: (603)437-1610
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Boring No. TB-2B-4
Scale 1" = 5'

City/Town: Acton - Concord | Bridge: Bruce Freeman Rail Trail (Phase II-B) | Project File No: 606223 | Contract No: 76859
Project: Bruce Freeman Rail Trail Route 2 (Phase II-B) | Date & Time Started: 11-14-14 12:00 pm | Total Hours: 3.5
Groundwater Depth: 6.4' | Date & Time: 11-14-14 3:15 pm | Date & Time Completed: 11-14-14 3:30 pm
Coordinates: N 2995941 E 681144 | Driller's Name: Manlea Thompson | Helper's Name: Donald Palmer
Ground Elevation: 126.5 | Inspector's Name: Weijie Dong | Inspector's Company: Lamson Engineering, Corp., for *

Sample Number	Depth Range (Feet)	Blow Counts per 6 Inches Coring Times Minute Per Foot	Recovery Inches	Field Description	Strata Changes
				TOPSOIL	5"
S-1	0' - 2'	2 3 4 4	18"	Moist, loose, red-brown FINE TO COARSE SAND, some inorganic silt, trace fine gravel.	4'
S-2	5' - 7'	6 4 5 6	14"	Wet, loose, brown FINE TO COARSE SAND, trace fine gravel, trace inorganic silt.	
S-3	10' - 11'	4 5 14 14	8"	Wet, loose, brown, FINE SAND, trace inorganic silt.	11'
S-3A	11' - 12'		6"	Wet, medium dense, brown, COARSE TO FINE SAND, trace fine gravel.	
S-4	15' - 17'	9 7 11 13	15"	Wet, medium dense, gray, FINE TO COARSE SAND, some fine to coarse gravel, trace inorganic silt.	
S-5	20' - 22'	8 8 8 8	13"	Wet, medium dense, brown, FINE TO COARSE SAND, some fine to medium gravel, trace inorganic silt.	
S-6	25' - 27'	9 8 8 6	10"	Wet, medium dense, gray, FINE TO COARSE SAND, some fine to coarse gravel, trace inorganic silt.	
S-7	30' - 31'8"	7 7 30 80/2"	9"	Wet, dense, gray, FINE TO COARSE SAND and fine to medium gravel, trace inorganic silt.	
S-8	35' - 37'	28 47 51 54	19"	Wet, very dense, gray, FINE TO COARSE SAND, some inorganic silt, trace fine to medium gravel.	37'
				Bottom of Exploration = 37'	

Remarks: * AECOM (Consultants)

Protective Device - Stand: Box:
Well Depth: Solid Pipe:
Stick Up Pipe: Screen Pipe:

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

Type of Drill Rig: CME 550X
Arrow-Board: Signs: Cones:
Casing: HW Size: 4" Amt: 35'
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:

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Boring No. WB-2B-1
Scale 1" = 5'

City/Town: Acton - Concord | Bridge: Bruce Freeman Rail Trail (Phase II-B) | Project File No: 606223 | Contract No: 76859
Project: Bruce Freeman Rail Trail Route 2 (Phase II-B) | Date & Time Started: 11-07-14 11:30 am | Total Hours: 5.5
Groundwater Depth: 8' | Date & Time: 11-10-14 7:25 am | Date & Time Completed: 11-10-14 9:00 am
Coordinates: N 2996414 E 680903 | Driller's Name: Manlea Thompson | Helper's Name: Donald Palmer
Ground Elevation: 130.0 | Inspector's Name: Weijie Dong | Inspector's Company: Lamson Engineering, Corp., for *

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'	2 2 3 3	6"	Dry, loose, dark brown, FINE TO COARSE SAND, trace fine to medium gravel, trace inorganic silt.	
S-2	5' - 7'	8 11 14 16	14"	Dry, medium dense, brown, FINE TO COARSE SAND and fine to medium gravel, trace inorganic silt.	
S-3	10' - 12'	18 21 13 7	9"	Wet, dense, brown, COARSE TO FINE SAND and fine to coarse gravel, trace inorganic silt.	13'6"
S-4	15' - 17'	2 5 4 5	15"	Wet, loose, brown, FINE SAND, some inorganic silt.	
S-5	20' - 22'	3 6 7 7	14"	Wet, medium dense, brown, FINE SAND, some inorganic silt, trace clay.	23'
S-6	25' - 27'	16 27 17 14	17"	Wet, dense, brown, FINE TO COARSE SAND and fine to medium gravel, some inorganic silt (Till.) Drove casing to 28', drive shoe broke had to re-locate hole.	28'
				Boring Terminated at 28'	

Remarks: * AECOM (Consultants)
Changed location; moved boring from N2996414, E680903 to N2996412, E680903 due to drive shoe breaking in hole and started new boring WB-2B-1A.

Protective Device - Stand: Box:
Well Depth: Solid Pipe:
Stick Up Pipe: Screen Pipe:

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

Type of Drill Rig: CME 550X
Arrow-Board: Signs: Cones:
Casing: HW Size: 4" Amt: 25'
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:

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Boring No. WB-2B-1A
Scale 1" = 5'

City/Town: Acton - Concord | Bridge: Bruce Freeman Rail Trail (Phase II-B) | Project File No: 606223 | Contract No: 76859
Project: Bruce Freeman Rail Trail Route 2 (Phase II-B) | Date & Time Started: 11-10-14 9:00 am | Total Hours: 5.5
Groundwater Depth: 8' | Date & Time: 11-10-14 2:30 pm | Date & Time Completed: 11-10-14 2:30 pm
Coordinates: N 2996412 E 680903 | Driller's Name: Manlea Thompson | Helper's Name: Donald Palmer
Ground Elevation: 130.0 | Inspector's Name: Weijie Dong | Inspector's Company: Lamson Engineering, Corp., for *

Sample Number	Depth Range (Feet)	Blow Counts per 6 Inches Coring Times Minute Per Foot	Recovery Inches	Field Description	Strata Changes
				See boring log WB-2B-1 for sample descriptions to 27'.	
				Top of BEDROCK at 28' Rollerbit to 30' and began coring.	28'
C-1	30' - 35'	5 4 4 4 4	58"	Hard, fresh slightly fractured, white GNEISS. Percent Recovery = 96%	
C-2	35' - 40'	4 3 5 3 4	57"	Hard, white, slightly to severely fractured, white GNEISS. Percent Recovery = 95%	40'
				Bottom of Exploration at 40'	

Remarks: * AECOM (Consultants)

Protective Device - Stand: Box:
Well Depth: Solid Pipe:
Stick Up Pipe: Screen Pipe:

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

Type of Drill Rig: CME 550X
Arrow-Board: Signs: Cones:
Casing: HW Size: 4" Amt: 28'
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: NX Size: 2.15"

5 0 5 10
HORIZONTAL
SCALE IN FEET

MASSDOT_V2014_R4.1.DWT Plotted on 10-Mar-2015 3:39 PM

ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	7	44
PROJECT FILE NO.	606223		

BORING LOGS

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Boring No. WB-2B-2
Scale 1" = 5'

City/Town: Acton - Concord | Bridge: Bruce Freeman Rail Trail (Phase II-B) | Project File No: 606223 | Contract No: 76859
Project: Bruce Freeman Rail Trail Route 2 (Phase II-B) | Date & Time Started: 11-06-14 10:00 am | Total Hours: 8.5
Groundwater Depth: 8.5' | Date & Time: 11-07-14 7:30 am | Date & Time Completed: 11-07-14 11:00 am
Coordinates: N 2996310 E 680961 | Driller's Name: Manlea Thompson | Helper's Name: Donald Palmer
Ground Elevation: 127.0 | Inspector's Name: Weijie Dong | Inspector's Company: Lamson Engineering, Corp., for *

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'	3 6 7 7	10"	Dry, medium dense, brown, FINE TO COARSE SAND, some fine to medium gravel, trace inorganic silt.	
S-2	5' - 7'	9 11 14 16	6"	Moist, medium dense, brown, FINE TO COARSE SAND, some fine to medium gravel, trace inorganic silt.	
S-3	10' - 11'6"	15 13 14 7	10"	Wet, medium dense, brown, FINE TO COARSE SAND and fine to medium gravel, trace inorganic silt.	11'6"
S-3A	11'6" - 12'		5"	Wet, medium stiff, gray-brown INORGANIC SILT and fine sand.	15'
S-4	15' - 17'	2 3 3 3	17"	Wet, loose gray-brown FINE SAND, some inorganic silt.	18'6"
S-5	20' - 20'6"	21 21 22 34	5"	Wet, dense, gray-brown, FINE TO COARSE SAND and fine to medium gravel, trace inorganic silt.	20'6"
S-5A	20'6" - 22'		5"	Wet,very dense, gray-brown, FINE TO COARSE SAND, some inorganic silt, some fine to medium gravel, (Till.)	
S-6	25' - 27'	26 60 60/4"	12"	Wet, very dense, gray-brown, FINE TO COARSE SAND, some inorganic silt, some fine to medium gravel, (Till.)	
S-7	30' - 30'6"	120	6"	Wet, very dense, gray-brown, FINE TO COARSE SAND and inorganic silt, some fine to medium gravel, (Till.) Top of BEDROCK at 30'6" Advanced roller bit through granite to 34' and began coring.	30'6"
C-1	34' - 39'	4 4 5 5 5	60"	Hard, fresh, sound, white-gray GRANITE. Percent Recovery = 100%	
C-2	39' - 44'	6 6 7 7 7	60"	Hard, fresh, sound, gray GRANITE. Percent Recovery = 100%	44'
				Bottom of Exploration = 44'	

Remarks: * AECOM (Consultants)

Protective Device - Stand: Box:
Well Depth: Solid Pipe:
Stick Up Pipe: Screen Pipe:

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

Type of Drill Rig: CME 550X
Arrow-Board: Signs: Cones:
Casing: HW Size: 4" Amt: 30'
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: NX Size: 2.15"

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E Mail: nhb@nhboring.com

Boring No. WB-2B-3
Scale 1" = 5'

City/Town: Acton - Concord | Bridge: Bruce Freeman Rail Trail (Phase II-B) | Project File No: 606223 | Contract No: 76859
Project: Bruce Freeman Rail Trail Route 2 (Phase II-B) | Date & Time Started: 11-12-14 7:30 am | Total Hours: 6.5
Groundwater Depth: 8.5' | Date & Time: 11-12-14 2:00 pm | Date & Time Completed: 11-12-14 2:00 pm
Coordinates: N 2996185 E 681019 | Driller's Name: Manlea Thompson | Helper's Name: Donald Palmer
Ground Elevation: 131.0 | Inspector's Name: Weijie Dong | Inspector's Company: Lamson Engineering, Corp., for *

Sample Number	Depth Range (Feet)	Blow Counts per 6 Inches Coring Times Minute Per Foot	Recovery Inches	Field Description	Strata Changes
S-1	0' - 1'	1 1 2 2	9"	Dry, very loose, brown, FINE SAND, trace inorganic silt.	1'
S-1A	1' - 2'		9"	Dry, soft, dark brown, ORGANIC SILT, trace fine sand, trace roots.	3'
S-2	5' - 7'	9 8 11 13	17"	Moist, medium dense, brown, COARSE TO FINE SAND, some fine gravel, trace inorganic silt.	
S-3	10' - 12'	9 9 11 14	6"	Wet, medium dense, brown, COARSE TO FINE SAND and fine to medium gravel, some inorganic silt.	13'6"
S-4	15' - 17'	5 5 5 6	12"	Wet, medium dense, gray FINE SAND and inorganic silt.	
S-5	20' - 22'	4 3 3 4	15"	Wet, loose, brown, FINE SAND, some inorganic silt.	
S-6	25' - 26'6"	2 2 3 6	12"	Wet, loose, gray FINE SAND, some inorganic silt.	26'6"
S-6A	26'6" - 27'		6"	Wet, loose, gray, FINE TO COARSE SAND, some fine to medium gravel, trace inorganic silt.	
S-7	30' - 32'	17 21 30 36	16"	Wet, very dense, gray, FINE TO COARSE SAND, trace fine to medium gravel, trace inorganic silt, (Till.) Top of BEDROCK at 32'2" Rollerbit to 34' through granite gneiss, began coring at 34'.	32'2"
C-1	34' - 39'	3 4 2 3 3	57"	Hard, slightly weathered, slightly to moderately fractured, gray-white GRANITE GNEISS. Percent Recovery = 95%	
C-2	39' - 44'	3 2 3 2 2	30"	Hard, highly weathered, extremely fractured, gray GRANITE. Percent Recovery = 50%	44'
				Bottom of Exploration = 44'	

Remarks: * AECOM (Consultants)

Protective Device - Stand: Box:
Well Depth: Solid Pipe:
Stick Up Pipe: Screen Pipe:

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

Type of Drill Rig: CME 550X
Arrow-Board: Signs: Cones:
Casing: HW Size: 4" Amt: 32'2"
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: NX Size: 2.15"

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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. WB-2B-4
Scale 1" = 5'

City/Town: Acton - Concord | Bridge: Bruce Freeman Rail Trail (Phase II-B) | Project File No: 606223 | Contract No: 76859
Project: Bruce Freeman Rail Trail Route 2 (Phase II-B) | Date & Time Started: 11-18-14 1:00 pm | Total Hours: 11.5
Groundwater Depth: 7.5' | Date & Time: 11-20-14 8:00 am | Date & Time Completed: 11-20-14 9:00 am
Coordinates: N 2995754.9 E 681434.5 | Driller's Name: Manlea Thompson | Helper's Name: Donald Palmer
Ground Elevation: 129.2 | Inspector's Name: Kin Lam | Inspector's Company: Lamson Engineering, Corp., for *

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'	2 3 3 3	13"	TOPSOIL 4" Dry, loose, brown, FINE TO COARSE SAND, some inorganic silt, trace fine gravel.	
S-2	5' - 6'	2 2 2 2	8"	Wet, loose, brown, FINE TO COARSE SAND, some inorganic silt.	6'
S-2A	6' - 7'		10"	Moist, soft, black/dark brown ORGANIC SILT, trace fine sand, trace roots.	8'
S-3	10' - 12'	3 4 5 5	6"	Wet, loose, brown, FINE TO COARSE SAND, some fine to medium gravel, trace inorganic silt. Top of BEDROCK at 12'1"	12'1"
C-1	16' - 21'	4 4 4 4 4	60"	Attempted to drive 4" casing when it crimped, pulled out of hole and advanced 5" casing down to 12'1", advanced rollerbit to 15' then advanced 4" casing to 15', rollerbit to 16' and began coring at 16'. Very hard sound, fresh, gray-pink-white QUARTZ GNEISS. Percent Recovery = 100%	
C-2	21' - 26'	5 4 4 5 4	60"	Very hard sound, fresh, gray-pink-white QUARTZ GNEISS. Percent Recovery = 100%	26'
				Bottom of Exploration = 26'	

Remarks: * AECOM (Consultants)

Protective Device - Stand: Box:
Well Depth: Solid Pipe:
Stick Up Pipe: Screen Pipe:

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

Type of Drill Rig: CME 550X
Arrow-Board: Signs: Cones:
Casing: HW Size: 4" Amt: 15'
Casing: PW Size: 5" Amt: 12'1"
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: NX Size: 2.15"

5 0 5 10

HORIZONTAL
SCALE IN FEET

MASSDOT_V2014_R4.1.DWT Plotted on 10-Mar-2015 3:39 PM

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. WB-2B-5
Scale 1" = 5'

City/Town: Acton - Concord | Bridge: Bruce Freeman Rail Trail (Phase II-B) | Project File No: 606223 | Contract No: 76859

Project: Bruce Freeman Rail Trail Route 2 (Phase II-B) | Date & Time Started: 11-20-14 9:30 am | Total Hours: 8.5

Groundwater Depth: 7' | Date & Time: 11-21-14 10:00 am | Date & Time Completed: 11-21-14 10:00 am

Coordinates: N 2995725 E 681508 | Driller's Name: Manlea Thompson | Helper's Name: Donald Palmer

Ground Elevation: 129.8 | Inspector's Name: Jun Jie Li | Inspector's Company: Lamson Engineering, Corp., for *

Sample Number	Depth Range (Feet)	Blow Counts per 6 Inches Coring Times Minute Per Foot	Recovery Inches	Field Description	Strata Changes
				TOPSOIL 4"	1'
S-1	0' - 1'	1 2 120/0"	9"	Dry, very dense, brown, FINE TO COARSE SAND, trace fine gravel, trace inorganic silt.	
				Encountered BOULDER at 1'	
C-1	4' - 9'	6 9 1 .5 .5	33"	Advanced rollerbit to 4' and began coring breaking through boulder at 7', continued to 9' with 5" casing.	
				BOULDER	7'
				Continued to 9' with 5" casing.	
S-2	9' - 11"	9 6 4 4	10"	Wet, medium dense, brown, FINE SAND, some inorganic silt, some fine to medium gravel.	
				Top of BEDROCK at 12'	12'
				Advanced rollerbit to 14' and began coring.	
C-2	14' - 19'	5 9 9 10 9	57"	Hard, fresh, sound, white GNEISS. Percent Recovery = 95%	
C-3	19' - 24'	3 3 4 4 4	40"	Hard, sligtly fractured, gray-white GNEISS. Percent Recovery = 66%	
					24'
				Bottom of Exploration = 24'	

Remarks: * AECOM (Consultants)
On core run C-3 while pulling barrell out of hole 20" of recovery was lost. Two additional attempts were made to retrieve but were unsuccessful.

Protective Device - Stand: Box:
Well Depth: Solid Pipe:
Stick Up Pipe: Screen Pipe:
Type of Drill Rig: CME 550X

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

Arrow-Board: Signs: Cones:
Casing: PW Size: 5" Amt: 9'
Casing: HW Size: 4" Amt: 12'
Casing: NW Size: 3" Amt: 14'
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: NX Size: 2.15"

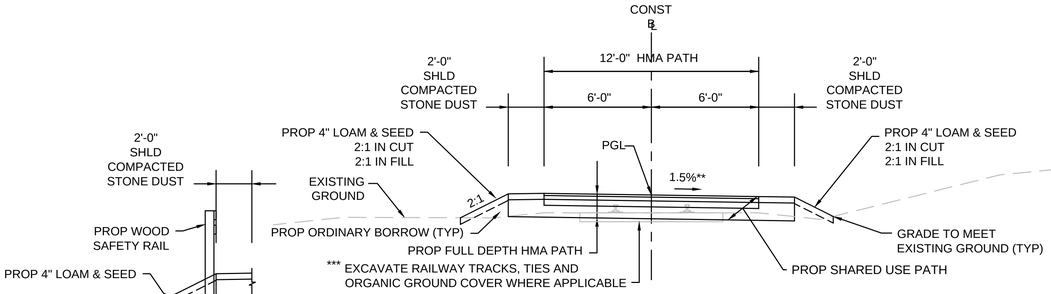
5 0 5 10
HORIZONTAL
SCALE IN FEET

MASSDOT_V2014_R4.1.DWT Plotted on 10-Mar-2015 3:39 PM

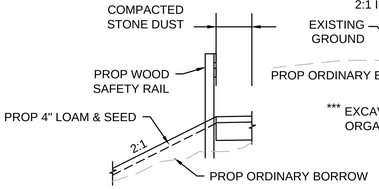
ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	9	44
PROJECT FILE NO.	606223		

TYPICAL SECTIONS



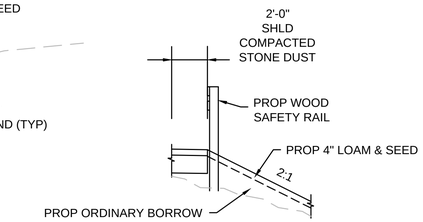
TYPICAL SECTION
STA 9+41 TO STA 21+80
STA 31+50 TO STA 58+50
STA 59+45 TO STA 60+99.49
NTS



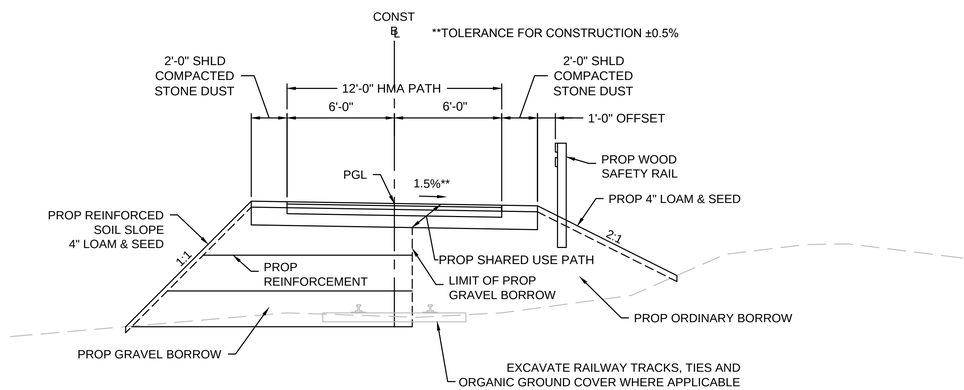
LOCATIONS OF WOOD SAFETY RAIL - LEFT
STA 21+55 TO STA 21+80
STA 31+50 TO STA 31+75

**TOLERANCE FOR CONSTRUCTION ±0.5%

*** AREAS OF TRACK EXCAVATION
STA 20+50 TO STA 21+80
STA 32+50 TO STA 58+45
STA 59+38 TO STA 60+99.49

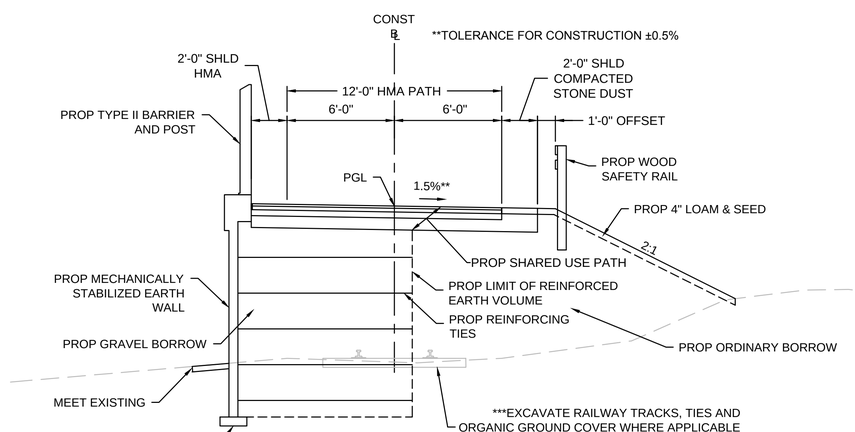


LOCATIONS OF WOOD SAFETY RAIL - RIGHT
STA 21+55 TO STA 21+80
STA 31+50 TO STA 31+75



**TOLERANCE FOR CONSTRUCTION ±0.5%

TYPICAL SECTION
STA 31+25 TO STA 31+50
NTS



**TOLERANCE FOR CONSTRUCTION ±0.5%

*** AREAS OF TRACK EXCAVATION
STA 21+80 TO STA 24+50

TYPICAL SECTION
STA 21+80 TO STA 24+50
STA 30+50 TO STA 31+25
NTS

PAVEMENT NOTES

FULL DEPTH HMA (MULTI-USE TRAIL)

SURFACE COURSE:	1½" SUPERPAVE SURFACE COURSE - 9.5 (SSC-9.5)
INTERMEDIATE COURSE:	2½" SUPERPAVE INTERMEDIATE COURSE - 12.5 (SIC-12.5)
FOUNDATION:	4" DENSE GRADED CRUSHED STONE FOR SUBBASE 8" GRAVEL BORROW (M1.03.0 TYPE B) SPECIAL BORROW (SEE NOTE BELOW)

NOTE: IN AREAS OF FILL PLACE AN ADDITIONAL 12" OF SPECIAL BORROW, GRAVEL BORROW OR RECLAIMED PAVEMENT FOR SUBBASE TO PROVIDE FROST PROTECTION.

FULL DEPTH HMA (ROUTE 2, UNION TURNPIKE)

SURFACE COURSE:	1¾" SUPERPAVE SURFACE COURSE - 12.5 (SSC-12.5)
INTERMEDIATE COURSE:	2.5" SUPERPAVE INTERMEDIATE COURSE - 19.0 (SIC-19.0)
BASE COURSE:	4½" SUPERPAVE BASE COURSE - 37.5 (SBC 37.5)
SUBBASE:	4" DENSE GRADED CRUSHED STONE SUBBASE OVER 8" GRAVEL BORROW (M1,03.0 TYPE B)
SUBGRADE:	12" SPECIAL BORROW

PAVEMENT MICROMILLING AND OVERLAY (ROUTE 2, UNION TURNPIKE)

SURFACE COURSE:	1¾" SUPERPAVE SURFACE COURSE - 12.5 (SSC-12.5)
SURFACE MILLING:	1¾" PAVEMENT MICROMILLING TO MATCH EXISTING CROSS SLOPE

PAVEMENT MICROMILLING AND OVERLAY (COMMONWEALTH AVENUE)

SURFACE COURSE:	1½" SUPERPAVE SURFACE COURSE - 9.5 (SSC-9.5)
SURFACE MILLING:	1½" PAVEMENT MICROMILLING TO MATCH EXISTING CROSS SLOPE

STONE DUST SHOULDER

SURFACE:	4" STONE DUST OVER WEED CONTROL FABRIC
FOUNDATION:	2"-8" GRAVEL BORROW (M1.03.0 TYPE B)

CEMENT CONCRETE SIDEWALK AND WHEELCHAIR RAMPS

SURFACE COURSE:	4" CEMENT CONCRETE (AIR ENTRAINED 4,000 PSI, ¾", 610)
SUBBASE:	8" GRAVEL BORROW (M1.03.0 TYPE B)

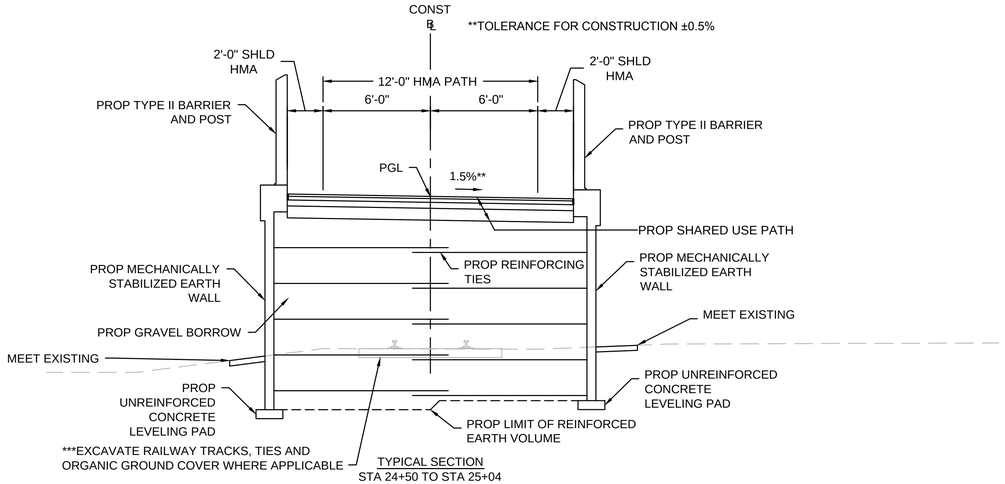
NOTE: ASPHALT EMULSION FOR TACK COAT SHALL BE APPLIED AT THE RATE OF 0.07 GAL/SY FOR MILLED SURFACES AND 0.05 GAL/SY FOR SMOOTH TIGHT PAVED SURFACES.

MASSDOT_V2014_R4.1.DWT Plotted on 10-Mar-2015 3:39 PM

ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

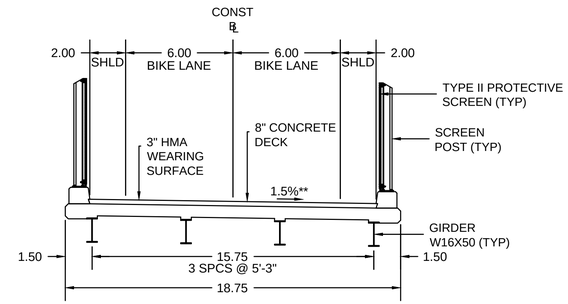
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	10	44
PROJECT FILE NO.	606223		

TYPICAL SECTIONS

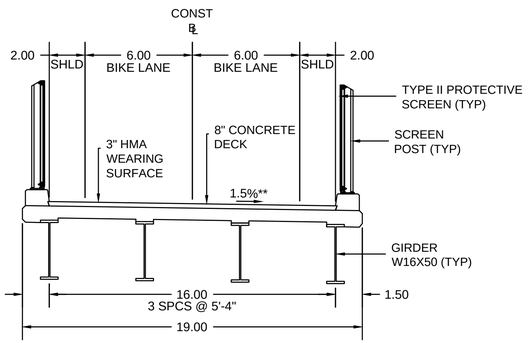


**TOLERANCE FOR CONSTRUCTION ±0.5%
*** AREAS OF TRACK EXCAVATION
STA 24+50 TO STA 25+04
STA 28+08 TO STA 28+32
STA 29+10 TO STA 29+35
STA 29+77 TO STA 30+15

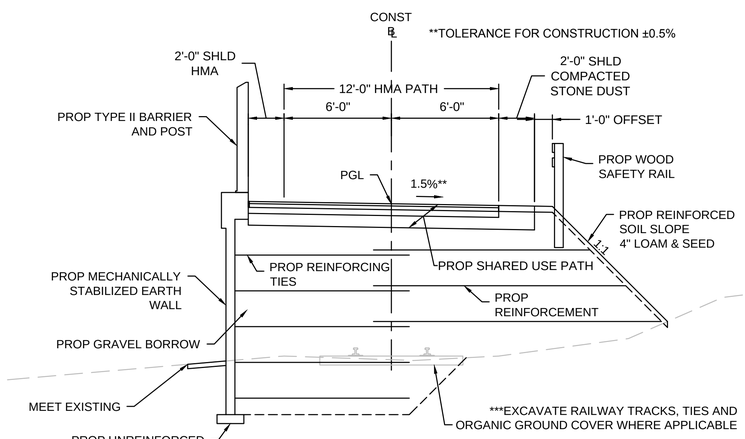
TYPICAL SECTION
STA 24+50 TO STA 25+04
STA 28+08 TO STA 28+32
STA 29+10 TO STA 29+31
STA 29+81 TO STA 30+15
NTS



TYPICAL PATH - STA 29+31 TO STA 29+81
BRIDGE SECTION OVER NASHOBA BROOK
NTS
**TOLERANCE FOR CONSTRUCTION ±0.5%



TYPICAL PATH - STA 25+04 TO STA 28+08
BRIDGE SECTION OVER ROUTE 2
NTS
**TOLERANCE FOR CONSTRUCTION ±0.5%



**TOLERANCE FOR CONSTRUCTION ±0.5%
*** AREAS OF TRACK EXCAVATION
STA 28+32 TO STA 29+10

TYPICAL SECTION
STA 28+32 TO STA 29+10
STA 30+15 TO STA 30+50
NTS

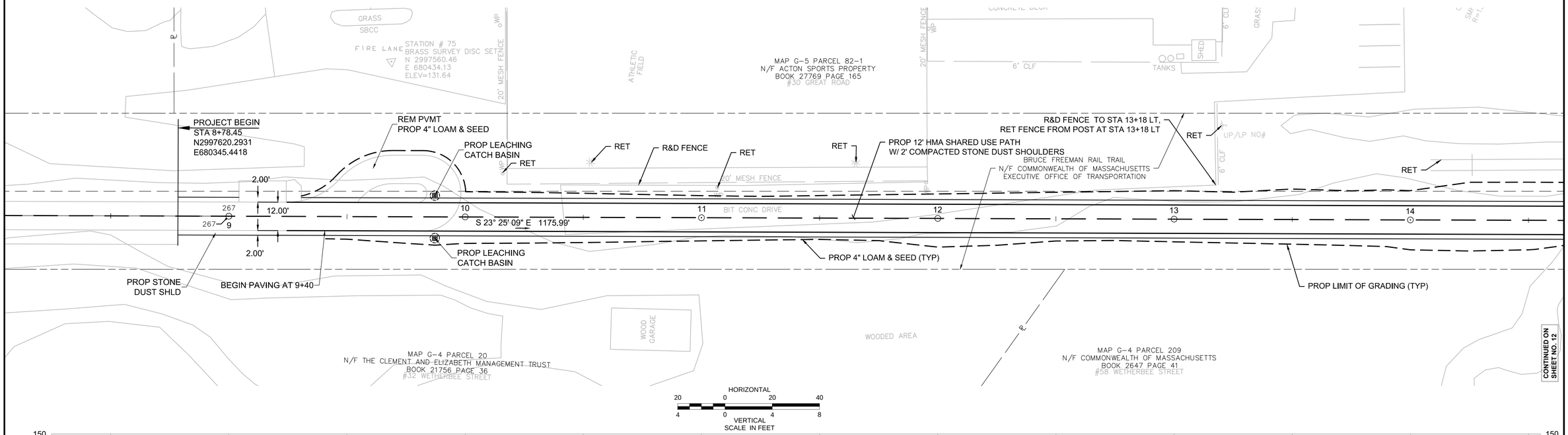
MASSDOT_V2014_R4.1.DWT Plotted on 10-Mar-2015 3:39 PM

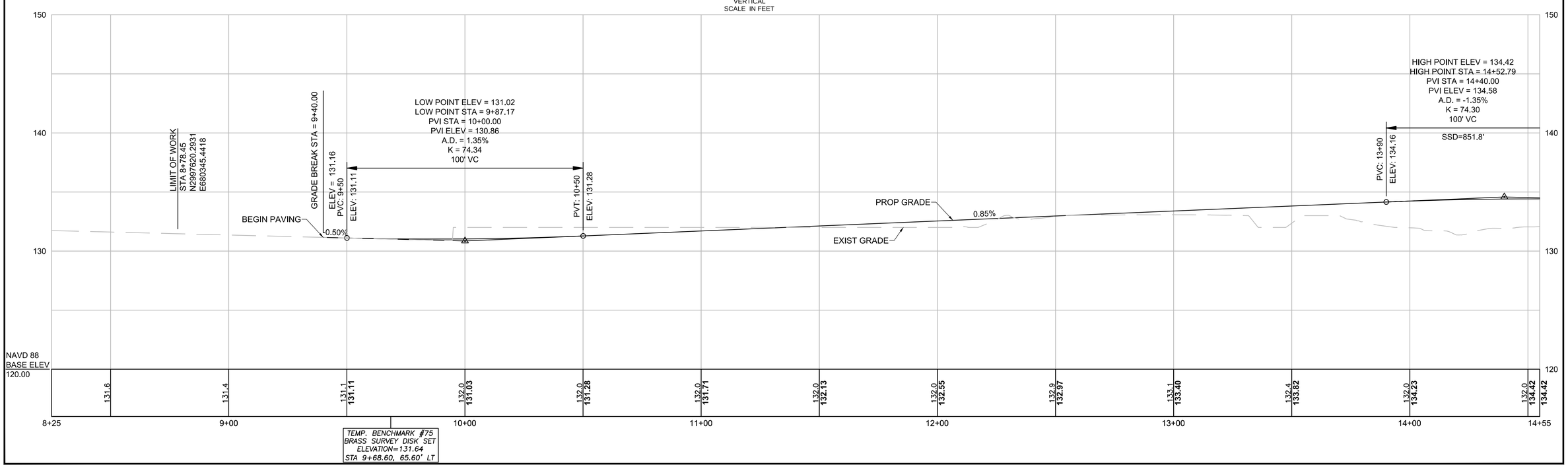
ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	11	44
PROJECT FILE NO.	606223		

CONSTRUCTION PLANS & PROFILES

HIGHWAY GUARD DETAILS	TRAFFIC SIGNAL CONDUIT	WATER SUPPLY ALTERATIONS	DRAINAGE DETAILS
NONE	NONE	NONE	SEE BELOW





606223_HD6_(CONSTRUCTION PLANS & PROFILES).DWG Plotted on 23-Feb-2016 2:35 PM

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

NONE

WATER SUPPLY ALTERATIONS

NONE

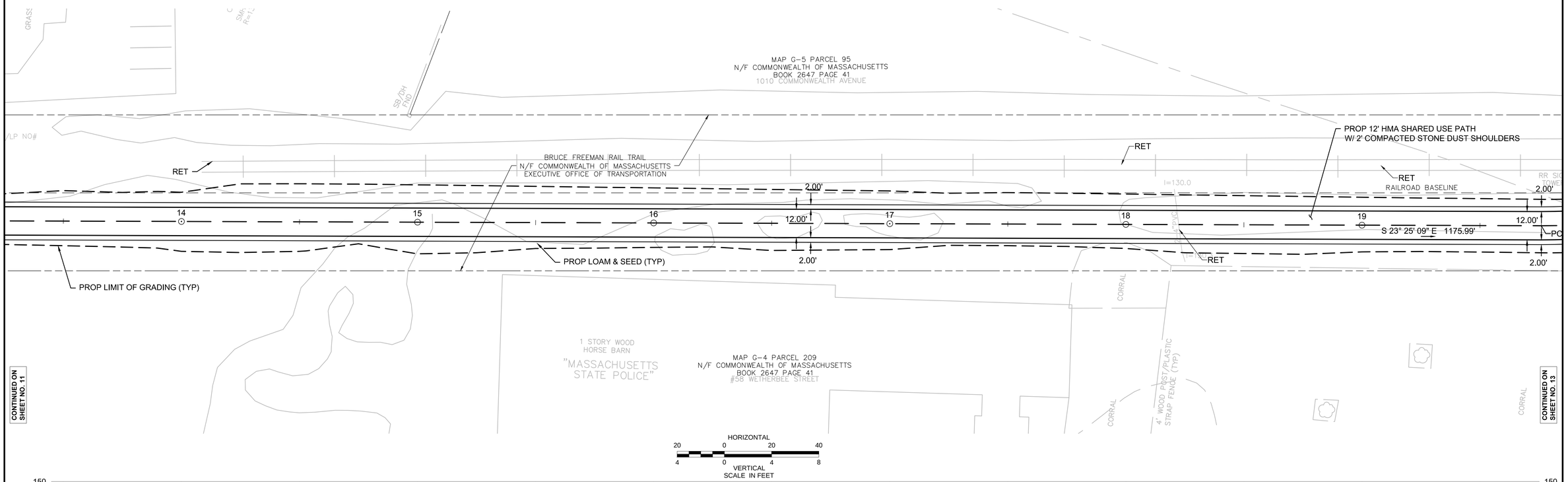
DRAINAGE DETAILS

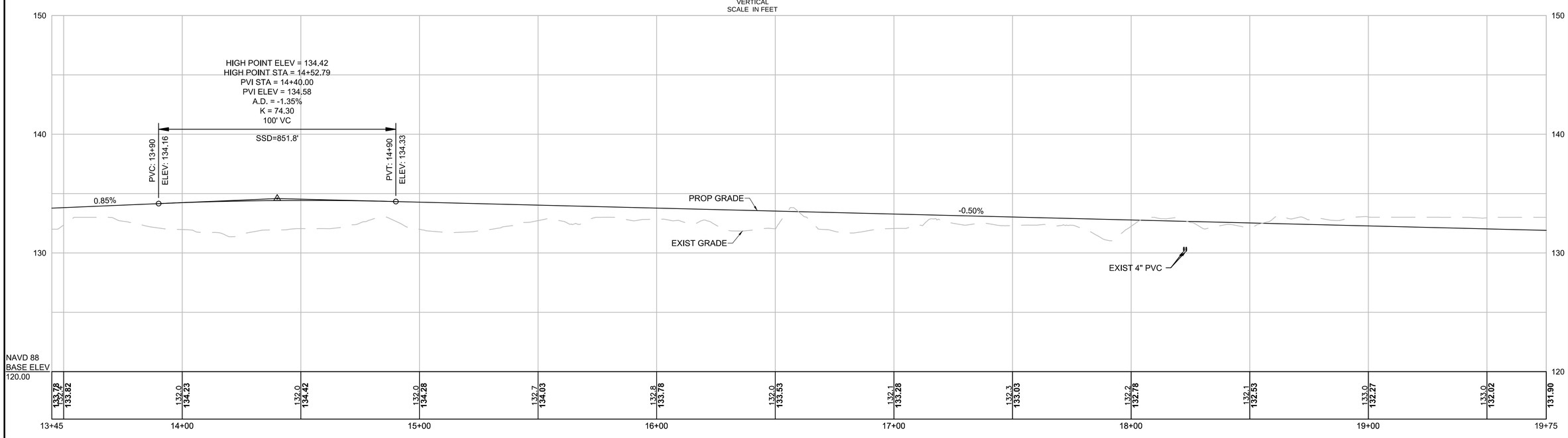
NONE

ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	12	44
PROJECT FILE NO.	606223		

CONSTRUCTION PLANS & PROFILES





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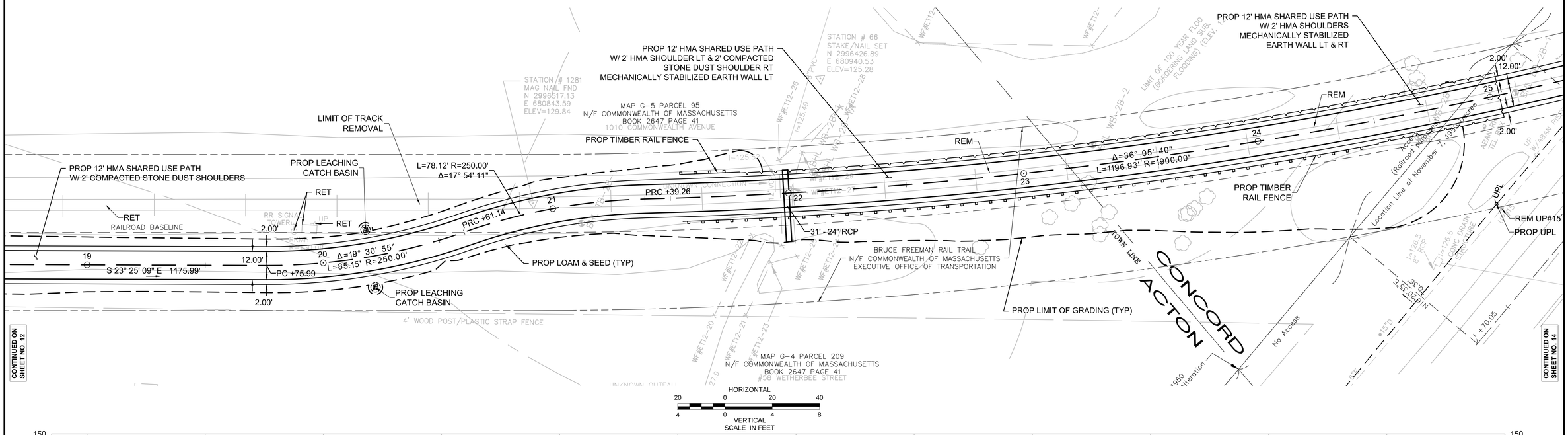
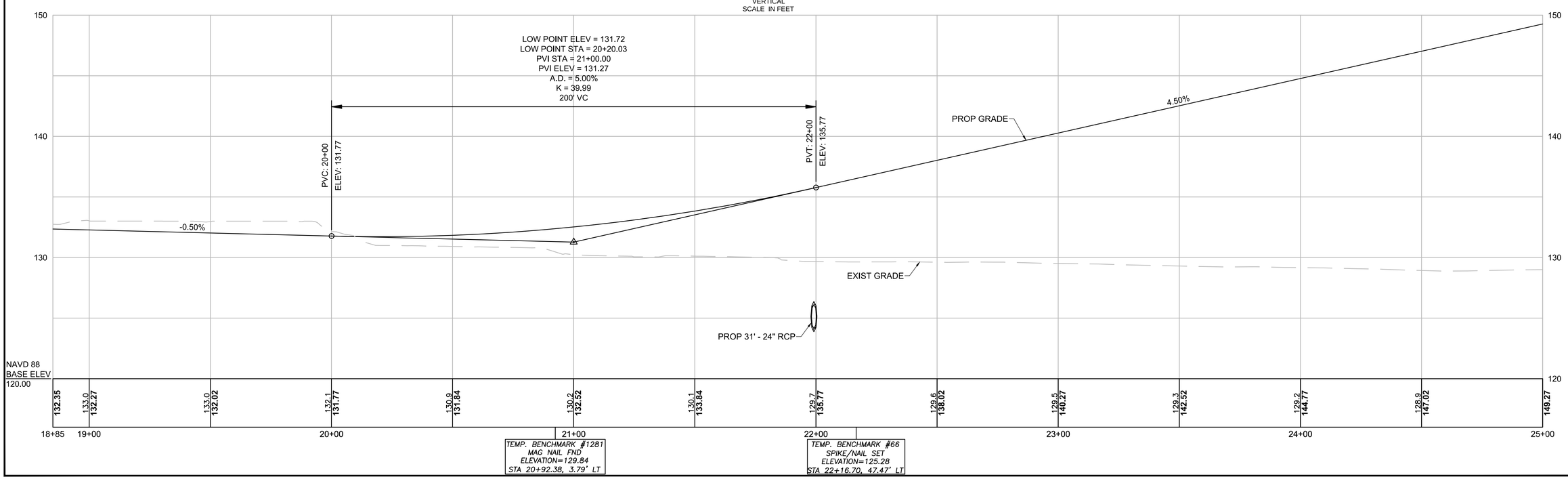
ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	13	44
PROJECT FILE NO.	606223		

CONSTRUCTION PLANS & PROFILES

HIGHWAY GUARD DETAILS	TRAFFIC SIGNAL CONDUIT	WATER SUPPLY ALTERATIONS	DRAINAGE DETAILS
NONE	NONE	NONE	SEE BELOW





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ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	14	44
PROJECT FILE NO.	606223		

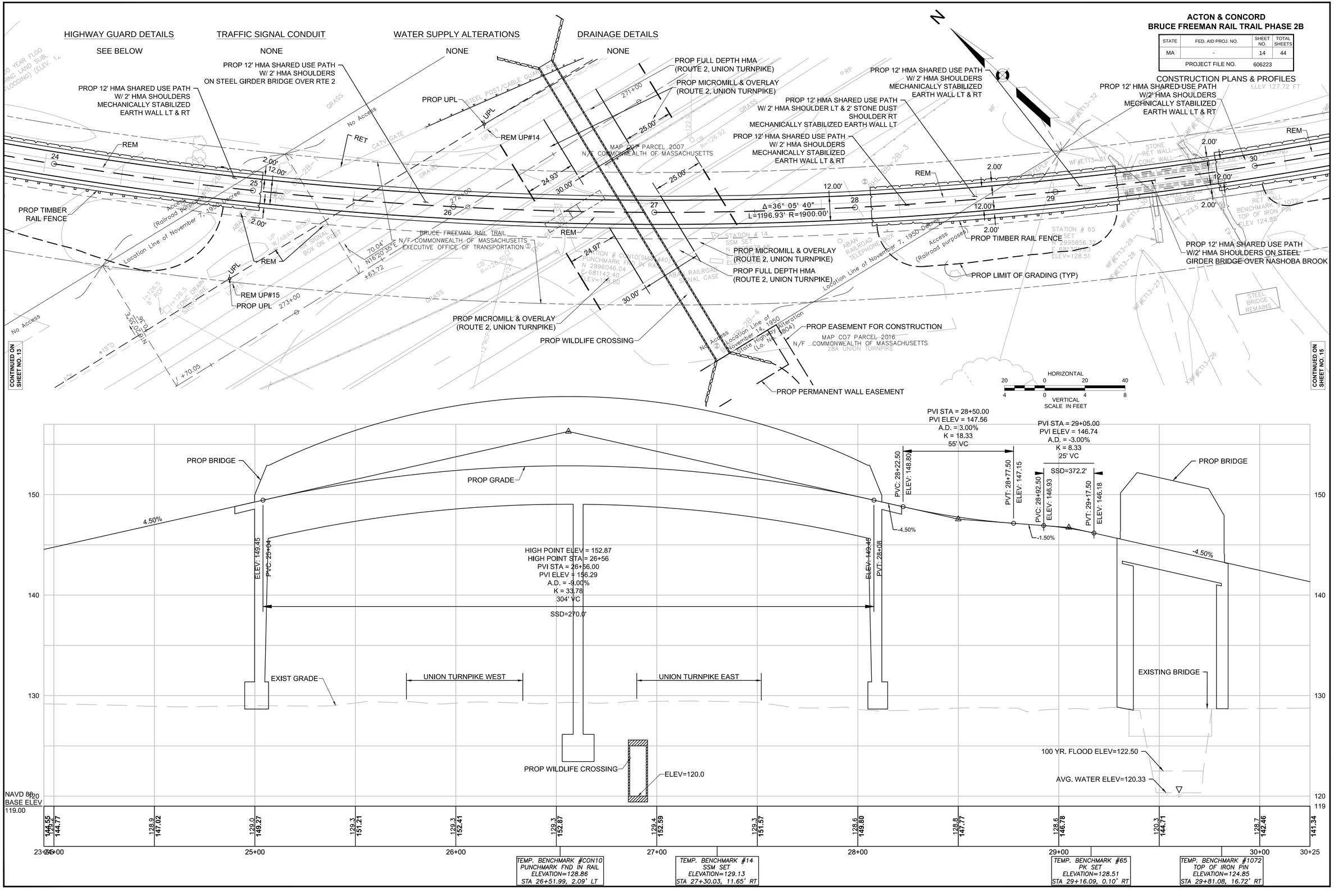
CONSTRUCTION PLANS & PROFILES

HIGHWAY GUARD DETAILS
SEE BELOW

TRAFFIC SIGNAL CONDUIT
NONE

WATER SUPPLY ALTERATIONS
NONE

DRAINAGE DETAILS
NONE



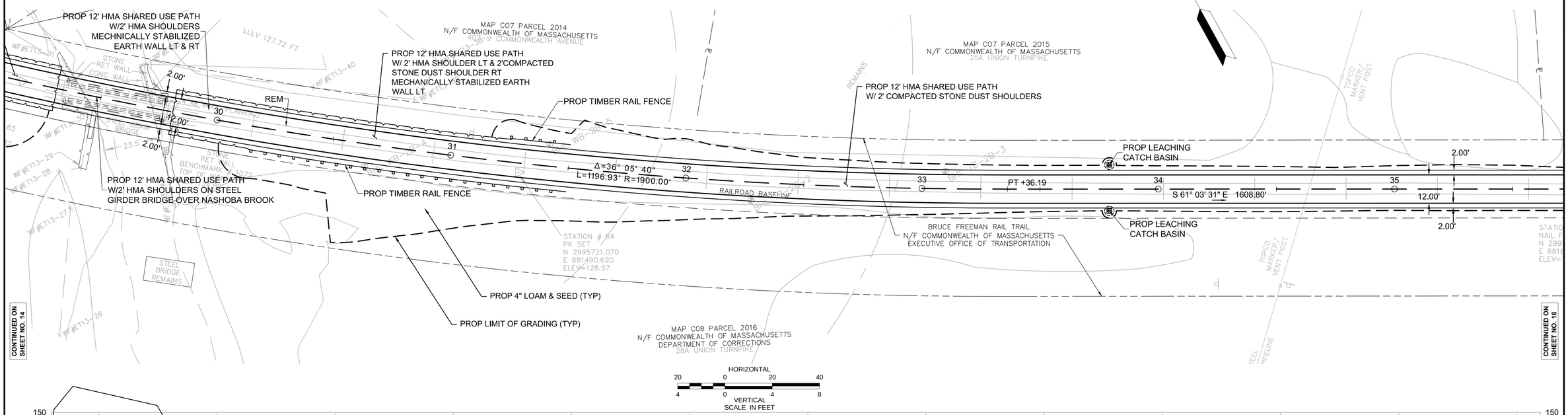
606223_HD6_(CONSTRUCTION PLANS & PROFILES).DWG Plotted on 23-Feb-2016 2:37 PM

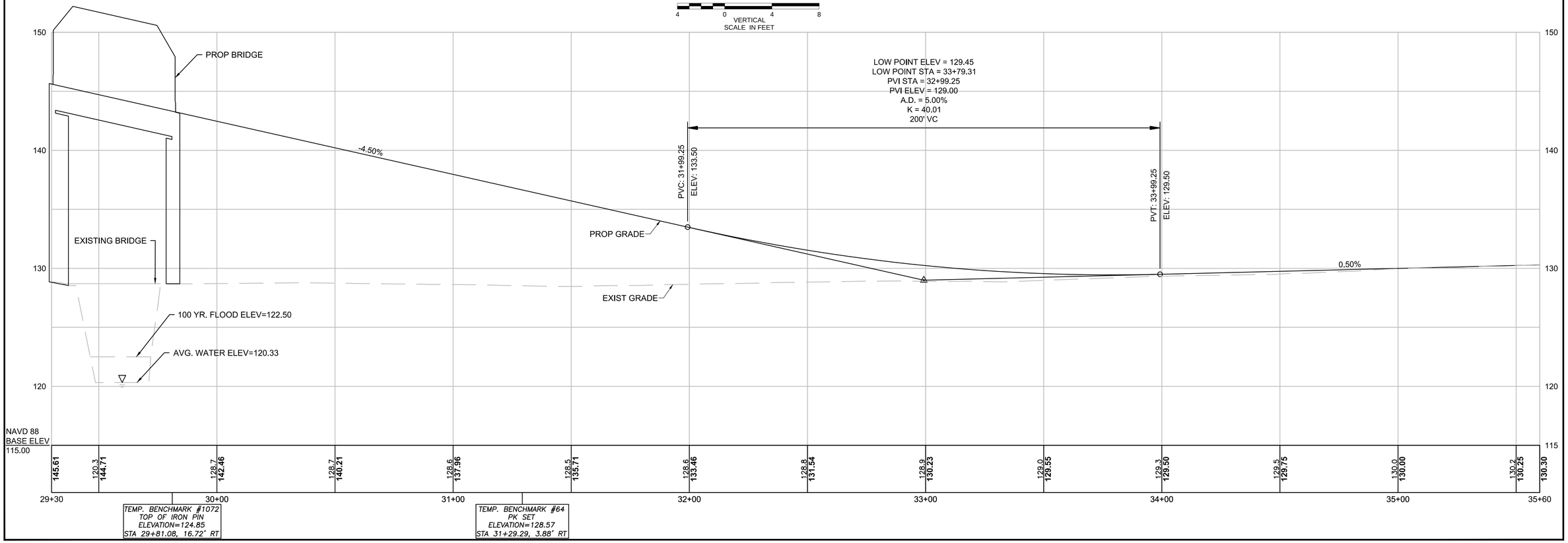
ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	15	44
PROJECT FILE NO.	606223		

CONSTRUCTION PLANS & PROFILES

HIGHWAY GUARD DETAILS	TRAFFIC SIGNAL CONDUIT	WATER SUPPLY ALTERATIONS	DRAINAGE DETAILS
NONE	NONE	NONE	SEE BELOW





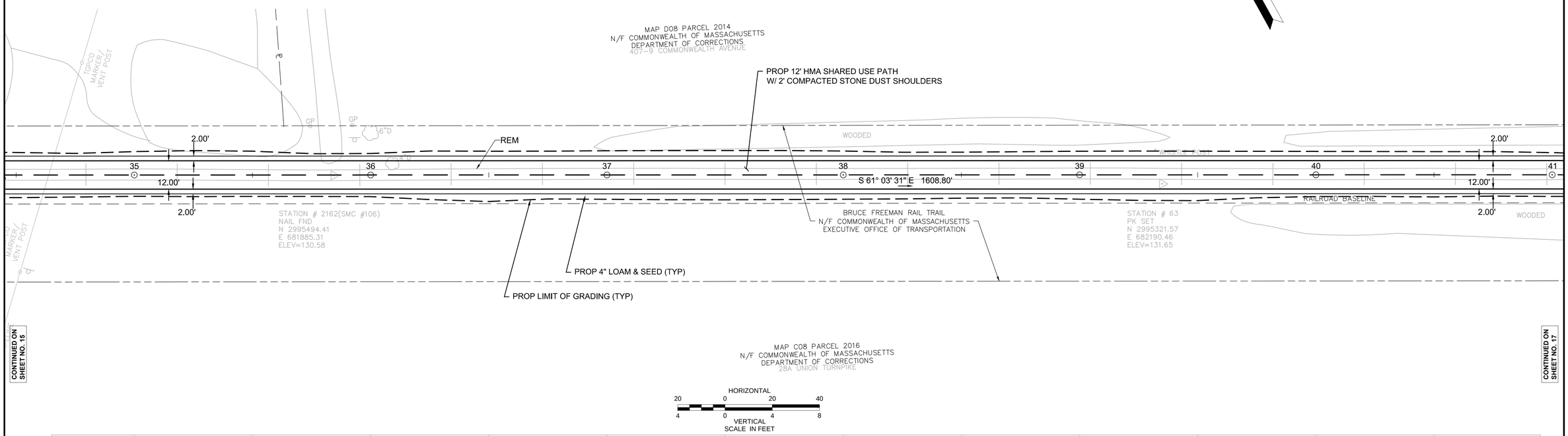
606223_HD6_(CONSTRUCTION PLANS & PROFILES).DWG Plotted on 23-Feb-2016 2:37 PM

ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	16	44
PROJECT FILE NO.	606223		

CONSTRUCTION PLANS & PROFILES

HIGHWAY GUARD DETAILS	TRAFFIC SIGNAL CONDUIT	WATER SUPPLY ALTERATIONS	DRAINAGE DETAILS
NONE	NONE	NONE	NONE



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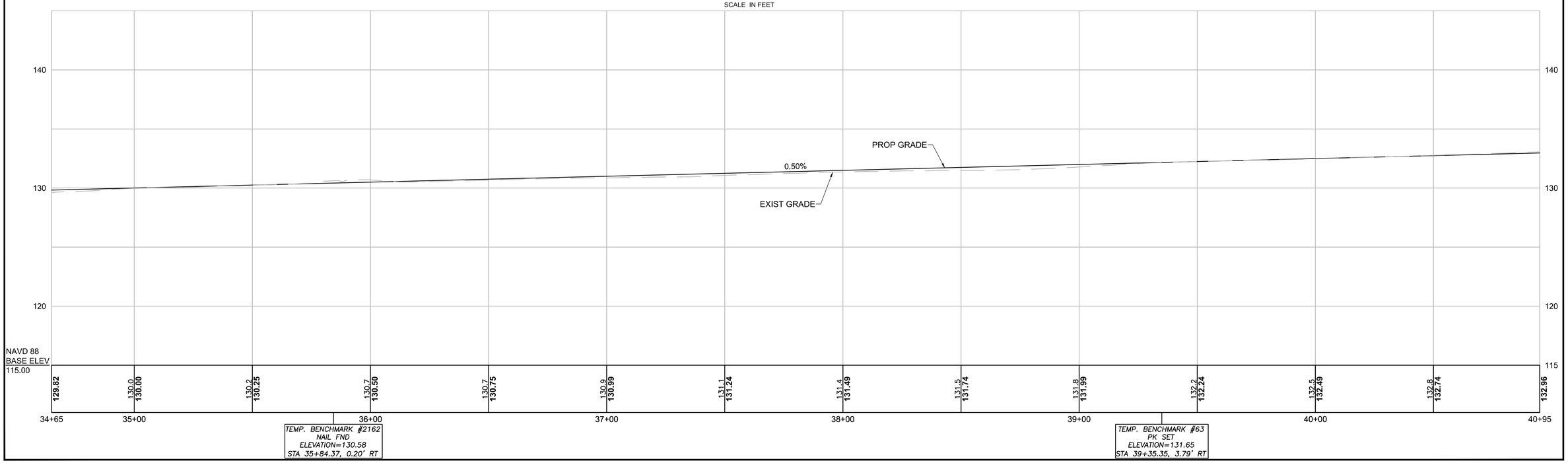
CONTINUED ON SHEET NO. 17



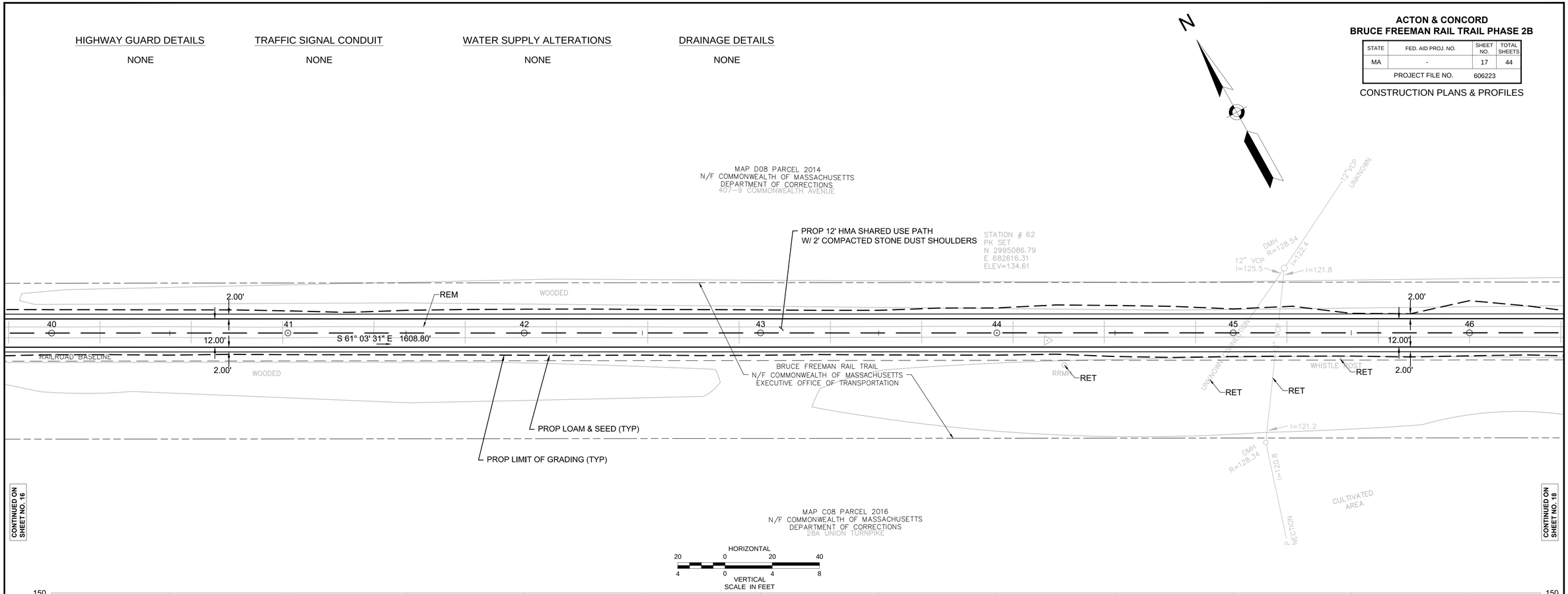
606223_HD6_(CONSTRUCTION PLANS & PROFILES).DWG Plotted on 23-Feb-2016 2:38 PM

HIGHWAY GUARD DETAILS	TRAFFIC SIGNAL CONDUIT	WATER SUPPLY ALTERATIONS	DRAINAGE DETAILS
NONE	NONE	NONE	NONE

ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	17	44
PROJECT FILE NO.	606223		

CONSTRUCTION PLANS & PROFILES



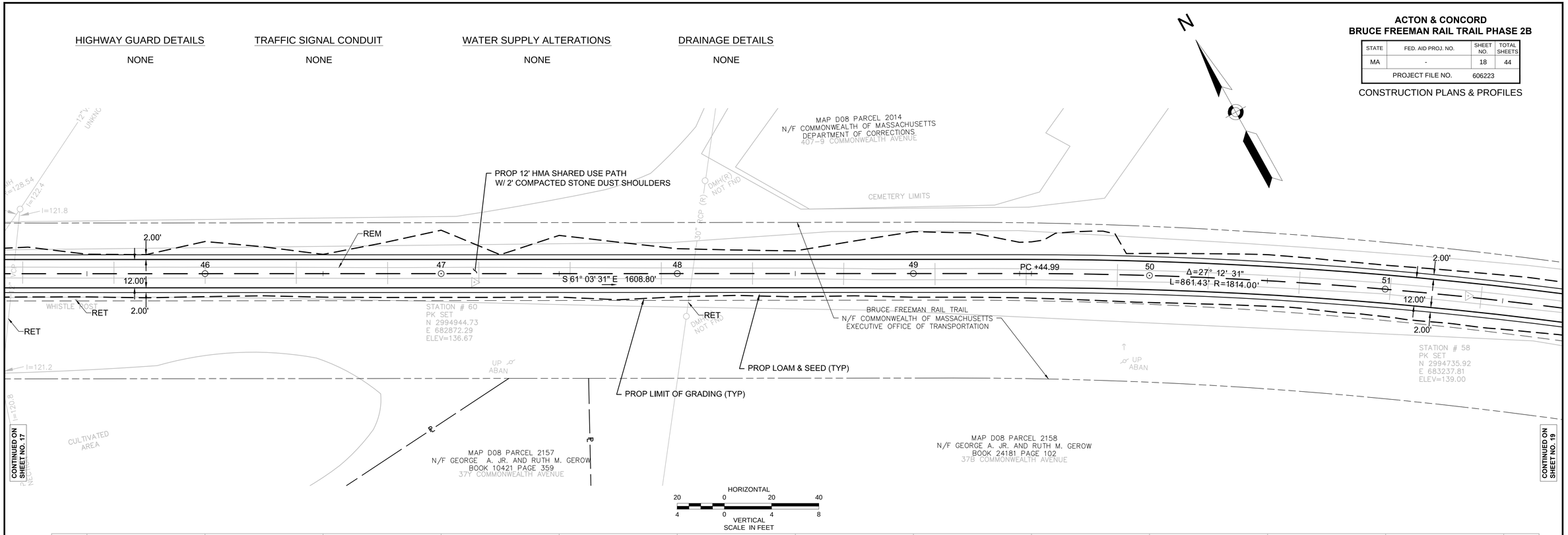
606223_HD6_(CONSTRUCTION PLANS & PROFILES).DWG Plotted on 23-Feb-2016 2:39 PM

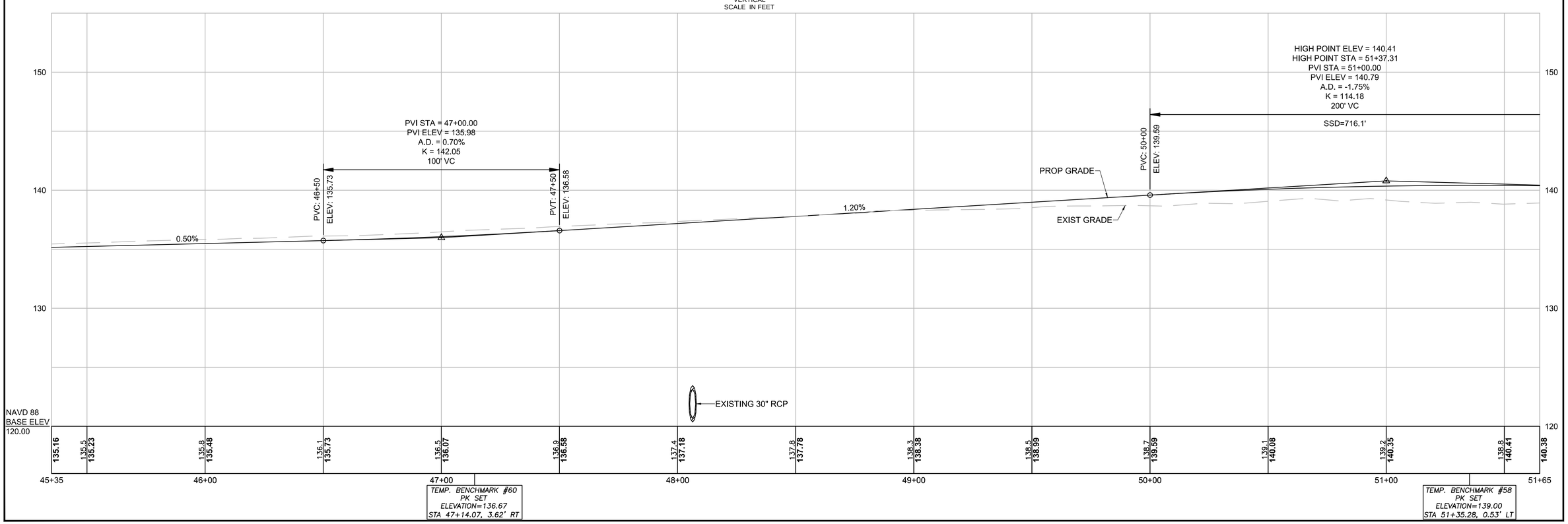
ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	18	44
PROJECT FILE NO.	606223		

CONSTRUCTION PLANS & PROFILES

HIGHWAY GUARD DETAILS	TRAFFIC SIGNAL CONDUIT	WATER SUPPLY ALTERATIONS	DRAINAGE DETAILS
NONE	NONE	NONE	NONE





606223_HD6_(CONSTRUCTION PLANS & PROFILES).DWG Plotted on 23-Feb-2016 2:39 PM

ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	19	44
PROJECT FILE NO.	606223		

CONSTRUCTION PLANS & PROFILES

HIGHWAY GUARD DETAILS

NONE

TRAFFIC SIGNAL CONDUIT

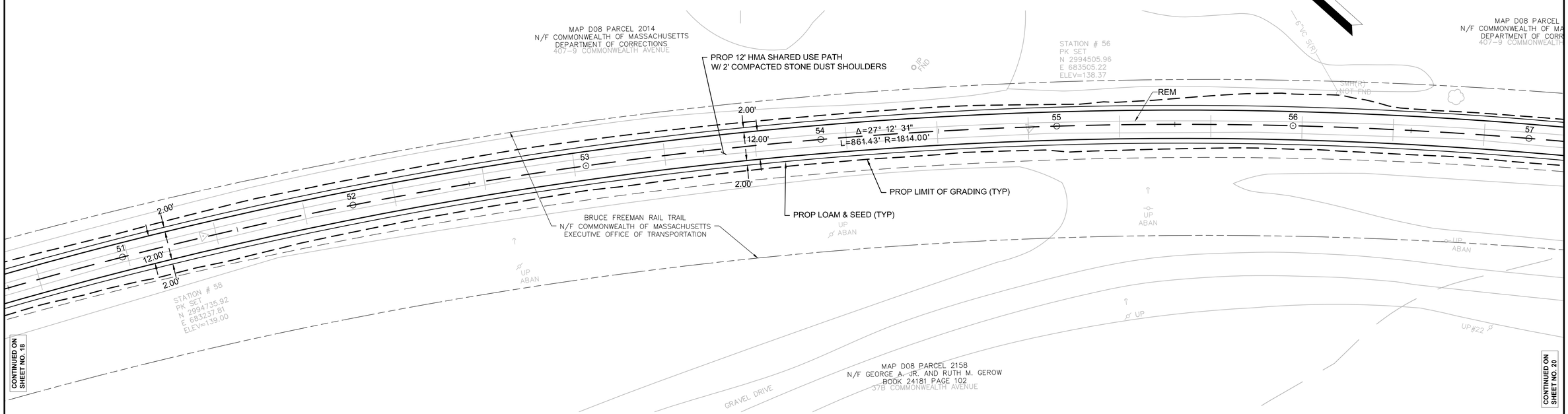
NONE

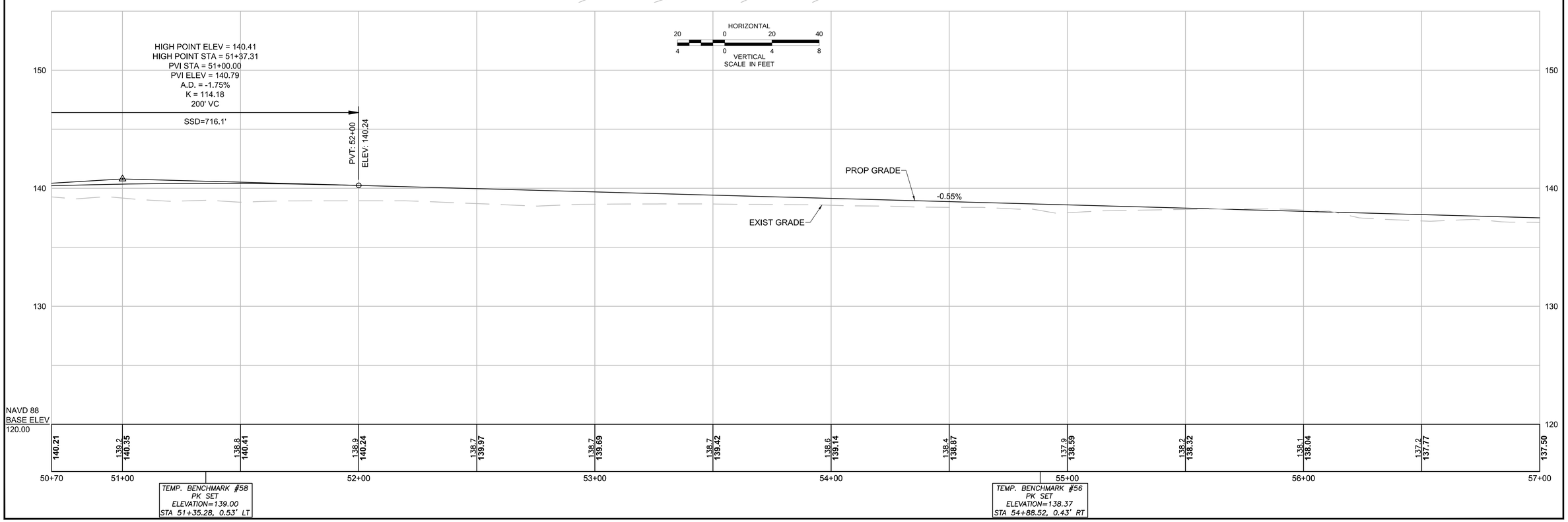
WATER SUPPLY ALTERATIONS

NONE

DRAINAGE DETAILS

NONE





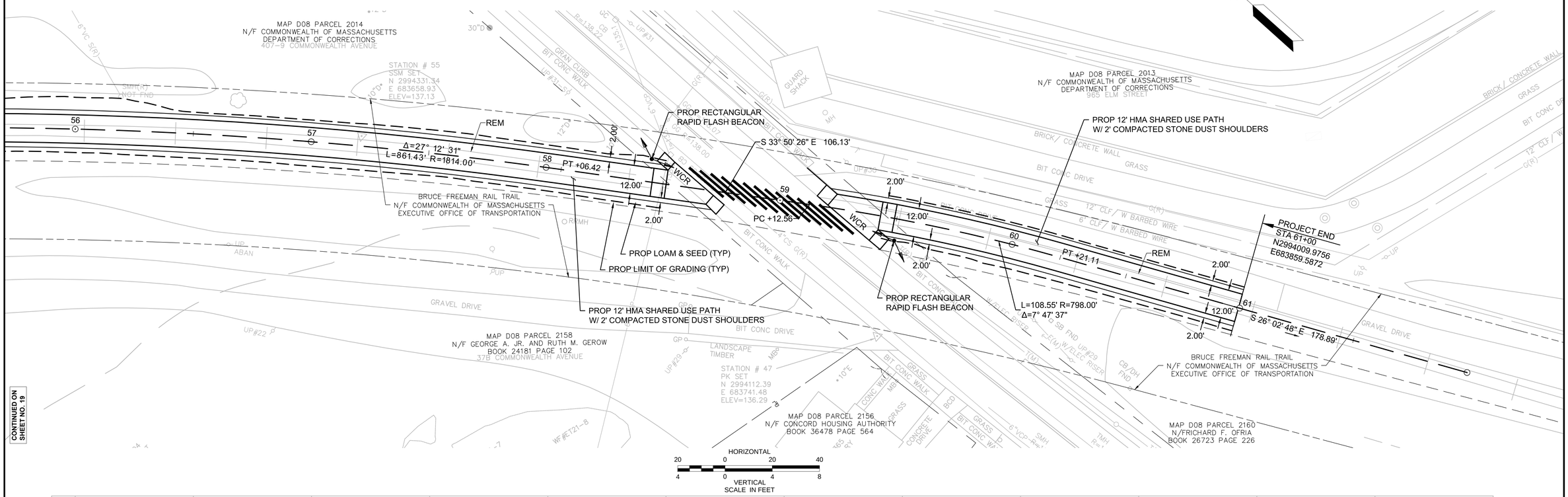
606223_HD6_(CONSTRUCTION PLANS & PROFILES).DWG Plotted on 23-Feb-2016 2:40 PM

ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	20	44
PROJECT FILE NO.	606223		

CONSTRUCTION PLANS & PROFILES

HIGHWAY GUARD DETAILS	TRAFFIC SIGNAL CONDUIT	WATER SUPPLY ALTERATIONS	DRAINAGE DETAILS
NONE	NONE	NONE	NONE



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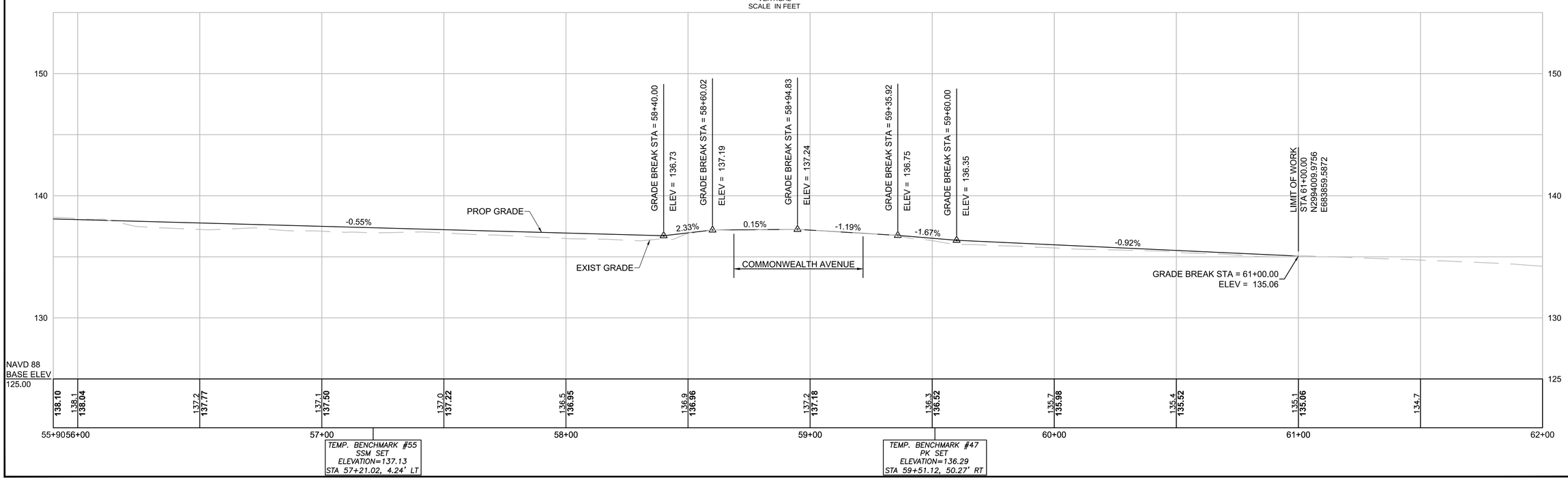
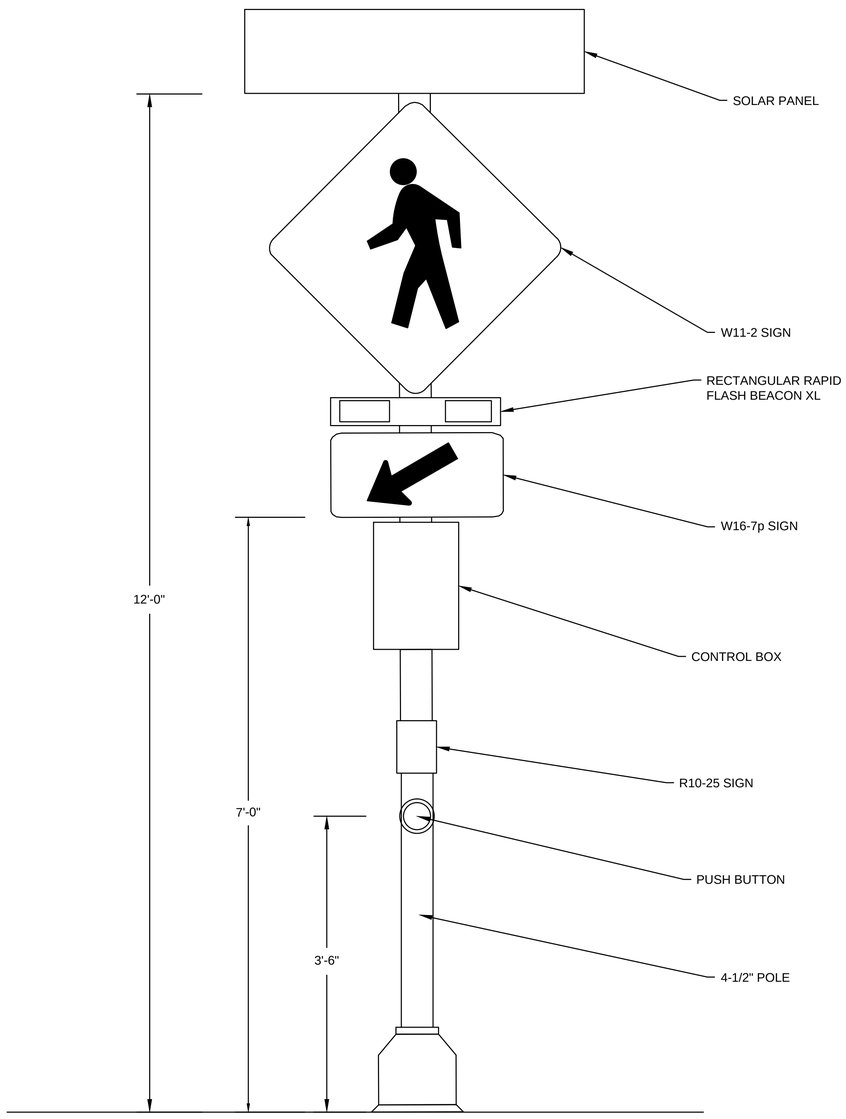


606223_HD6_(CONSTRUCTION PLANS & PROFILES).DWG Plotted on 23-Feb-2016 2:41 PM

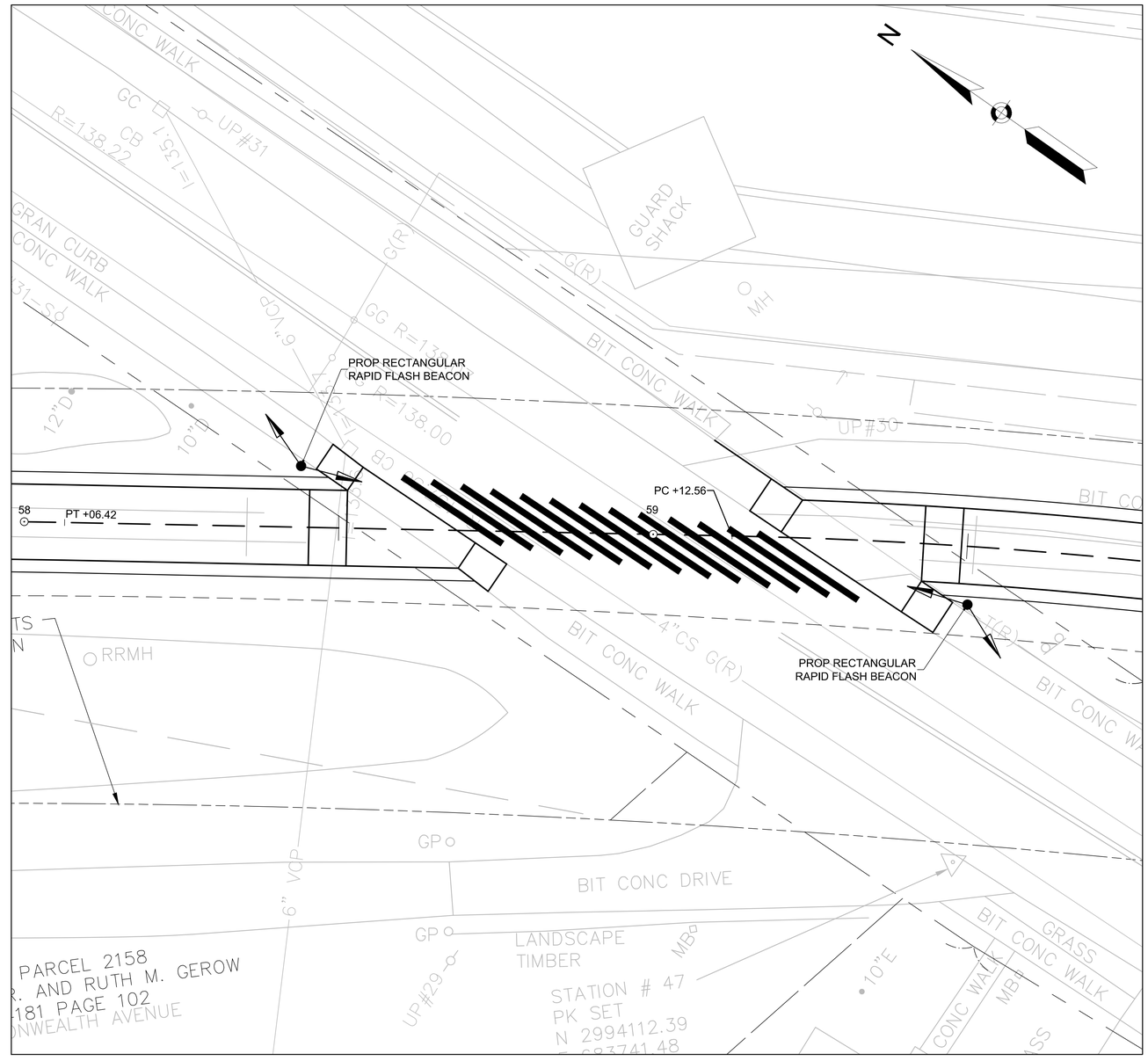
ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	21	44
PROJECT FILE NO.	606223		

TRAFFIC PLAN
LOCATION 1



RECTANGULAR RAPID FLASH BEACON DETAIL
NOT TO SCALE



LOCATION PLAN

0 10 20 30 40
SCALE: 1" = 10'

606223_HD7_(TRAFFIC PLAN).DWG Plotted on 10-Mar-2015 3:39 PM

ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	22	44
PROJECT FILE NO.	606223		

TEMPORARY TRAFFIC CONTROL PLAN
TYPICAL DETAILS
SHEET 1 OF 1

TABLE 1
SUGGESTED WORK ZONE WARNING SIGN SPACING

ROAD TYPE	DISTANCE BETWEEN SIGNS		
	A	B	C
LOCAL OR LOW VOLUME ROADWAYS*	350	350	350
MOST OTHER ROADWAYS*	500	500	500
FREEWAYS AND EXPRESSWAYS*	1,000	1,500	2,640

* SPEED CATEGORY TO BE DETERMINED BY HIGHWAY AGENCY.

TABLE 2
BUFFER LENGTHS

SPEED* (mph)	LENGTH (ft)
25	155
30	200
35	250
40	305
45	360

TABLE 3
FLARE RATE

SPEED* (mph)	FLARE RATE
40	9:1
50	11:1
60	13:1

* POSTED SPEED, OFF-PEAK 85TH PERCENTILE SPEED PRIOR TO WORK STARTING, OR THE ANTICIPATED OPERATING SPEED IN MPH.

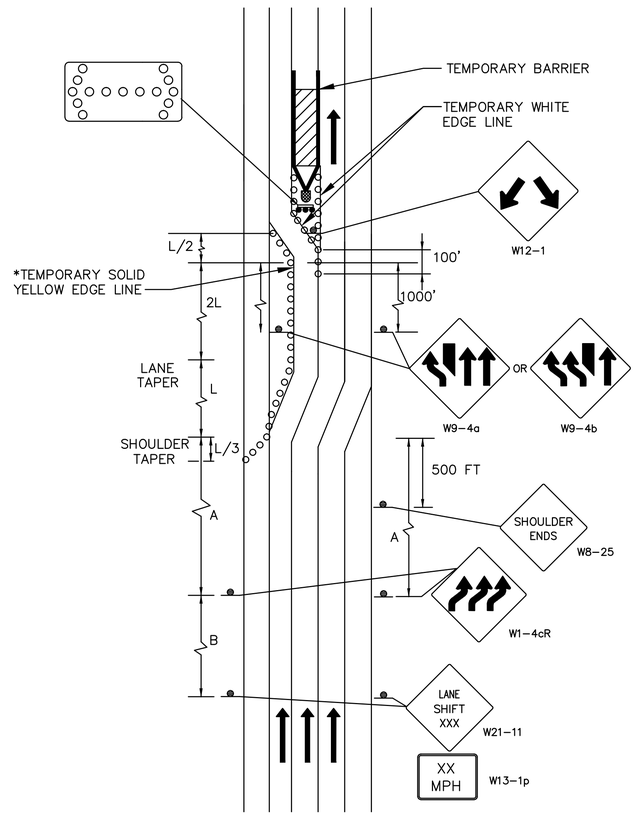
FORMULAS FOR L **

SPEED	FORMULA
40 mph or less	$L = \frac{WS^2}{60}$
45 mph or greater	$L = W \times S$

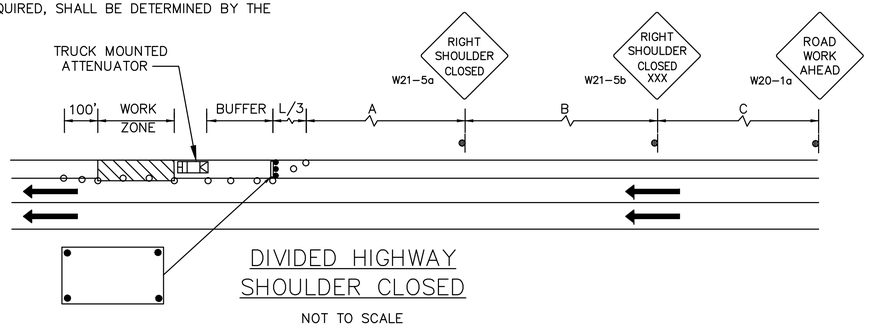
* SPEED CATEGORY TO BE DETERMINED BY STATE HIGHWAY AGENCY IN COOPERATION WITH LOCAL JURISDICTIONS.
** L = TAPER LENGTH IN FEET.
W = WIDTH OF OFFSET IN FEET.
S = POSTED SPEED, THE OFF-PEAK 85TH PERCENTILE SPEED PRIOR TO WORK STARTING, OR THE ANTICIPATED OPERATING SPEED IN MPH.

NOTES FOR TYPICAL TRAFFIC MANAGEMENT PLANS

1. REFERENCE TABLE 1 FOR THE SUGGESTED WORK ZONE SIGN SPACING.
2. REFERENCE TABLE 2 ABOVE FOR RECOMMENDED BUFFER LENGTHS.
3. REFERENCE TABLE 3 ABOVE FOR RECOMMENDED FLARE RATE.
4. THE MAXIMUM SPACING BETWEEN CHANNELIZING DEVICES IN A TAPER (T1) SHOULD BE APPROXIMATELY EQUAL IN FEET TO 1.0 TIMES THE SPEED LIMIT (MPH).
5. THE MAXIMUM SPACING BETWEEN CHANNELIZING DEVICES ON THE TANGENT (T2) SHOULD BE APPROXIMATELY EQUAL IN FEET TO 2.0 TIMES THE SPEED LIMIT (MPH).
6. THE FIRST FIVE PLASTIC DRUMS OF A TAPER MAY BE MOUNTED WITH TYPE A LIGHTS.
7. THE ADVISORY SPEED, IF REQUIRED, SHALL BE DETERMINED BY THE DISTRICT TRAFFIC ENGINEER.



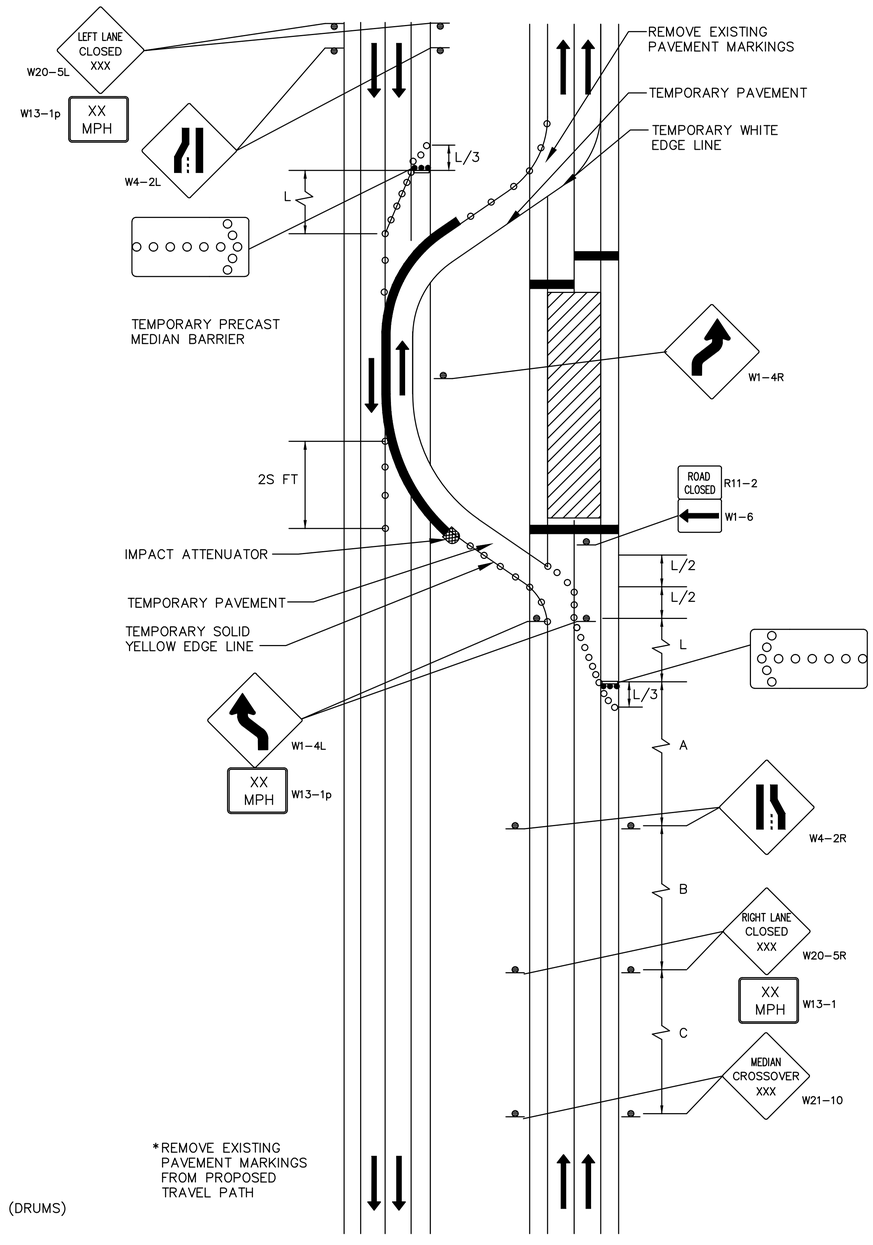
DIVIDED HIGHWAY
CENTER LANE CLOSURE
NOT TO SCALE



DIVIDED HIGHWAY
SHOULDER CLOSED
NOT TO SCALE

KEY

- CHANNELIZING DEVICES (DRUMS)
- TEMPORARY SIGN
- DIRECTION OF TRAVEL
- IMPACT ATTENUATOR



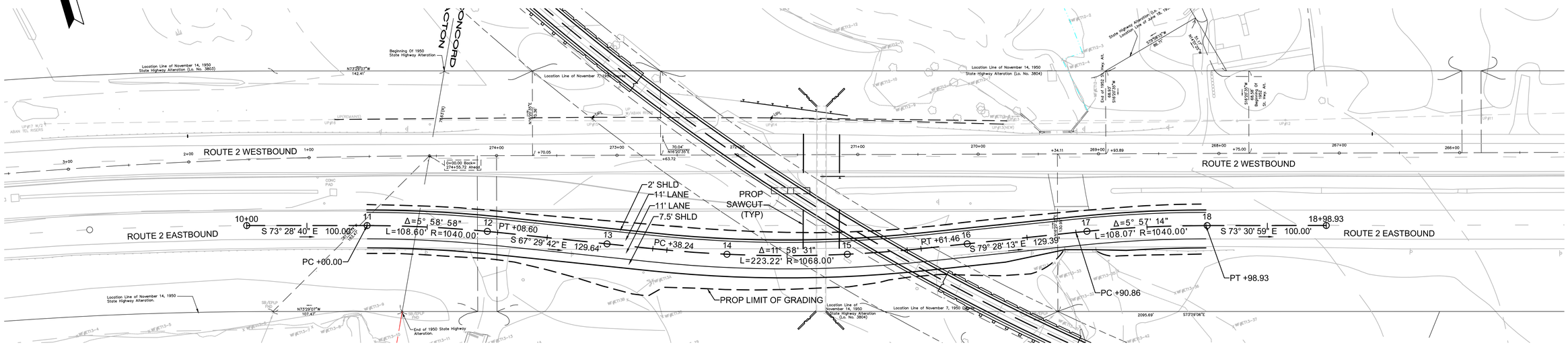
DIVIDED HIGHWAY
MEDIAN CROSS-OVER
NOT TO SCALE

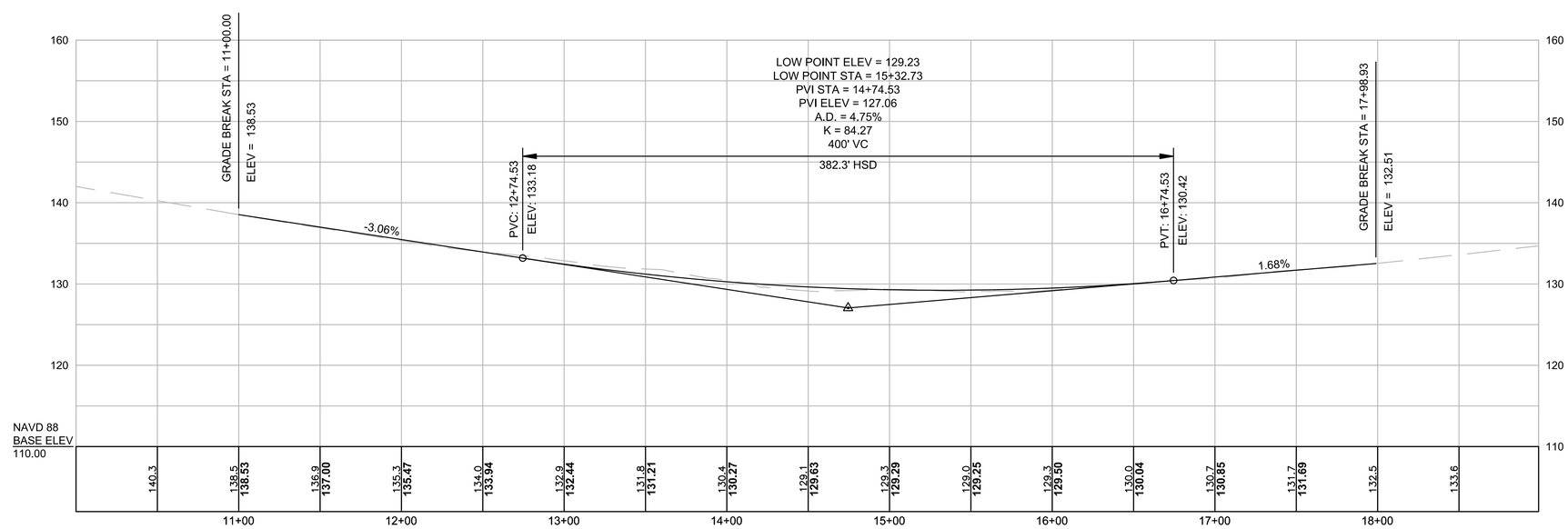
606223_HD8_(TTCP).DWG Plotted on 23-Feb-2016 1:49 PM

ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	23	44
PROJECT FILE NO.	606223		

TEMPORARY TRAFFIC CONTROL PLAN
STAGE 1
SHEET 1 OF 4





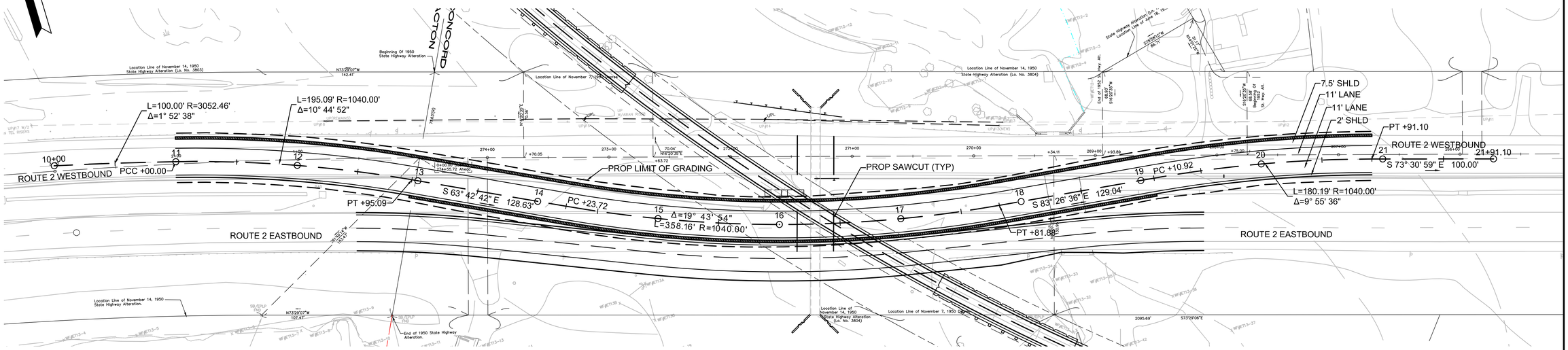
HOR. SCALE IN FEET
40 0 40 80
8 0 8 16
VER. SCALE IN FEET

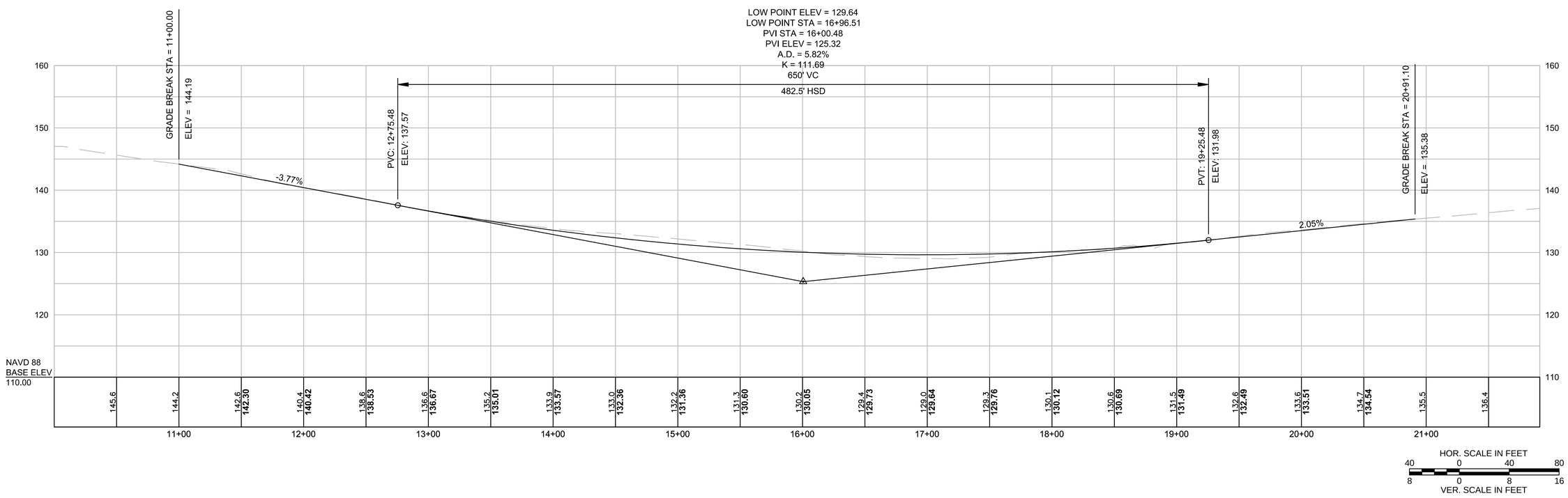
606223_HD8_(TTCP).DWG Plotted on 23-Feb-2016 1:49 PM

ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	24	44
PROJECT FILE NO.	606223		

TEMPORARY TRAFFIC CONTROL PLAN
STAGE 2
SHEET 2 OF 4



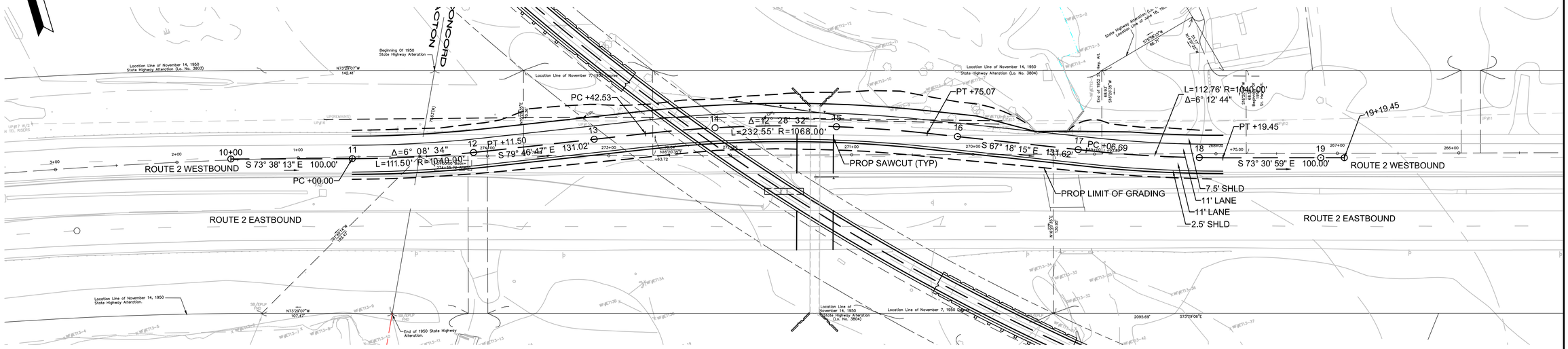


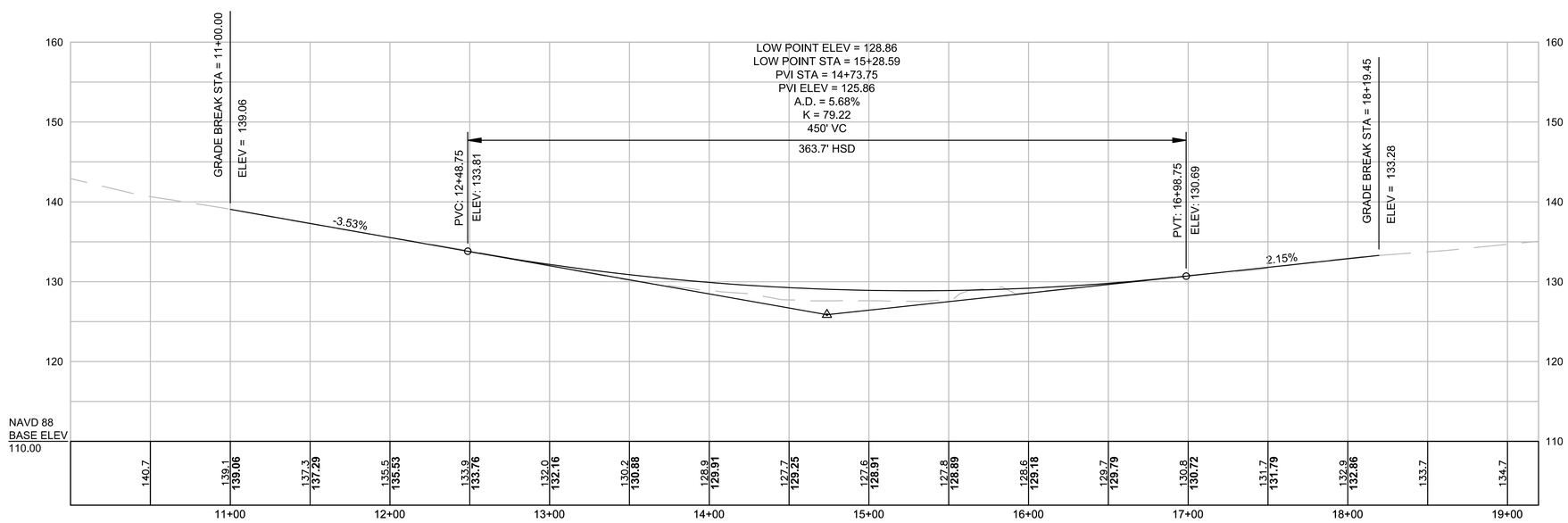
606223_HD9_(TTCP).DWG Plotted on 23-Feb-2016 1:49 PM

ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	25	44
PROJECT FILE NO.	606223		

TEMPORARY TRAFFIC CONTROL PLAN
STAGE 3
SHEET 3 OF 4





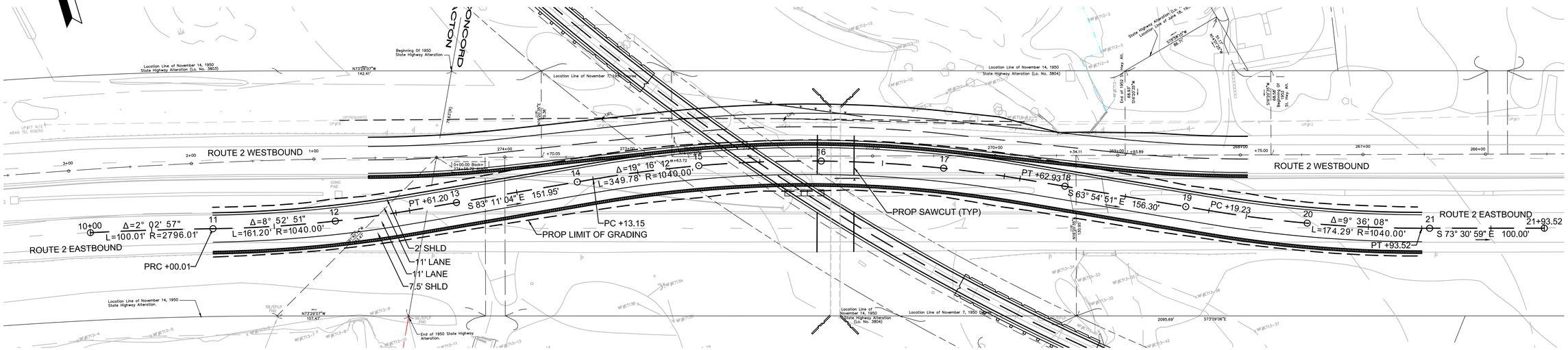
HOR. SCALE IN FEET
40 0 40 80
8 0 8 16
VER. SCALE IN FEET

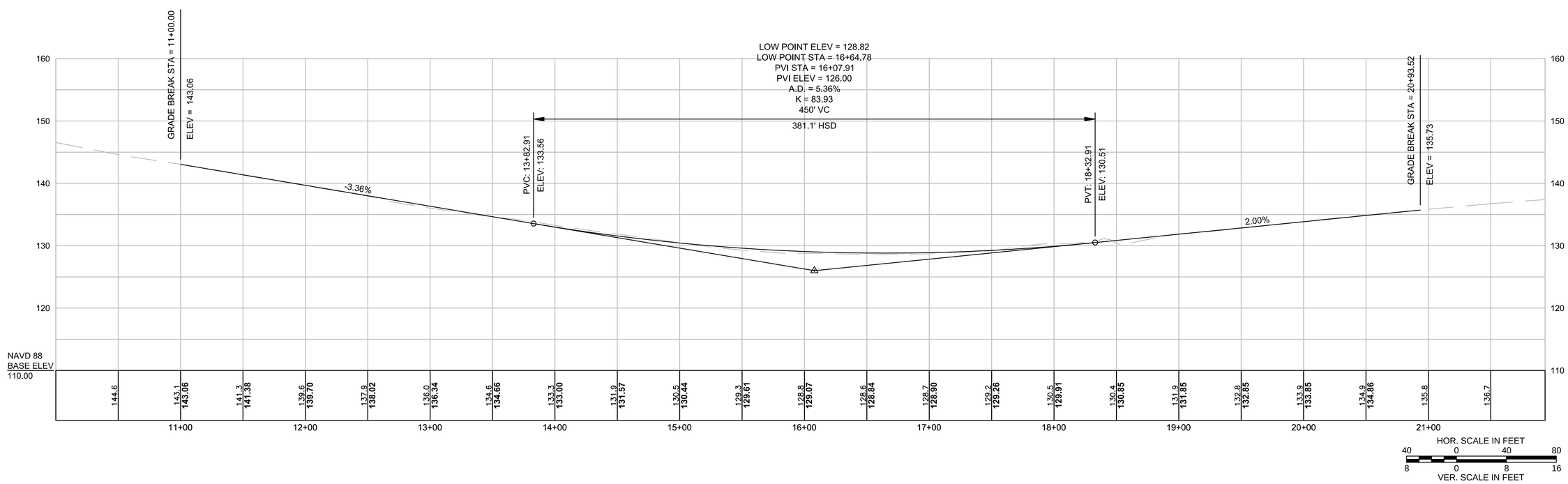
606223_HD8_(TTCP).DWG Plotted on 23-Feb-2016 1:50 PM

ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	26	44
PROJECT FILE NO.	606223		

TEMPORARY TRAFFIC CONTROL PLAN
STAGE 4
SHEET 4 OF 4



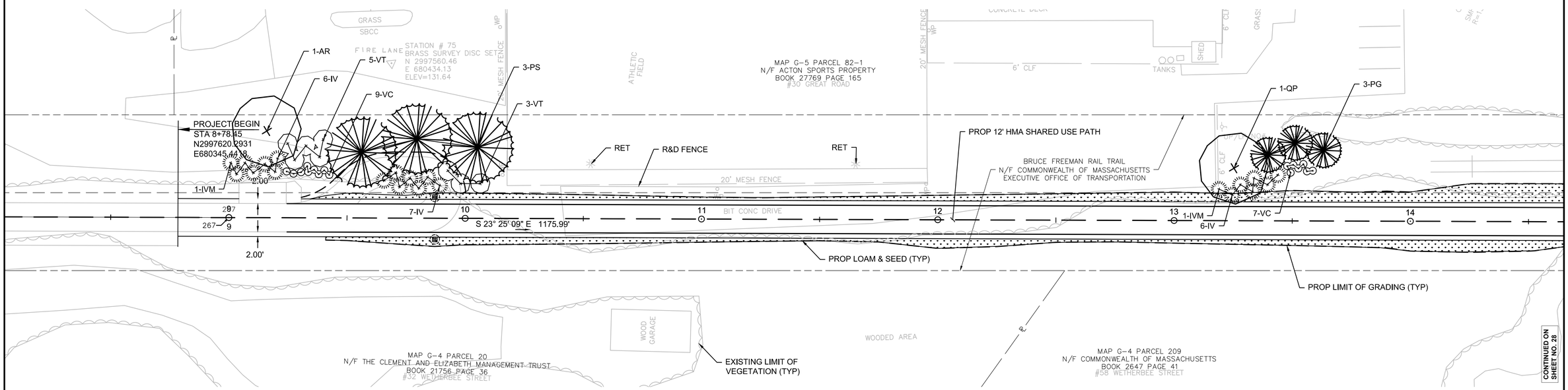


606223_HD8_(TTCP).DWG Plotted on 23-Feb-2016 1:50 PM

ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	27	44
PROJECT FILE NO.	606223		

LANDSCAPING PLANS & DETAILS



LEGEND

- PROPOSED SHRUBS
- PROPOSED TREES
- LOAM & SEED
- REM — REMOVE TREE/SHRUB
- RET — RETAIN TREE/SHRUB

PLANT SCHEDULE

NO.	KEY	BOTANICAL NAME	COMMON NAME	INSTALL SIZE	COMMENTS
EVERGREEN TREES					
3	PG	PICEA GLAUCA	WHITE SPRUCE	7-8 FT.	B&B
3	PS	PINUS STROBUS	WHITE PINE	10-12 FT.	B&B
SHADE TREES					
1	AR	ACER RUBRUM 'OCTOBER GLORY'	RED MAPLE	2-2.5 IN. CAL.	B&B
1	QP	QUERCUS PALUSTRIS	PIN OAK	2-2.5 IN. CAL.	B&B
SHRUBS					
19	IV	ILEX VERTICILLATA	WINTERBERRY	24-30 IN.	
2	IVM	ILEX VERTICILLATA	WINTERBERRY (MALE)	24-30 IN.	
16	VC	VACCINIUM ANGUSTIFOLIUM	LOWBUSH BLUEBERRY	6-9 IN.	
8	VT	VIBURNUM TRILOBUM	AMERICAN CRANBERRY VIBURNUM	3-4 FT.	

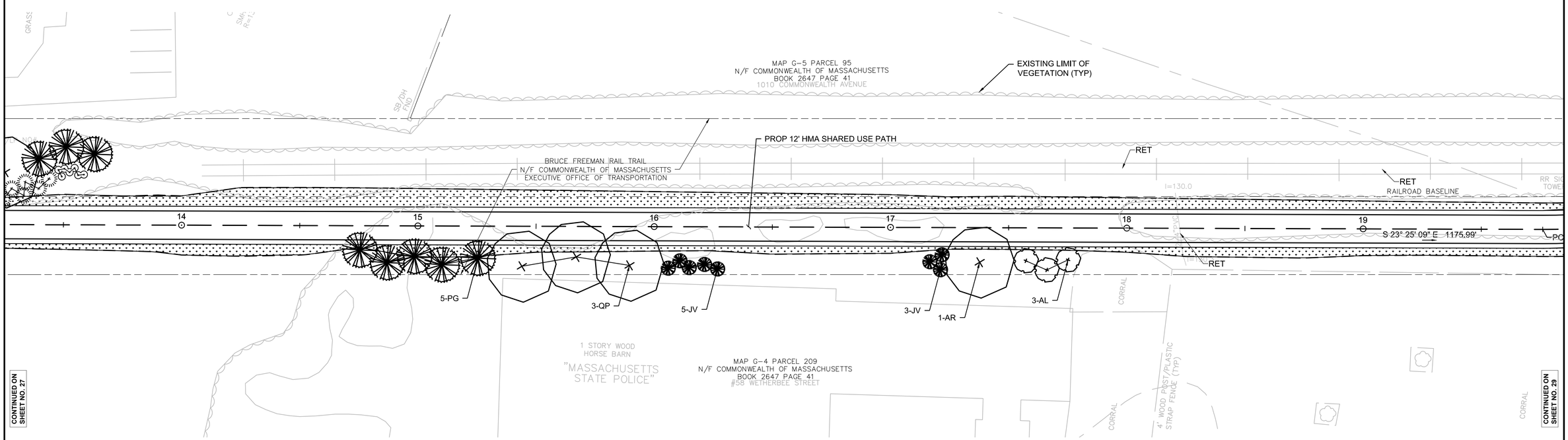
0 20 50 100
SCALE: 1" = 20'

606223_H09_(LANDSCAPING PLANS & DETAILS).DWG Plotted on 23-Feb-2016 12:07 PM

ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	28	44
PROJECT FILE NO.	606223		

LANDSCAPING PLANS & DETAILS



LEGEND

- PROPOSED SHRUBS
- PROPOSED TREES
- LOAM & SEED
- REM — REMOVE TREE/SHRUB
- RET — RETAIN TREE/SHRUB

PLANT SCHEDULE

NO.	KEY	BOTANICAL NAME	COMMON NAME	INSTALL SIZE	COMMENTS
EVERGREEN TREES					
8	JV	JUNIPERUS VIRGINIANA 'EMERALD SENTINEL'	RED CEDAR	5-6 FT.	B&B
5	PG	PICEA GLAUCA	WHITE SPRUCE	7-8 FT.	B&B
SHADE TREES					
1	AR	ACER RUBRUM 'OCTOBER GLORY'	RED MAPLE	2-2.5 IN. CAL	B&B
3	QP	QUERCUS PALUSTRIS	PIN OAK	2-2.5 IN. CAL.	B&B
ORNAMENTAL TREES					
3	AL	AMELANCHIER LAEVIS	ALLEGHENY SERVICEBERRY	8-10 FT. CLUMP	B&B

0 20 50 100

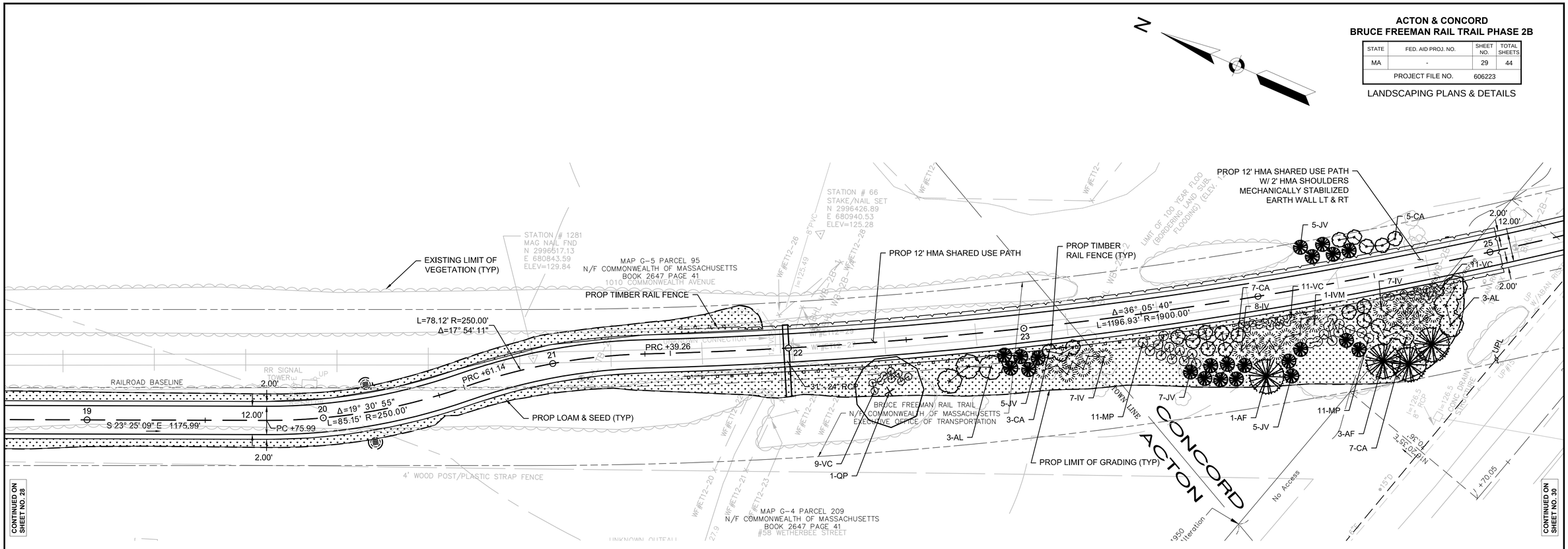
SCALE: 1" = 20'

606223_H09_(LANDSCAPING PLANS & DETAILS).DWG Plotted on 23-Feb-2016 12:08 PM

ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	29	44
PROJECT FILE NO.	606223		

LANDSCAPING PLANS & DETAILS



LEGEND

- PROPOSED SHRUBS
- PROPOSED TREES
- LOAM & SEED
- REM — REMOVE TREE/SHRUB
- RET — RETAIN TREE/SHRUB

PLANT SCHEDULE

NO.	KEY	BOTANICAL NAME	COMMON NAME	INSTALL SIZE	COMMENTS
EVERGREEN TREES					
4	AF	ABIES FRASERI	FRASER FIR	5-6 FT.	B&B
22	JV	JUNIPERUS VIRGINIANA 'EMERALD SENTINEL'	RED CEDAR	5-6 FT.	B&B
SHADE TREES					
1	QP	QUERCUS PALUSTRIS	PIN OAK	2-2.5 IN. CAL.	B&B
ORNAMENTAL TREES					
6	AL	AMELANCHIER LAEVIS	ALLEGHENY SERVICEBERRY	8-10 FT. CLUMP	B&B
SHRUBS					
22	CA	CLETHRA ALNIFOLIA	SUMMERSWEET	18-24 IN.	
22	IV	ILEX VERTICILLATA	WINTERBERRY	24-30 IN.	
1	IVM	ILEX VERTICILLATA	WINTERBERRY (MALE)	24-30 IN.	
22	MP	MYRICA PENSYLVANICA	BAYBERRY	2-3 FT.	
31	VC	VACCINIUM ANGUSTIFOLIUM	LOWBUSH BLUEBERRY	6-9 IN.	

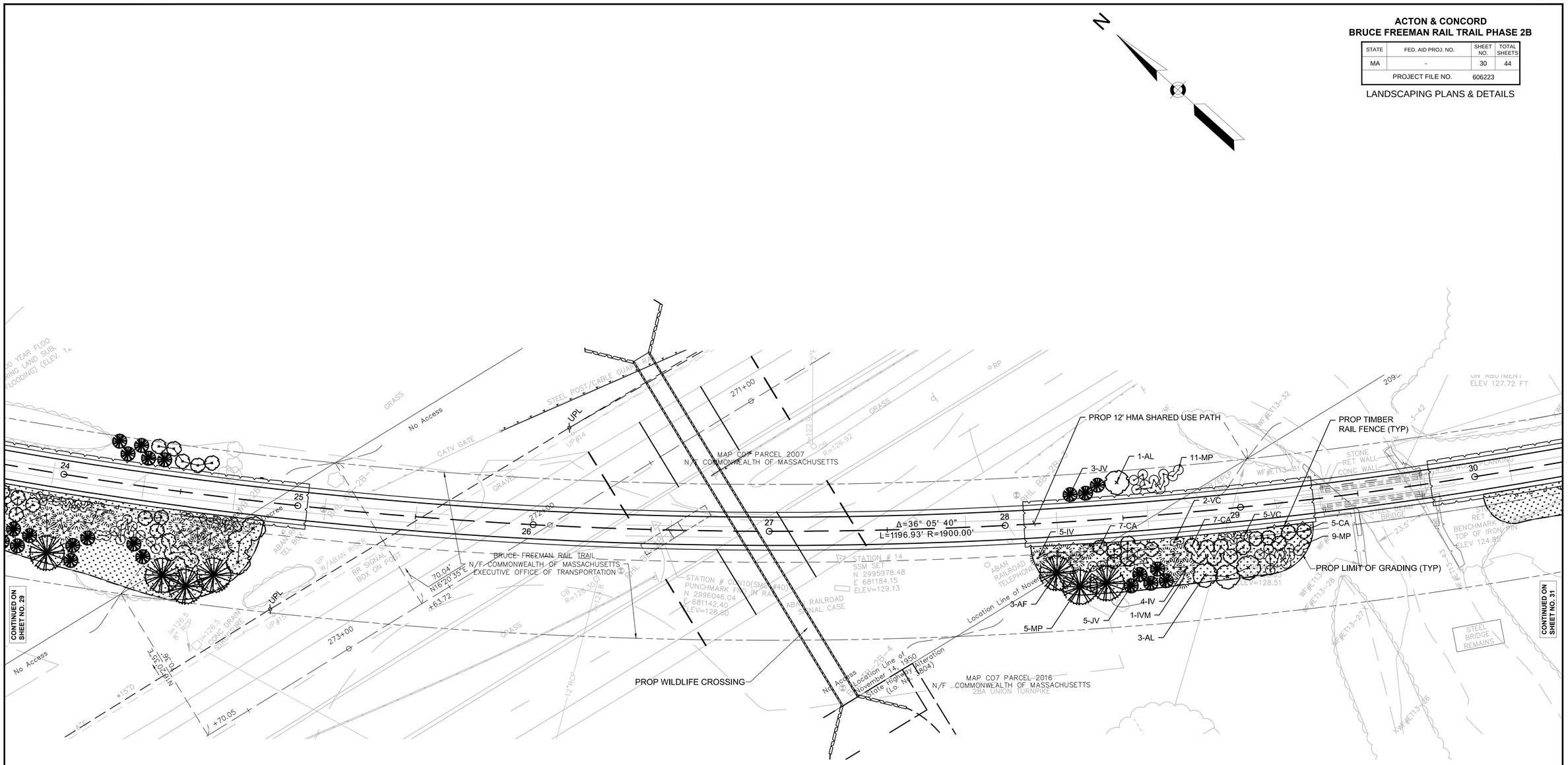
0 20 50 100
SCALE: 1" = 20'

606223_H09_(LANDSCAPING PLANS & DETAILS).DWG Plotted on 23-Feb-2016 12:08 PM

ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	30	44
PROJECT FILE NO.	606223		

LANDSCAPING PLANS & DETAILS



LEGEND

- PROPOSED SHRUBS
- PROPOSED TREES
- LOAM & SEED
- REM — REMOVE TREE/SHRUB
- RET — RETAIN TREE/SHRUB

PLANT SCHEDULE

NO.	KEY	BOTANICAL NAME	COMMON NAME	INSTALL SIZE	COMMENTS
EVERGREEN TREES					
3	AF	ABIES FRASERI	FRASER FIR	5-6 FT.	B&B
8	JV	JUNIPERUS VIRGINIANA 'EMERALD SENTINEL'	RED CEDAR	5-6 FT.	B&B
ORNAMENTAL TREES					
4	AL	AMELANCHIER LAEVIS	ALLEGHENY SERVICEBERRY	8-10 FT. CLUMP	B&B
SHRUBS					
19	CA	CLETHRA ALNIFOLIA	SUMMERSWEET	18-24 IN.	
9	IV	ILEX VERTICILLATA	WINTERBERRY	24-30 IN.	
1	IVM	ILEX VERTICILLATA	WINTERBERRY (MALE)	24-30 IN.	
25	MP	MYRICA PENSYLVANICA	BAYBERRY	2-3 FT.	
7	VC	VACCINIUM ANGUSTIFOLIUM	LOWBUSH BLUEBERRY	6-9 IN.	

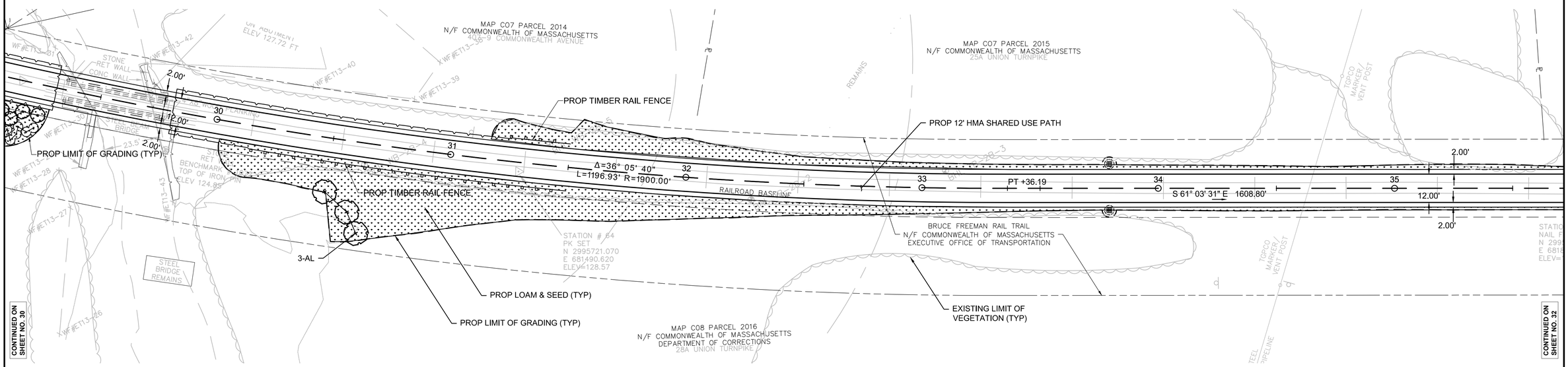
0 20 50 100
SCALE: 1" = 20'

606223_H09_(LANDSCAPING PLANS & DETAILS).DWG Plotted on 23-Feb-2016 12:08 PM

ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	31	44
PROJECT FILE NO.	606223		

LANDSCAPING PLANS & DETAILS



LEGEND

- PROPOSED SHRUBS
- PROPOSED TREES
- LOAM & SEED
- REM — REMOVE TREE/SHRUB
- RET — RETAIN TREE/SHRUB

PLANT SCHEDULE

ORNAMENTAL TREES

NO.	KEY	BOTANICAL NAME	COMMON NAME	INSTALL SIZE	COMMENTS
3	AL	AMELANCHIER LAEVIS	ALLEGHENY SERVICEBERRY	8-10 FT. CLUMP	B&B

0 20 50 100

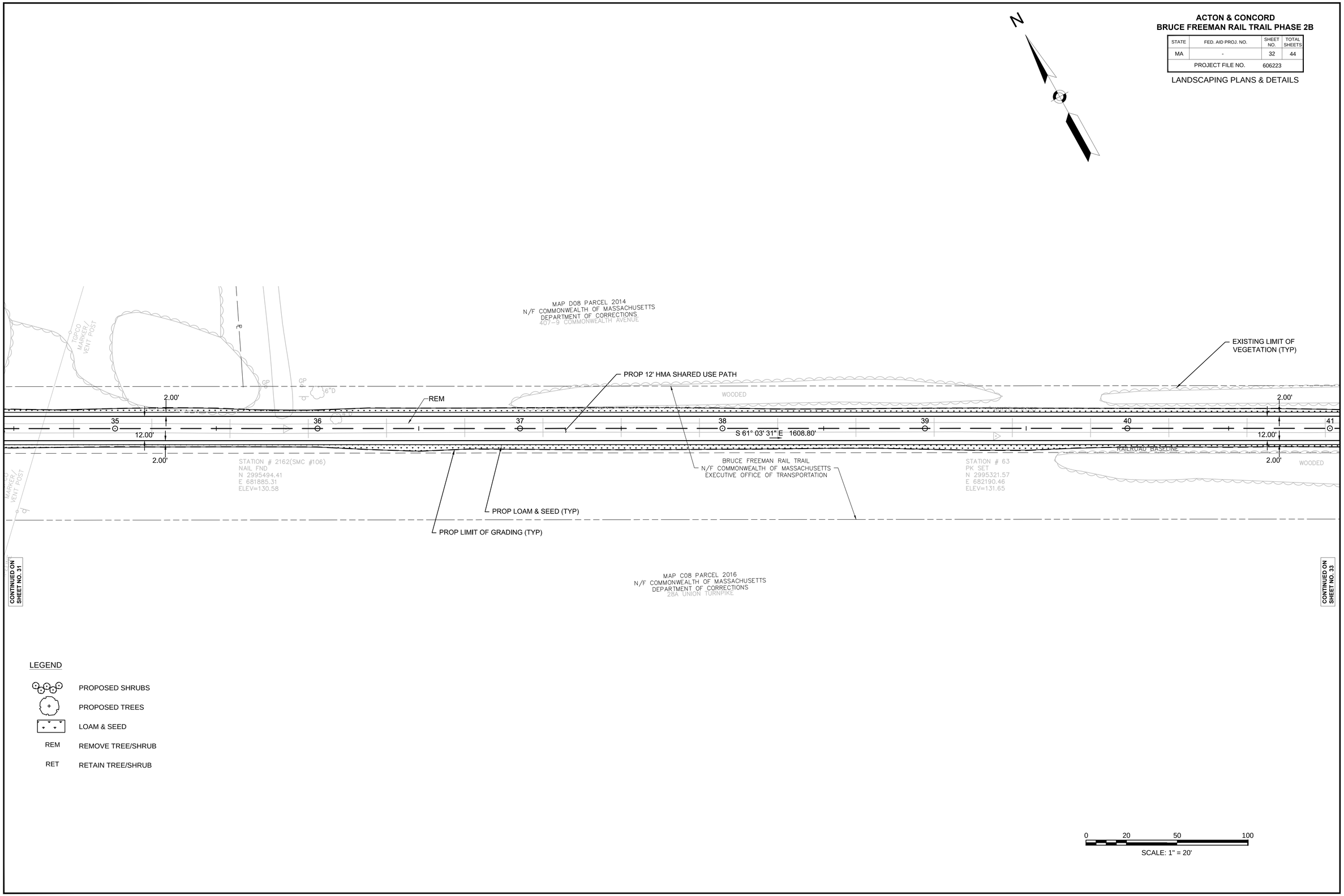
SCALE: 1" = 20'

606223_H09_(LANDSCAPING PLANS & DETAILS).DWG Plotted on 23-Feb-2016 12:08 PM

ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	32	44
PROJECT FILE NO.	606223		

LANDSCAPING PLANS & DETAILS



LEGEND

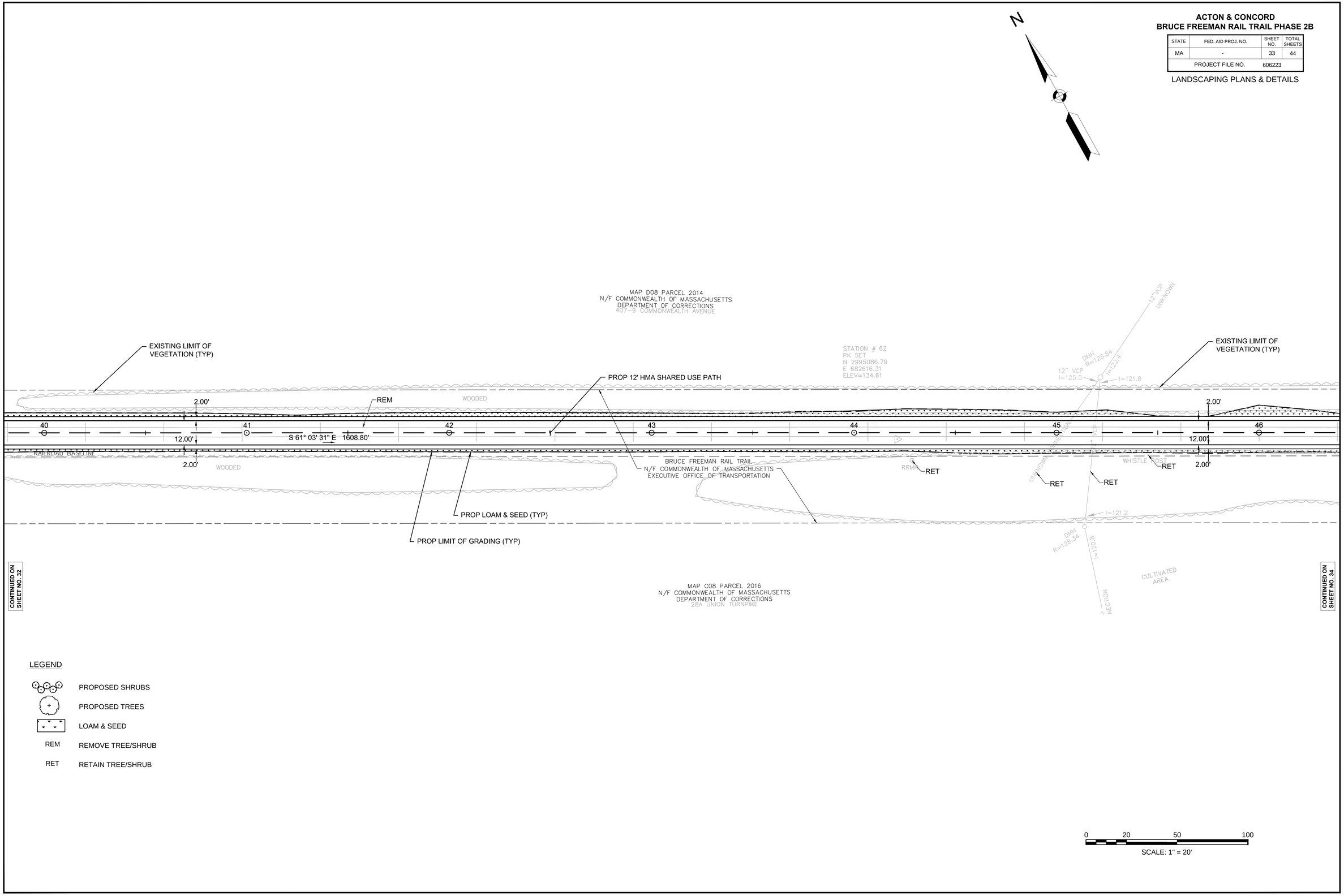
	PROPOSED SHRUBS
	PROPOSED TREES
	LOAM & SEED
REM	REMOVE TREE/SHRUB
RET	RETAIN TREE/SHRUB

606223_H09_(LANDSCAPING PLANS & DETAILS).DWG Plotted on 23-Feb-2016 12:08 PM

ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	33	44
PROJECT FILE NO.	606223		

LANDSCAPING PLANS & DETAILS



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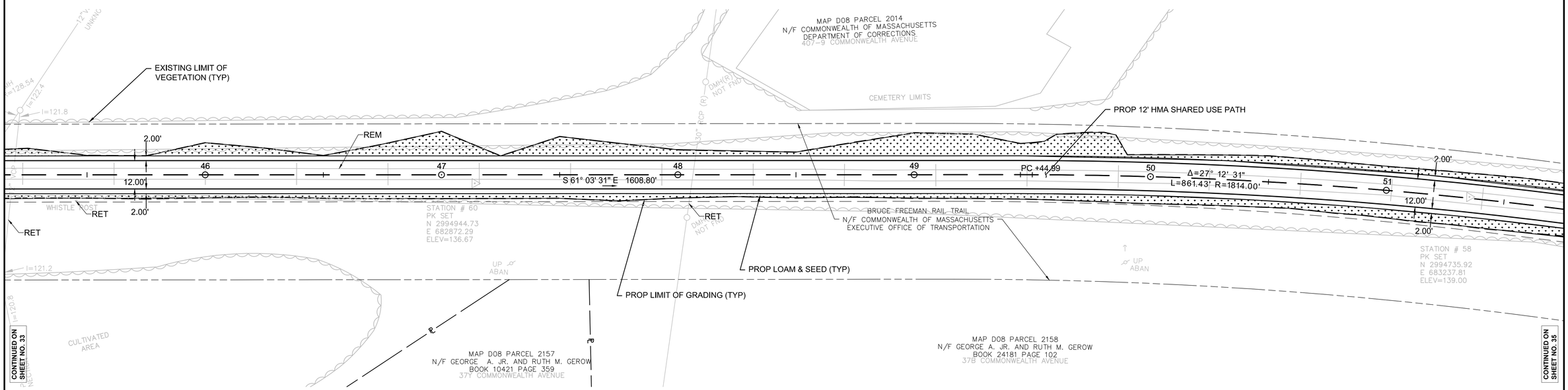
ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	34	44
PROJECT FILE NO.	606223		

LANDSCAPING PLANS & DETAILS



LEGEND

	PROPOSED SHRUBS
	PROPOSED TREES
	LOAM & SEED
REM	REMOVE TREE/SHRUB
RET	RETAIN TREE/SHRUB

0 20 50 100

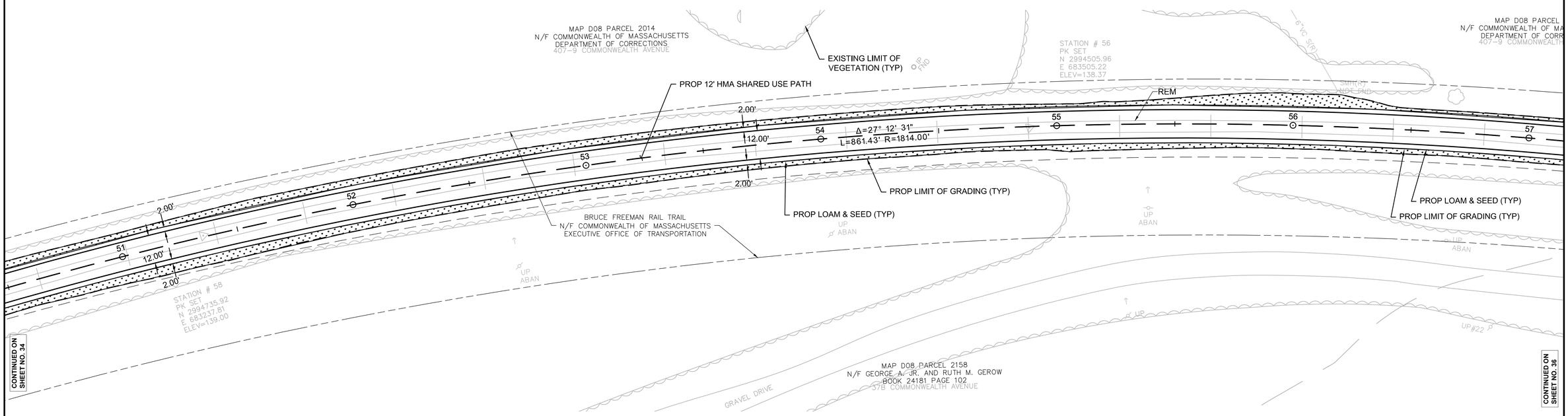
SCALE: 1" = 20'

606223_H09_(LANDSCAPING PLANS & DETAILS).DWG Plotted on 23-Feb-2016 12:09 PM

ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	35	44
PROJECT FILE NO.	606223		

LANDSCAPING PLANS & DETAILS



LEGEND

	PROPOSED SHRUBS
	PROPOSED TREES
	LOAM & SEED
REM	REMOVE TREE/SHRUB
RET	RETAIN TREE/SHRUB

0 20 50 100

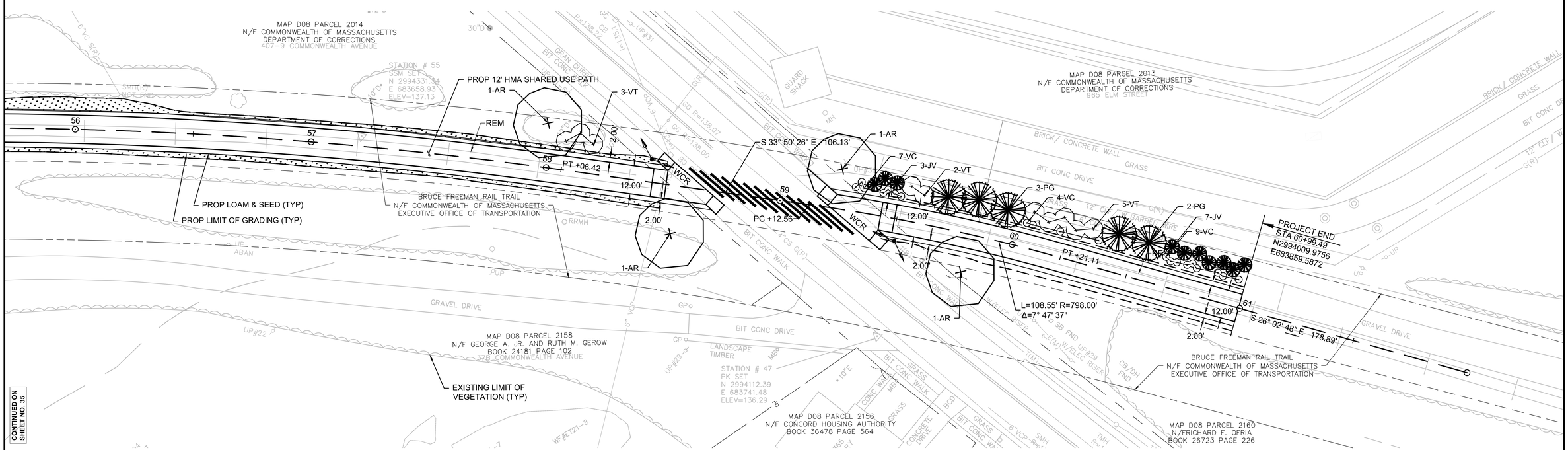
SCALE: 1" = 20'

606223_H09_(LANDSCAPING PLANS & DETAILS).DWG Plotted on 23-Feb-2016 12:09 PM

ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	36	44
PROJECT FILE NO.	606223		

LANDSCAPING PLANS & DETAILS



LEGEND

	PROPOSED SHRUBS
	PROPOSED TREES
	LOAM & SEED
REM	REMOVE TREE/SHRUB
RET	RETAIN TREE/SHRUB

PLANT SCHEDULE

NO.	KEY	BOTANICAL NAME	COMMON NAME	INSTALL SIZE	COMMENTS
EVERGREEN TREES					
10	JV	JUNIPERUS VIRGINIANA 'EMERALD SENTINEL'	RED CEDAR	5-6 FT.	B&B
5	PG	PICEA GLAUCA	WHITE SPRUCE	7-8 FT.	B&B
SHADE TREES					
4	AR	ACER RUBRUM 'OCTOBER GLORY'	RED MAPLE	2-2.5 IN. CAL.	B&B
SHRUBS					
20	VC	VACCINIUM ANGUSTIFOLIUM	LOWBUSH BLUEBERRY	6-9 IN.	
10	VT	VIBURNUM TRILOBUM	AMERICAN CRANBERRY VIBURNUM	3-4 FT.	

0 20 50 100
SCALE: 1" = 20'

606223_H09_(LANDSCAPING PLANS & DETAILS).DWG Plotted on 23-Feb-2016 12:09 PM

LEGEND

PROPOSED SHRUBS

PROPOSED TREES

LOAM & SEED

REM REMOVE TREE/SHRUB

RET RETAIN TREE/SHRUB

PLANT SCHEDULE

pg. 27	pg. 28	pg. 29	pg. 30	pg. 31	pg. 36	ITEM BID NUMBER	TOTAL QTY.	KEY	BOTANICAL NAME	COMMON NAME	INSTALL SIZE	COMMENTS
EVERGREEN TREES												
--	--	4	3	--	--	772.356	7	AF	ABIES FRASERI	FRASER FIR	5-6 FT.	B&B
--	8	22	8	--	10	772.336	48	JV	JUNIPERUS VIRGINIANA 'EMERALD SENTINEL'	RED CEDAR	5-6 FT.	B&B
3	5	--	--	--	5	774.642	13	PG	PICEA GLAUCA	WHITE SPRUCE	7-8 FT.	B&B
3	--	--	--	--	--	773.439	3	PS	PINUS STROBUS	WHITE PINE	10-12 FT.	B&B
SHADE TREES												
1	1	--	--	--	4	776.543	6	AR	ACER RUBRUM 'OCTOBER GLORY'	RED MAPLE	2-2.5 IN. CAL.	B&B
1	3	1	--	--	--	777.138	5	QP	QUERCUS PALUSTRIS	PIN OAK	2-2.5 IN. CAL.	B&B
ORNAMENTAL TREES												
--	3	6	4	3	--	783.041	16	AL	AMELANCHIER LAEVIS	ALLEGHENY SERVICEBERRY	8-10 FT. CLUMP	B&B
SHRUBS												
--	--	22	19	--	--	794.731	41	CA	CLETHRA ALNIFOLIA	SUMMERSWEET	18-24 IN.	
19	--	22	9	--	--	795.157	50	IV	ILEX VERTICILLATA	WINTERBERRY	24-30 IN.	
2	--	1	1	--	--	795.151	4	IVM	ILEX VERTICILLATA	WINTERBERRY (MALE)	24-30 IN.	
--	--	22	25	--	--	789.333	47	MP	MYRICA PENSYLVANICA	BAYBERRY	2-3 FT.	
16	--	31	7	--	20	789.669	74	VC	VACCINIUM ANGUSTIFOLIUM	LOWBUSH BLUEBERRY	6-9 IN.	
8	--	--	--	--	10	795.053	18	VT	VIBURNUM TRILOBUM	AMERICAN CRANBERRY VIBURNUM	3-4 FT..	

LANDSCAPE NOTES:

1. ALL DIMENSION LINES ARE EITHER PARALLEL OR PERPENDICULAR TO LINES FROM WHICH THEY ARE DRAWN UNLESS OTHERWISE INDICATED ON THE DRAWINGS.

2. BEFORE CONSTRUCTION BEGINS, SUBMITTALS MUST BE APPROVED, ALL LOCATIONS SHALL BE STAKED IN THE FIELD, MOCKUPS CONSTRUCTED AND VERIFIED BY THE CONTRACTOR AND REVIEWED BY THE ENGINEER. ADJUSTMENTS SHALL BE MADE AT NO ADDITIONAL COST TO THE DEPARTMENT.

3. REFER TO SPECIFICATIONS FOR MATERIALS AND INSTALLATION.

PLANTING NOTES:

1. ALL PLANT MATERIAL SHALL CONFORM TO THE GUIDELINES ESTABLISHED BY THE 'AMERICAN STANDARD FOR NURSERY STOCK' PUBLISHED BY AMERICAN ASSOCIATION OF NURSERYMEN, LATEST EDITION, OR AS INDICATED IN THE PLANT LIST, WHICH SHALL GOVERN.

2. ALL PLANT MATERIAL SHALL BE FIELD SELECTED IN NURSERIES BY THE ENGINEER AFTER PRELIMINARY TAGGING BY CONTRACTOR. ALL STOCK SHALL BE NURSERY GROWN.

3. ENGINEER SHALL REVIEW PLACEMENT OF PLANTS IN FIELD BEFORE INSTALLATION AFTER STAKING IN FIELD BY CONTRACTOR ACCORDING TO PLANTING PLANS AND SITE DETAILS. THE CONTRACTOR SHALL INFORM THE ENGINEER IMMEDIATELY OF ANY CONFLICTS BETWEEN PROPOSED PLANT LOCATIONS AND BELOW GRADE UTILITIES, STRUCTURES, DRAINAGE PROBLEMS, OR ANY OTHER PLANTING CONFLICT ENCOUNTERED OR ANTICIPATED AND REVIEWED WITH THE ENGINEER BEFORE CONSTRUCTION COMMENCES.

4. THE CONTRACTOR SHALL SUPPLY ALL PLANT MATERIALS IN SIZES AND QUANTITIES SUFFICIENT TO COMPLETE THE PLANTING SHOWN ON THE DRAWINGS. THE NUMBERS OF PLANTS GIVEN IN MASSINGS AND ON THE PLANT LIST IS APPROXIMATE AND CONTRACTOR SHALL PLANT SHRUBS AND TREES AT INDICATED SPACING AS INDICATED ON THE PLANS. THE ENGINEER HAS THE RIGHT TO REJECT INJURED, DISEASED, DESICCATED, OR INCORRECT SPECIES AT ANY TIME.

5. ALL PLANTS THAT ARE DELIVERED TO THE SITE AND NOT PLANTED IMMEDIATELY SHALL BE STORED AND WATERED PROPERLY, ACCORDING TO THE SPECIFICATIONS, IN SECURE LOCATIONS REVIEWED BY THE ENGINEER. ALL PLANTS SHALL HAVE ONE YEAR GUARANTEE.

6. ALL NEW AND EXISTING PLANT MATERIAL WITHIN THE LANDSCAPE LIMIT OF WORK LINE SHALL BE PRUNED AFTER PLANTING TO REMOVE ALL DEAD OR DAMAGED BRANCHES. TREE WOUND DRESSING SHALL NOT BE USED ON ANY PLANTINGS. ALL NEW PLANTINGS SHALL BE WATERED FROM DELIVERY UNTIL THE END OF THE GUARANTEE PERIOD.

7. ALL PLANTS SHALL BEAR THE SAME RELATION TO FINISHED GRADE AS TO ORIGINAL GRADE BEFORE DIGGING, UNLESS OTHERWISE DETAILED, AND SHALL HAVE A MULCHED SAUCER ACCORDING TO THE DETAILS. PLANT PITS SHALL DRAIN, OR REMEDIAL UNDER-DRAINAGE SHALL BE INSTALLED TO DRAIN OUTLETS.

8. ALL PAPER OR PLASTIC CONTAINERS, WIRE BASKETS, TWINE, AND PLASTIC OR IRON FASTENERS AND ROPE SHALL BE REMOVED FROM PLANTS BEFORE SETTING IN PLANT PIT. TURN DOWN BURLAP TWO-THIRDS.

9. EXISTING TOPSOILS SHALL BE UTILIZED FOR LOAM, OR PLANTING SOIL MIXTURES, ONLY IF TESTING INDICATES TOTAL CONFORMITY TO SPECIFICATIONS FOR LOAM BORROW. ALL GRASS, SOD, ROOTS, AND STONES OVER TWO-INCH DIAMETER SHALL BE REMOVED AND LEGALLY DISPOSED OF.

10. SHRUBS SHALL BE INSTALLED AND MAINTAINED 10' CLEAR FROM ALL HYDRANTS AND STANDPIPES TO ENSURE THEIR VISIBILITY AT ALL TIMES.

11. PLANT SPACING SHALL BE AS INDICATED ON THE DRAWINGS OR IN THE PLANT LIST. MULCH WITH 2" DEPTH SHREDDED PINE BARK TO LIMITS OF BED IN LOCATION SHOWN ON SEEDING PLANS.

12. REFER TO SHEET 38 FOR TREE PROTECTION DETAIL. TREE PROTECTION FENCING SHALL BE INSTALLED BEFORE CONSTRUCTION VEHICLES ACCESS OR CONSTRUCTION OCCURS WITHIN 25' OF ANY EXISTING TREE TO REMAIN. FENCING SHALL BE INSTALLED AT TREE DRIPLINE OR EDGE OF ADJACENT PAVING AND IN ACCORDING TO CIVIL PLANS AND WITH REVIEW OF ENGINEER. REMOVAL SHALL BE AT COMPLETION OF CONSTRUCTION IN THE VICINITY.

LOAM & GRADING NOTES:

1. ANY DISCREPANCIES OR CONFLICTS ARISING BETWEEN EXISTING CONDITIONS AND THE GRADING PLANS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER BEFORE PROCEEDING.

2. GRADE STAKES SHOWING DEPTH OF LOAM SHALL BE REVIEWED BY ENGINEER IN FIELD BEFORE FINAL GRADING CAN COMMENCE.

3. ALL NEW ON-GRADE PLANTINGS AND RAISED MEDIAN PLANTING AREAS SHALL HAVE MODIFIED LOAM (PLANTING SOIL), INSTALLED AT A DEPTH AS INDICATED ON THE DRAWINGS AND SPECIFICATIONS. ALL SEEDED AREAS SHALL HAVE FOUR INCH DEPTH MODIFIED LOAM. LOAM BORROW SHALL BE REQUIRED TO BE TESTED FOR CONFORMANCE WITH SPECIFICATIONS BEFORE DELIVERY OF PRODUCT FOR SPREADING. SOIL MAY NOT BE WORKED IN A WET OR FROZEN STATE OR LOAM BORROW MAY BE REJECTED BY THE ENGINEER.

4. AREAS WHERE PLANTING OR SEEDING OCCURS ON EXISTING GRADES AREAS SHALL BE CLEARED, DISCED AND/OR FILLED AND SOIL AMENDED TO MEET THE RANGES AND MINIMUM REQUIREMENTS FOR MODIFIED LOAM BORROW. IF EXISTING SOIL CANNOT BE AMENDED TO MEET SPECIFICATIONS, IT SHALL BE EXCAVATED AND REPLACED WITH APPROVED LOAM BORROW.

5. ALL EXISTING OR PROPOSED INLET COVERS, GRATES, ETC. SHALL BE SET AND ADJUSTED BY THE CONTRACTOR TO BE FLUSH WITH THE FINISHED GRADE AT NO EXTRA COST TO THE DEPARTMENT.

6. THE CONTRACTOR'S WORK SHALL BE SCHEDULED TO ALLOW THE FINISHED SUBGRADE ELEVATIONS TO DRAIN PROPERLY WITHOUT PUDDLING. PROVIDE TEMPORARY POSITIVE DRAINAGE AS REQUIRED.

7. THE PROPOSED SITE PAVEMENTS, SURFACINGS, AND PLANTED AREAS SHALL BE PITCHED IN THE DIRECTIONS SHOWN ON THE DRAWINGS. IF NOT OTHERWISE SHOWN, PROPOSED PAVEMENT AREAS SHALL BE PITCHED A MINIMUM OF ONE PERCENT IN THE DIRECTION SHOWN ON THE DRAWINGS, AND PROPOSED SEEDED AND PLANTED AREAS SHALL BE PITCHED IN A MINIMUM OF ONE PERCENT TOWARD A DRAIN INLET OR BASIN.

8. CONTRACTOR SHALL MEET EXISTING GRADES IN A SMOOTH MANNER, WITHOUT DISTURBING DRAINAGE CONDITIONS, AND SHALL PROTECT EXISTING VEGETATION AND PROTECTIVE FENCING. THE CONTRACTOR SHALL REQUEST THAT THE ENGINEER REVIEW THE FINISHED GRADES BEFORE PLANTING AND SEEDING BEGIN.

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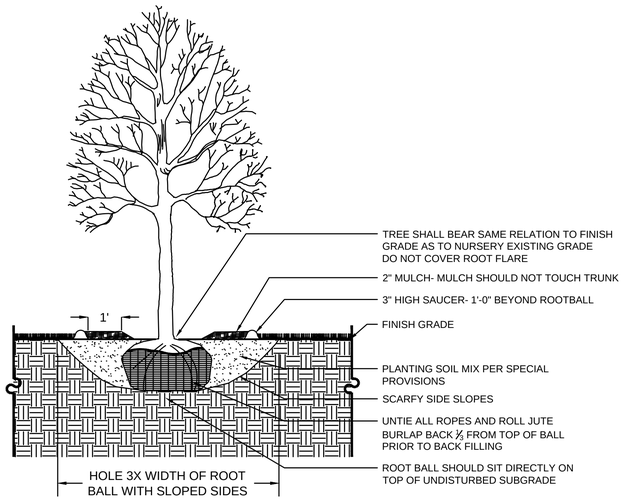
ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	38	44
PROJECT FILE NO.	606223		

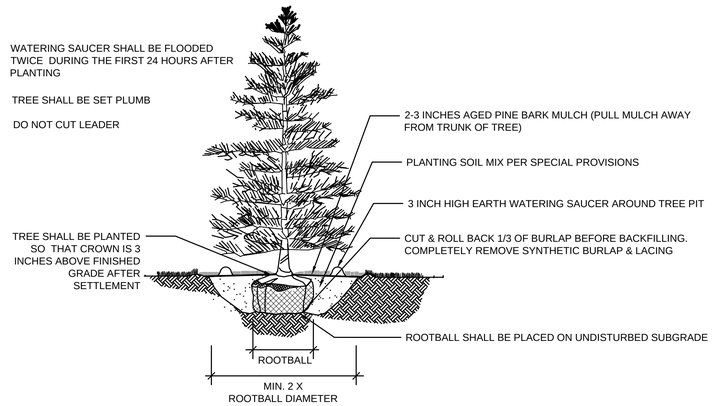
LANDSCAPING PLANS & DETAILS



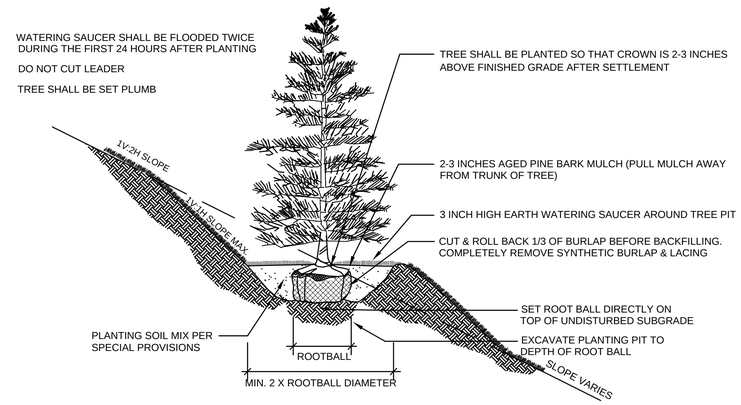
NOTE:

PLANT MATERIAL SHALL NOT BE BROUGHT TO THE SITE IN WIRE BASKETS OR IN POLY-BURLAP

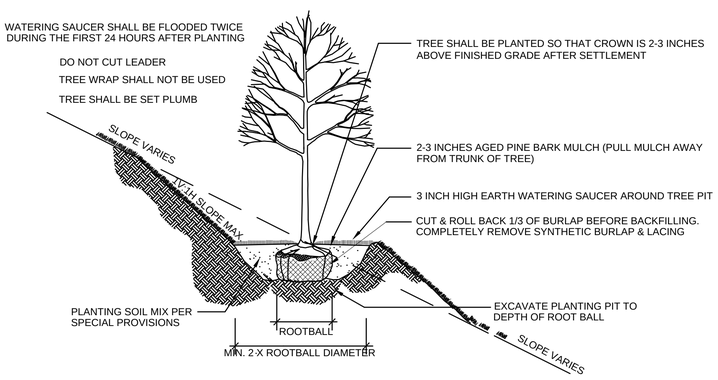
1 DECIDUOUS TREE PLANTING
NOT TO SCALE



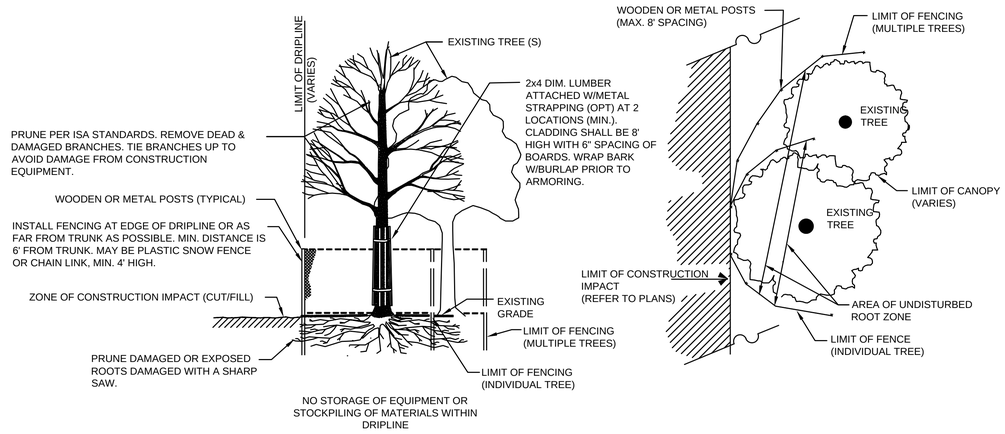
2 EVERGREEN TREE PLANTING
NOT TO SCALE



3 EVERGREEN TREE PLANTING (SLOPE)
NOT TO SCALE



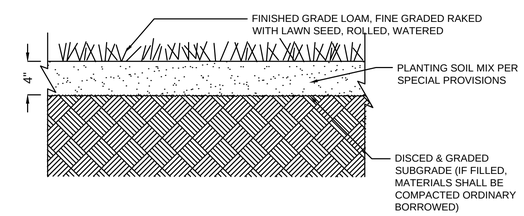
4 DECIDUOUS TREE PLANTING (SLOPE)
NOT TO SCALE



5 TEMPORARY TREE PROTECTION FENCING
NOT TO SCALE

NOTE:

AFTER COMPLETION & REVIEW BY ENGINEER, PROTECTIVE FENCING REVIEWED FOR THIS PURPOSE SHALL BE INSTALLED AT PERIMETER OF ALL LAWN AREAS UNTIL ACCEPTANCE OF LAWNS.



6 LOAM & SEED
NOT TO SCALE

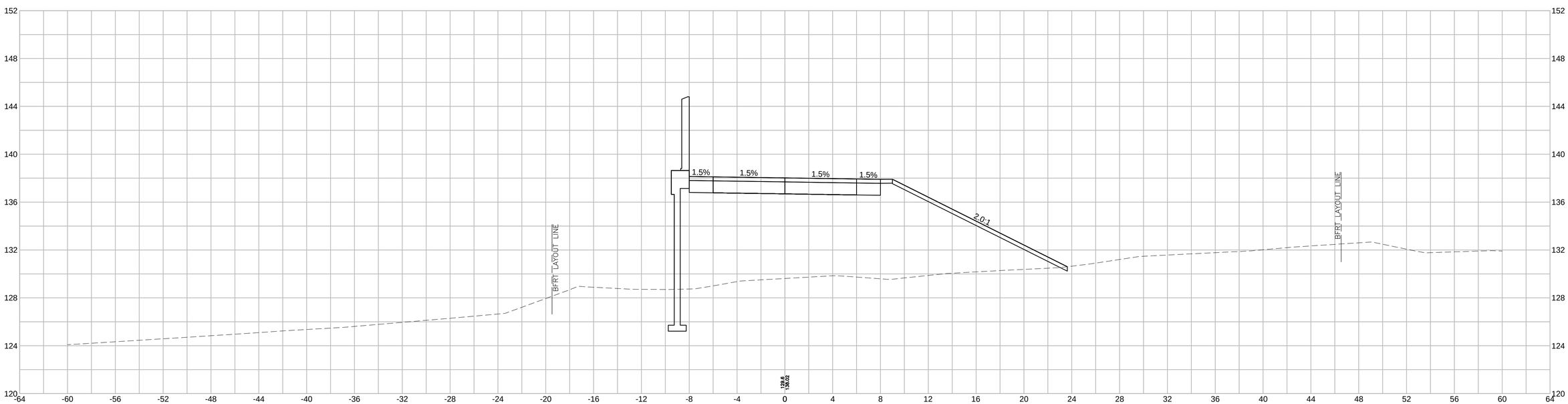
606223_HD9_(LANDSCAPING PLANS & DETAILS).DWG Plotted on 23-Feb-2016 12:09 PM

ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

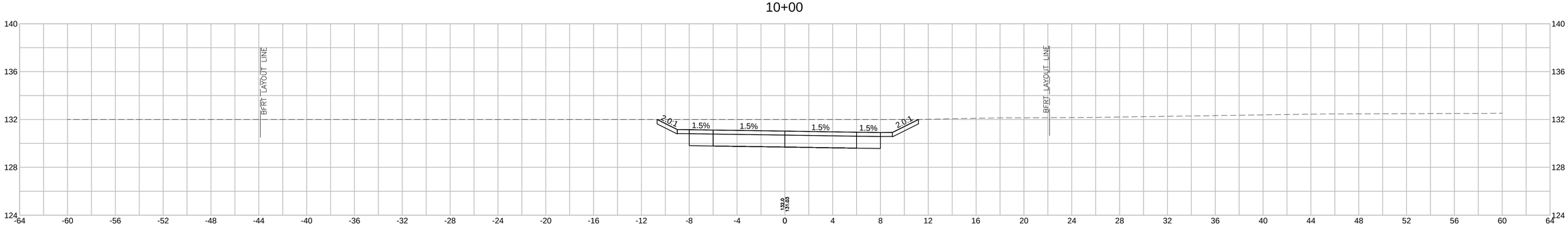
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	39	44
PROJECT FILE NO.	606223		

CRITICAL SECTIONS

22+50



10+00



HOR. SCALE IN FEET
20 0 20 40
4 0 4 8
VER. SCALE IN FEET

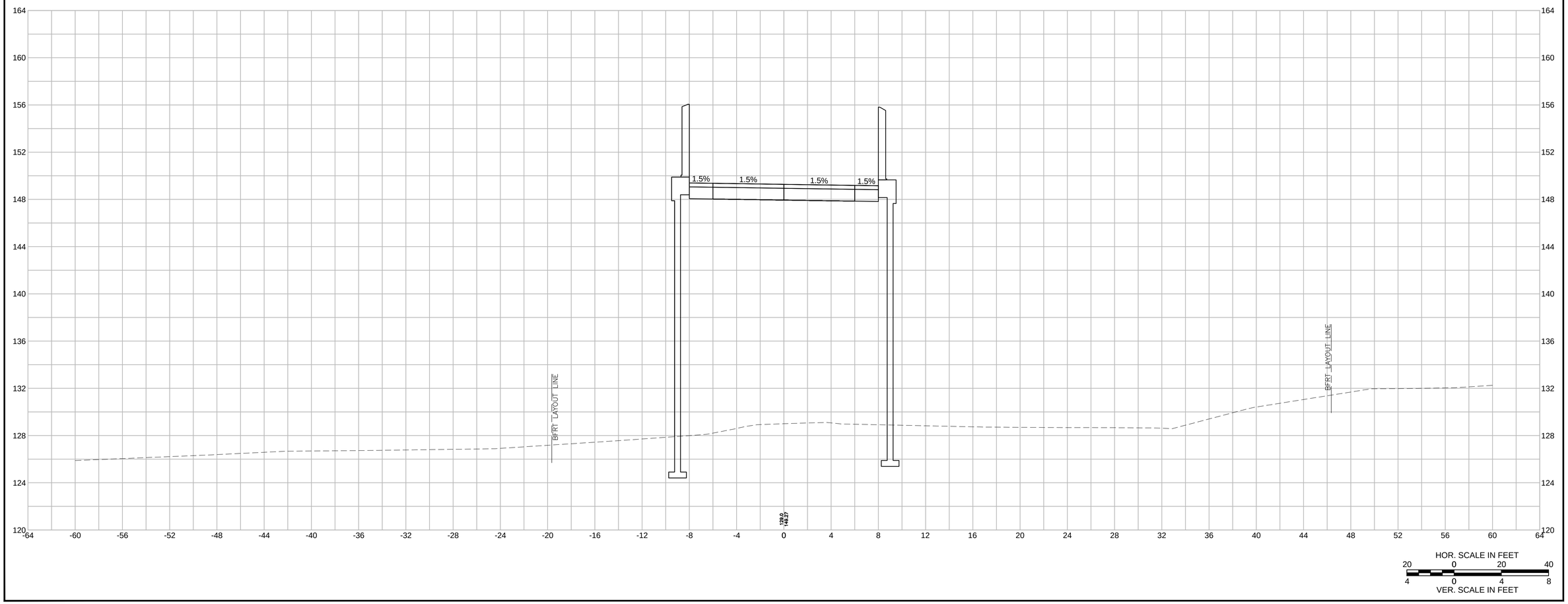
606223_HD10_(CRITICAL SECTIONS).DWG Plotted on 23-Feb-2016 12:12 PM

ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	40	44
PROJECT FILE NO.	606223		

CRITICAL SECTIONS

25+00



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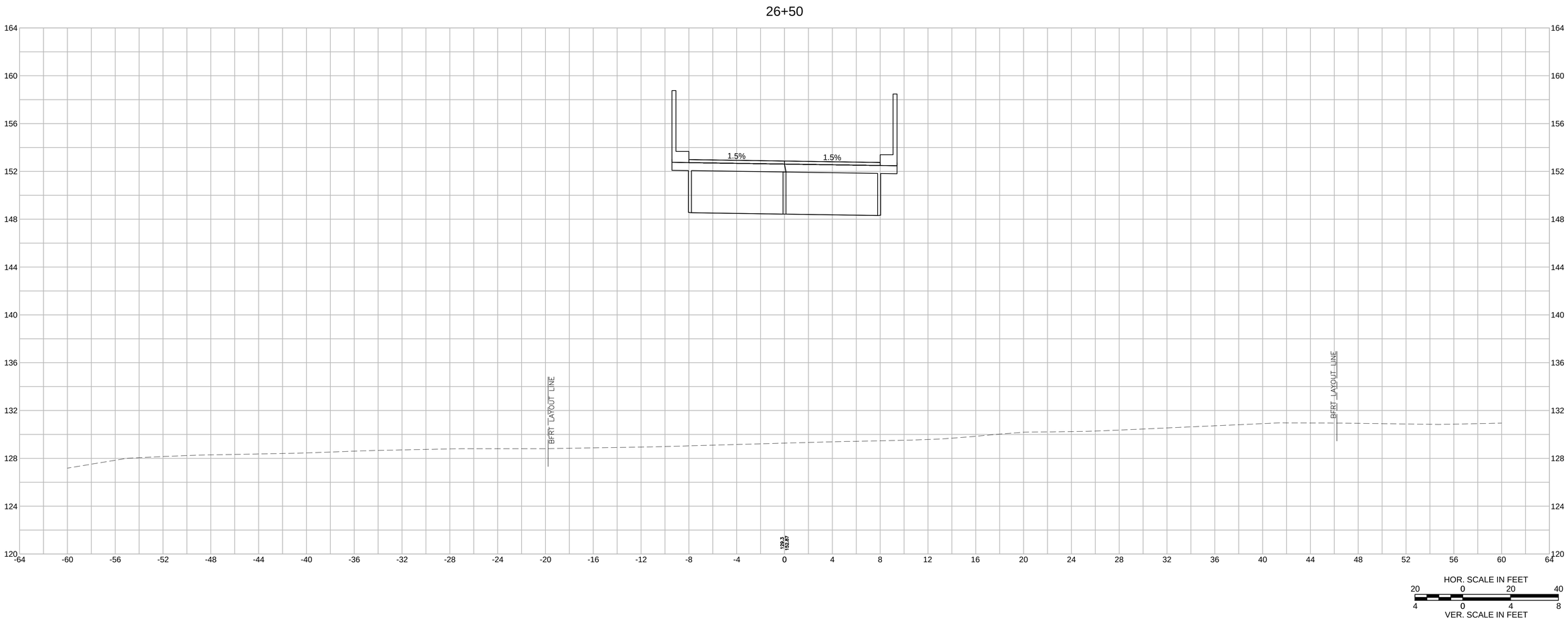
ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	41	44
PROJECT FILE NO.	606223		

CRITICAL SECTIONS



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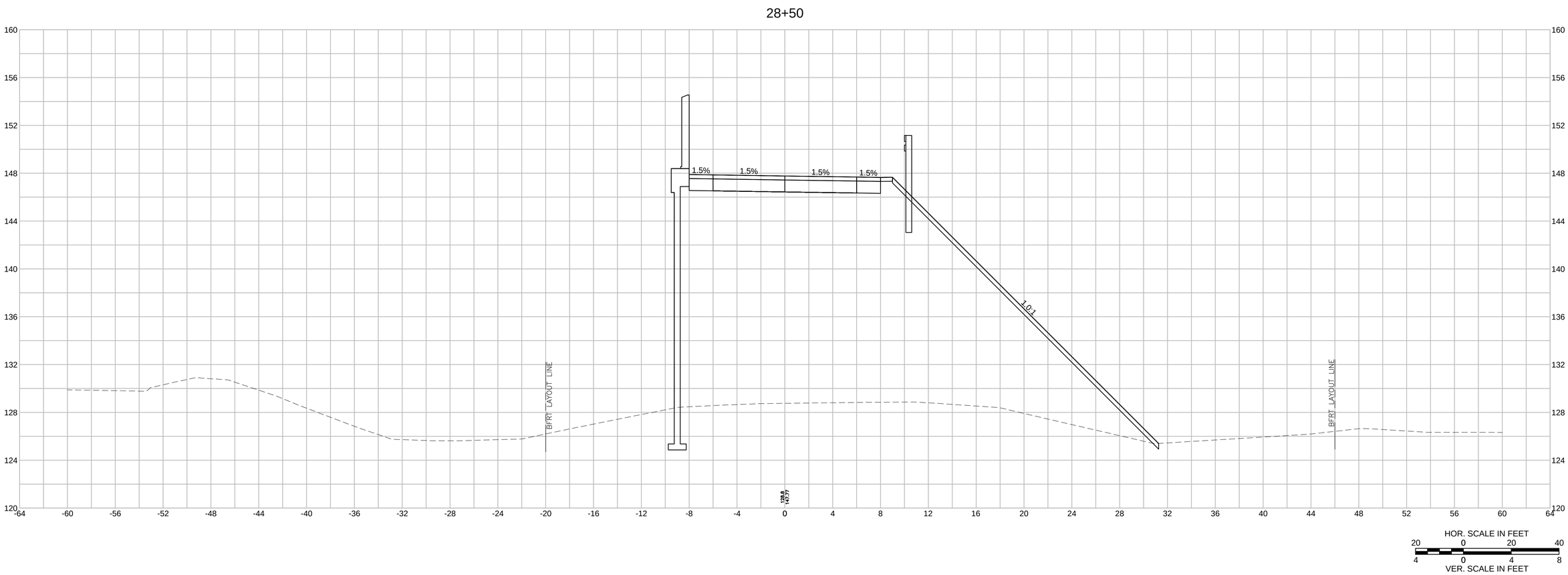
ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	42	44
PROJECT FILE NO.	606223		

CRITICAL SECTIONS



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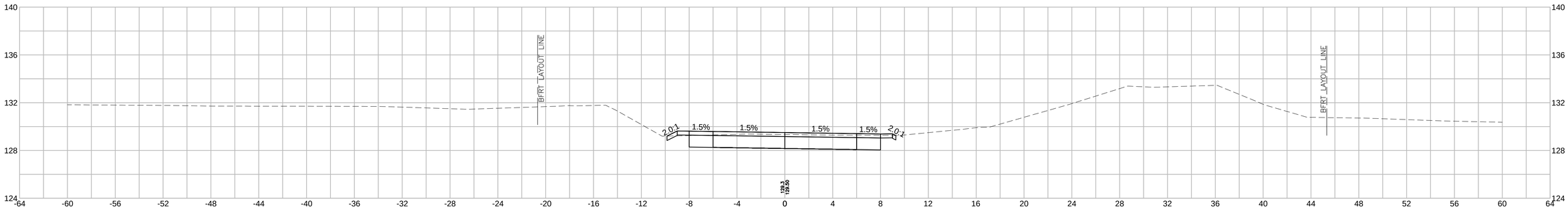
ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

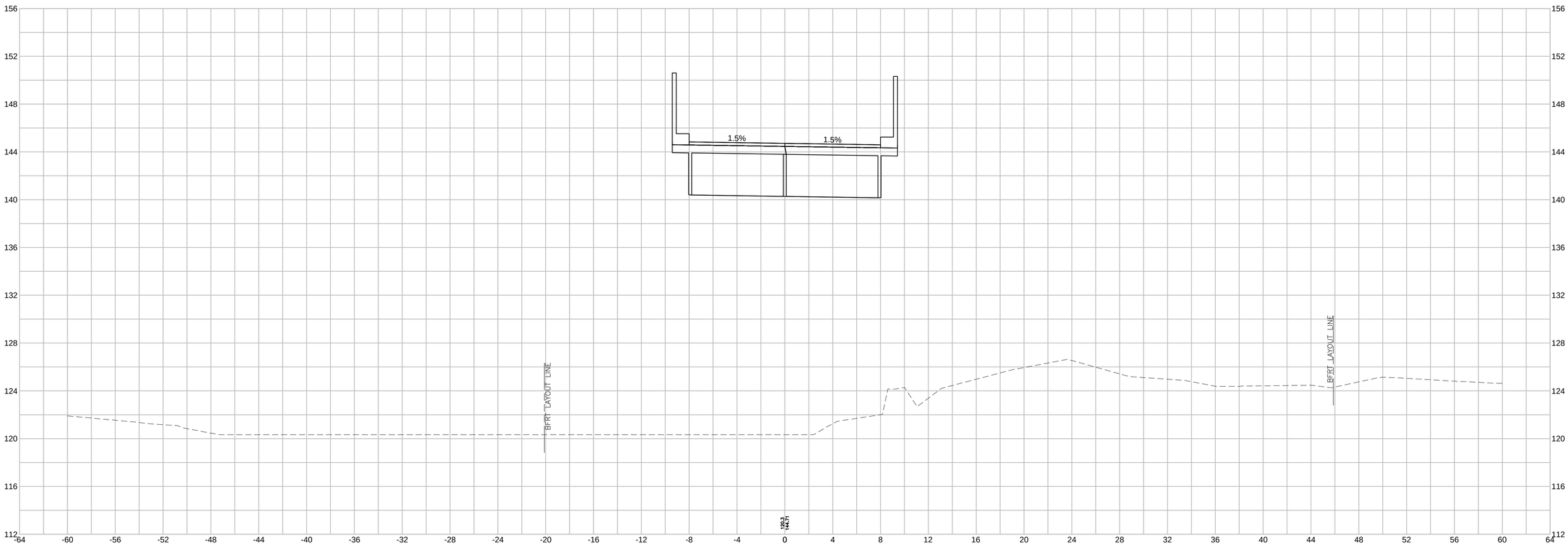
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	43	44
PROJECT FILE NO.	606223		

CRITICAL SECTIONS

34+00



29+50



HOR. SCALE IN FEET
20 0 20 40
4 0 4 8
VER. SCALE IN FEET

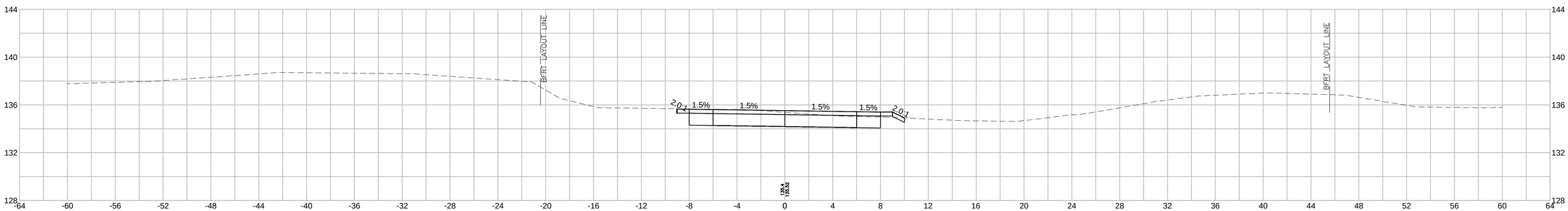
606223_HD10_(CRITICAL SECTIONS).DWG Plotted on 23-Feb-2016 12:13 PM

ACTON & CONCORD
BRUCE FREEMAN RAIL TRAIL PHASE 2B

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	44	44
PROJECT FILE NO.	606223		

CRITICAL SECTIONS

60+50



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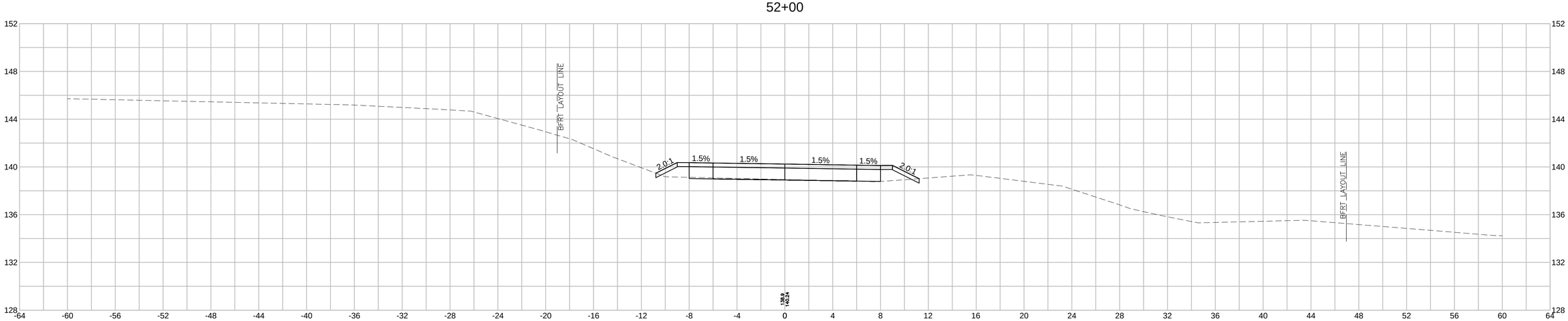

HOR. SCALE IN FEET
20 0 20 40
4 0 4 8
VER. SCALE IN FEET

606223_HD10_(CRITICAL SECTIONS).DWG Plotted on 23-Feb-2016 12:13 PM